Executive Summary

Faridpur Sadar Upazila is the prominent Upazila under Faridpur District in respect of area, population and high potential for agriculture production. It has productive plain land, char land agriculture, housing, forestry, water bodies, capture and culture fisheries etc. Faridpur Sadar Upazila consists of erosion prone char land and mixed use with agriculture and semi urban and commercial activities. This Upazila is susceptible to natural and human induced disasters like flood, drought, river erosion, water pollution, deforestation, loss of fertile agricultural land, unplanned growth of brick fields and housing in agricultural land. The study is to determine the present scenario of agriculture practices and assessment of the potential sustainable future development of the sector. Both the primary and secondary data were reviewed for preparing the survey report. The project entitled "**Preparation of Development Plan for Fourteen Upazilas**", Package-03 is expected to contribute to achieving the objectives of the National Agriculture Policy.

The landscape is complex and seasonally flooded. The AEZ of the Upazila has been identified as (a) Active Ganges River Floodplain (AEZ-10) and (b) Low Ganges River Floodplain (AEZ-12) which is mainly typical meander floodplain landscape of broad ridges and basins. The Upazila consists of 11 unions, and 01 Paurashava, 164 mauzas, 34 agriculture blocks and 363 villages. There are many famous places of interest in the Upazila. There are six types of land zoning identified for Faridpur Sadar Upazila. These are: (1) Agriculture Zone, (2) Agriculture –Historical Place Zone (Poet Jashimuddin), (3) Mixed Use Zone (Agriculture-Semi Urban and Commercial), (4) Agriculture-Farm Land Forest Zone, (5) Agriculture- Erosion Prone Char Land Zone and (6) Paurashava.

The highest percentage is double cropped area (58%) followed by triple cropped area (37%) and single crop area (5%) under Faridpur Sadar Upazila. The cropping intensity of Faridpur Sadar Upazila is 232% which is higher than average Faridpur District cropping intensities (227%) and also higher than average National Cropping Intensities (192%).

The scenario of present cropping pattern under Faridpur Sadar Upazila is predominantly Boro (HYV/Hybrid), Aus & T. Aman (HYV/LV) Rice, Jute, potato, Wheat, Maize, Vegetables, Onion/Garlic Oilseeds, Pulses, Spices, Sugarcane, Groundnut, Chili, vegetables and orchard etc. Study finding shows that 19 different cropping pattern are practiced by Faridpur Sadar Upazila farmers. Faridpur Sadar Upazila present five main cropping pattern are:

Pulses/oilseeds/Spices→Jute→T.Aman (HYV) (16.06%), Onion/Garlic→Fallow→T.Aman (15.45%), Wheat→Jute→T.Aman (12.20%), Wheat→Jute→fallow(10.37%), and Boro (HYV/Hybrid)→Fallow→T. Aman (8.13%). Both winter and summer vegetables cropping pattern covering about 5% of the NET Cultivable Area. Faridpur Sadar Upazila soil and climate are suitable for diversified crop production.

The present total diversified cropped area is 42749 ha of which rice cropped area are 16415 ha and the rest 26334 ha is covered by non-rice crops (Jute, Potato, W & S. vegetables, pulses, and oilseeds and Fruits etc). The rice and non-rice cropped area are about 38% and 62% respectively of the total cropped area. The highest land area was used for T. Aman (HYV) rice, Pulses, Wheat and Spices cultivation. Total crop production is 212754.95 metric tons of which rice production is 75444.35 metric tons and non-rice production is 137310.6 metric tons. Among the rice crops the highest contributions of T. Aman (HYV) and Boro (HYV) are about 60% and 34% respectively. The highest contribution among the non-rice crops are spices (48%) followed by Wheat (15%) & winter vegetables (11%), and pulses (8%) and overall, rice and non-rice production difference is 35% and 65% in this upazila.

The main source of irrigation water is both surface and ground water. A total of 6607 machine were used for irrigation under Unions in Faridpur Sadar Upazila. A total 22 DTW, 6573 STW and 12 LLP along with other indigenous irrigation tools are used for lifting water. All DTW, 439 STW and 6 LLP has electricity facilities but 6134 STW & 6 LLP has no electricity. Inadequate electricity supply during Boro season was acute problems. Framers wanted nonstop electricity supply during Boro season. Farmers reported irrigation drainage system of DTW, STW and LLP 95-100% drain is kutcha which is causes wastage of irrigation water. Farmers wanted pucca drainage system.

Study finding shows that 11 Unions & Paurashava 81-99 % land area covered by irrigation water in rabi season. Only Uttar Channel and Krishnagar Unions 46-70% land are covered by irrigation water. Farmers have given supplementary irrigation in drought prone and water logged areas in this Upazila. This indicates that farmers have access to irrigation water that facilitated ground water and surface water lifting. About 80% farmers used power tiller and 20% farmers used tractor during land preparation and per hector cultivation cost is Tk. 6000-7000/-.

During 2015-16, BRRI study shows that farmer's average per kg cost of Boro Tk.20.07 followed by Aus Tk.18.37 and Aman Tk.17.83 in the year 2015-16. Cost of per kg Boro rice production is increased Tk.1.42. Department of Agriculture Marketing was estimated production cost for Boro rice Tk. 22.06, Aman riceTk.19.0 and Wheat Tk. 28.50 per kg in the year 2016-17. On this basis Government has declared buying rate of Boro rice Tk.20.70, Aman rice Tk18.50 per kg and Wheat 27.02 per kg respectively in 2016. Farmers wanted and also need to ensure the profitable farm gate price for rice.

The present study was assessed financial profitability of Brinjal, Tomato, Potato and Cabbage/cauliflower vegetables production under Faridpur Sadar Upazila. Finding shows that Tomato cultivation is more profitable Tomato Tk. 925000/-per ha followed by Brinjal Tk. 825000/- per ha, Cabbage/Cauliflower Tk. 455000 per ha and potato Tk 290000per ha respectively. Study finding indicated that all four types of vegetables cultivation are profitable for farmers of this Upazila.

Study finding shows above 98% local variety rice was decreased during last ten years. The HYV/Hybrid paddy cultivation area 204% was increased. The reason for increased HYV rice cultivated area due to higher yield many farmers were cultivated HYV and Hybrid rice. Study finding shows that maize production is 272% increased but wheat production is gradually above 54% decreased. Remarkable significant changed or increased during 10 years was occurred in winter (250%) and summer vegetables (86%) production under this Upazila. Highly significant changed or increased during ten years was occurred in Spices (335%) followed by Tuber crops (128. Among the other purposes remarkable significant changed were occurred in Brick field (215%) and followed by poultry farm (118%), Industries (37%) and fish cultivation (6%) respectively. This finding clearly indicated crop land day by day has gradually decreased which will be reflected on agriculture crop production.

Major problems are: Severe river erosion damages valuable land and properties, Sand deposition on agricultural land affecting normal crop cultivation, Risk of early flood damage the field crops, Water stagnation, silted canals and Kutcha irrigation drainage system, Acute drought in char land area and no sustainable agricultural planned for char land areas, lack of quality seed & equipments supply, Kutcha road and damaged and poor transportation in some of the Unions , Farmers lack of knowledge on modern crop production technology, Shortage of cold storage & seed store and lack of wholesale market infrastructure, Shortage of high quality HYV & Hybrid crop seeds and cultivation equipments, Productive

agricultural lands are reducing due to construction of houses and industries on agricultural land, Top soil cutting, Increase water & air pollution and decreasing fruit setting, No agro processing center and industries under Unions level, Sand filling on fertile agricultural land, unplanned expansion of urban and commercial areas, Decreasing level of underground water, arsenic problem, and City migration.

Construction of embankment for controlled of river erosion and protecting crops from early flood. Road network at local level, agro-processing and whole sale marketing infrastructure development, Re-excavation of canals and irrigation facilities need to be improved for mitigating impacts of crop production related vulnerabilities and climate change. Reconstruction of damaged water management infrastructures need to be made. In each Union, one wholesale market infrastructure needs to be constructed. Further in each Union, one seed store infrastructure need to be constructed and also multiperposes cold storage and food store need to be established. Nonstop electricity supply during Boro crop season and Kutcha drain need to be made pucca drain or underground pipe system. Needs sustainable agricultural development plan for char land areas. Need to adopt Biodynamic/eco-friendly agriculture, Rice and non-rice crops integrated farming, Grow vegetables predominantly and Fruit tree based Agro-forestry system. Protection of present triple and double cropped land is the top priority issue. Agricultural land identified in the present study should be protected by taking relevant administrative measures and also implementation of **"Preparation of Development Plan for Fourteen Upazilas**" Package 03. The local people are in favor of present Preparation of Development Plan for Fourteen Upazilas Package-03 and found very much positive to protect arable land through implementing proposed plan.

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List of Abbreviations

AEO	Agriculture Extension Officer
AEZ	Agro-Ecological Zone
AVRDC	Asian Vegetable Research and Development Center
BARI	Bangladesh Agriculture Research Institute
BCR	Benefit Cost Ratio
BINA	Bangladesh Institute of Nuclear Agriculture
BRRI	Bangladesh Rice Research Institute
BSRI	Bangladesh Sugarcane Research Institute
CC	Climate Change
DAE	Department of Agricultural Extension
DTW	Deep Tube well
DS/m	Deci-Siemens/meter
FAO	Food and Agricultural Organization
GED	General Economic Division
GO-	Government Organization
GoB	Government of Bangladesh
Ha	Hectare
HL	High Land
HQ	Head Quarter
HYV-	High Yielding Variety
HHS	Household Survey
IPM	Integrated Pest Management
IPMP	Integrated Pest Management Plan (IPMP)
KII-	Key informant Interview
LIV	Local Improved Variety
LV	Local Variety
LL	Low Land
LLP	Low Lift Pump

MoL	Ministry of Land
MHL	Medium High Land
MLL	Medium Low Land
NCA	Net Cultivable Area
NIPM	National Integrated Pest Management
NLUP	National Land Use Policy
NWP	National Water Policy
NWMP	National Water Management Plan
P^H	Negative Logarithm of Hydrogen Ion Concentration
RRI	River Research Institute
SAAO	Sub-Assistant Agricultural Officer
SRDI	Soil Resource Development Institute
SPSS	Statistical Package for the Social Sciences
STW	Shallow Tube Well
T. Aman	Transplanted Aman
T. Aus	Transplanted Aus
ToT	Training of Trainers
UAO	Upazila Agricultural Officer
UDD	Urban Development Directorate
VLL	Very Low Land
ULO	Upazila Livestock Officer
UFO	Upazila Fisheries Officers
WARPO	Water Resources Planning Organization
W& S	Winter & Summer

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Faridpur Sadar Upazila of Faridpur District is located in central Bangladesh and lies on the bank of mighty Ganges River. The District was named after the name of Sufi Saint Shah Sheikh Farid. It has an ancient and historical heritage. Faridpur Sadar came into existence as a Thana in 1894. It is an erosion prone and historical Upazila in Faridpur district with a total area of about 39623ha and located between 23º 29´ and 23º 34´ north latitudes and between 89º 43´ and 89º 56´ east longitudes. The Upazila is bordering to the north with Goalanda of Rajbari district and Shibalaya and Harirampur Upazilas of Manikganj district; to the east with Char Bhadrasan Upazila; to the south with Nagarkanda and Boalmari Upazila; and to the west with Madhukhali and Rajbari Sadar Upazila of Rajbari district. The Upazila consists of 11 unions, and 01 Paurashava, 164 mauzas, 34 agriculture blocks and 363 villages. There are many famous places of interest in the Upazila. Some of them are: house of famous poet Jasimuddin, Rajendra College, River Research Institute, Regional Jute Research Institute, Kanaipur industrial zone and Zaminder house etc. In the past this Upazila suffered severe flood in almost every year and damaged crops since the District was very low and remained under water for long period. The Upazila was reputed for inland land open water delicious fishes of the beel areas. There were also famous Hilsha fish and other river water fisheries of the Ganges River.

Faridpur Sadar Upazila consists of erosion prone char land and mixed use with agriculture and semi Urban and commercial activities. The char areas are thinly populated and some land remains uncultivated or occasionally cultivated as chance crop due to early flood and other natural calamities. The AEZ of the Upazila has been identified as (a) Active Ganges River Floodplain (AEZ-10) and (b) Low Ganges River Floodplain (AEZ-12) which is mainly typical meander floodplain landscape of broad ridges and basins. Soils of this region are sandy loams and silty clay loams on the ridges and silty clay loam to heavy clays on lower sites. The fertile agricultural land is decreasing due to severe erosion of Ganges and rapid urbanization and commercial activities on agricultural land creating pressure on land resources. It has productive plain land, char land agriculture, housing, forestry, water bodies, capture and culture fisheries etc. This Upazila is susceptible to natural and human induced disasters like flood, drought, river erosion, water pollution, deforestation, loss of fertile agricultural land, unplanned growth of brick fields and housing in agricultural land. However, shifting agricultural land to non-agricultural purposes is a common phenomenon in this Upazila. Improper land use causes various forms of land degradation resulting in a reduced agriculture production. Indiscriminate land conversion will impose threat to national food security. As such, land use pattern of the Upazila is changing, creating pressure on land resources and biodiversity. Protecting fertile agricultural land and to meet rational needs of

other sectors are our great national challenges. To protect agricultural land, to minimize land degradation and introducing modern technology are the basic needs to cope-up with the increasing demand of food for the growing population of this Upazila.

In view of the above mentioned context, a comprehensive study was conducted in all the Unions of Faridpur Sadar Upazila to assess present situation of land uses, related problems and potentialities of land for different other uses, and to find out possible coping ways to solve the problems. Therefore, considering all available parameters and characteristics of the area a sustainable land management was considered to develop better crop production.

1.2 Objectives of the Study

The main objective of the study is to assess the present cropping pattern and cropping intensities, single, double and triple crop area, land utilization and flood level. The main study questions are to determine the growth or decline of agricultural land during last ten years (from 2005-2016) and their causes for growth or decline covering a possible quality of existing and future agricultural land for the project area. The study is to determine the present scenario in agriculture practices and assessment of potential sustainable future development of the sector.

1.3 Approach and Methodology

A multi-disciplinary, participatory and interactive method has been followed in carrying out the study. Both primary and secondary data were reviewed. The primary data were collected through KII (Key Informant Interview) and field visit. AII information was collected by using questionnaire survey (Annex-1). The secondary data were collected and reviewed on land use from DAE Union and Upazila Office documents. KII information was collected from 34 Sub-Assistant Agriculture Officers under 11 Unions & 01 Paurashava through interview. Structured and semi-structured questionnaire was used for data collection (Annex-2). Data collection and consolidation occurred simultaneously. Data collection activities were completed from 10-30 November 2016. Data consolidation activities, such as editing, coding, classifying and data entry into the computer software for analysis were carried out simultaneously. Frequency tables (one, two or multiple ways) were prepared for interpretations and analyses using SPSS for data analysis.

CHAPTER-TWO: AGRICULTURE RELEVANT POLICY FRAME WORK

This Chapter presents a review of the national policy, legal, and regulatory framework relevant to the agriculture aspects of the Project.

2.1 National Agriculture Policy, 2013

The National Agriculture Policy, 2013 approved by the Government of Bangladesh focuses on agriculture production, alleviating poverty through generating jobs and ensuring food security. The Policy outlined nine specific objectives. Although the policy does not emphasize the coastal zone separately, all specific objectives are applicable to the development of coastal zone agriculture.

The GoB will pursue programmed for agro-ecologically disadvantaged regions in the hilly area, drought-prone area, Barind tract, char land, haor-baor and coastal belt with appropriate technological support.

To increase water productivity and enhance irrigation efficiency through optimal use of available water resources the GoB will facilitate dissemination of water management technology. Modern irrigation, drainage and water application systems will be introduced for expanding irrigation coverage including difficult or disadvantaged areas i.e. in char, hilly areas, Barind tract, drought-prone and saline areas.

The proposed Preparation of Development Plan for Fourteen Upazilas Package: 03 are expected to contribute to achieving the objectives of the agriculture policy.

2.2 National Water Management Plan, 2001 (Approved in 2004)

The National Water Management Plan (NWMP) 2001, approved by the National Water Resources Council in 2004, envisions establishing an integrated development, management and use of water resources in Bangladesh over a period of 25 years. WARPO has been assigned to monitor the national water management plan. The major programs in the Plan have been organized under eight sub-sectoral clusters: (i) Institutional Development, (ii) Enabling Environment, (iii) Main Rivers, (iv) Towns and Rural Areas, (v) Major Cities, (vi) Disaster Management, (vii) Agriculture and Water Management, and (viii) Environment and Aquatic Resources. Each cluster comprises of a number of individual programs, and a total of 84 sub-sectoral programs have been identified and presented in the investment portfolio. Preparation of Development Plan for Fourteen Upazilas Package: 03 have been designed in line with this Plan and address its key objectives for the water resource management in the Faridpur Sadar Upazila.

2.3 The Ground Water Management Ordinance, 1985 (Ordinance No. XXVII of 1985)

This is an Ordinance to manage ground water resources for agricultural production. This Act authorizes the Thana Parishad (Police Station) to grant license for installing tube wells under its jurisdiction. The Thana Parishad may grant the license if the Parishad is satisfied that the installation of the tube well applied for complies with the following points will be beneficial to the areas where it is to be installed, or will not have any adverse effect upon the surrounding areas, or is otherwise feasible. Preparation of Development Plan for Fourteen

Upazilas Package 03 has been designed in line with this Plan and addresses its key objectives for the ground water management ordinance for Faridpur Sadar Upazila.

2.4 National Land Use Policy (MoL, 2001)

The National Land Use Policy enacted in 2001, aims at managing land use effectively to support trends in accelerated urbanization, industrialization and diversification of development activities. The NLUP urges that increasing the land area of the country may not be possible through artificial land reclamation process, which is cost-effective only in the long run. Therefore, land use planning should be based on the existing and available land resources. The policy suggests establishing land data-banks where, among others, information on accreted reverie and chars will be maintained. Among the 28 policy statements of NLUP, the following are relevant to the Faridpur Sadar Upazila are: forests declared by the Ministry of Environment and Forests will remain as forest lands and re-classification of forest lands will be prevented. Preparation of Development Plan for Fourteen Upazilas Package 03 is designed in
National accordance with this Policy and will comply with the above listed requirements.

2.5 Water Policy, 1999

Endorsed by the GoB in 1999, the National Water Policy (NWP) aims to provide guidance to the major players in the water sector for ensuring optimal development and management of water. According to the policy, all agencies and departments entrusted with water resource management responsibilities (regulation, planning, construction, operation, and maintenance) are required to enhance environmental amenities and ensure that environmental resources are protected and restored in executing their tasks.
The proposed Preparation of Development Plan for Fourteen Upazilas Package: 03 are expected to contribute to achieving the objectives of the National Water Policy.

2.6 National Integrated Pest Management (NIPM) Policy

IPM Action Plan supports a strategy that promotes use of biological or environmental pest control methods and reduces reliance on synthetic chemical pesticides. Agriculture, rural development and health sector projects have to avoid using harmful pesticides. Other pesticides can be used, but only as an element of an Integrated Pest Management Plan (IPMP) that emphasizes environmental and biological controls.
The proposed Preparation of Development Plan for Fourteen Upazilas Package 03 is expected to contribute to achieving the reduce pesticides used in agriculture sector and increases use of other pest control methods under National IPM policy.

2.7 The Perspective Plan of Bangladesh (2010-2021) and 7 the Five Year Plan (2016-20)

Both the plans have emphasized on food production with specific targets to achieve by 2021 which will be the golden jubilee year of Bangladesh independence. The 7th Five Year Plan (2016-20) has prescribed for the transformation of agriculture into its newer and modern form which will certainly require short-and medium-term adjustments with adequate investment.

These include among others (i) crop diversification with the application of innovative technology;(ii) modern forms of irrigation and fertilizer use;(iii) well integrated and developed storage facilities and transportation systems;(iv) advanced agriculture research in a wide range of products beyond its traditional focus on rice and introduction of hybrid seeds; and (v) development of drought or flood resistant crops (GED 2010 and GED 2015).

The proposed Preparation of Development Plan for Fourteen Upazilas, Package-03 are expected to contribute to achieving the objectives of the Perspective Plan of Bangladesh (2010-2021) and 7 the Five Year Plan (2016-20). .

CHAPTER-THREE: PRESENT LAND USE

3.1 Description of the Present Situation

The land of Bangladesh is complex. Land and its resources are owned, developed, managed and maintained by different agencies. Faridpur Sadar Upazila is the prominent Upazila under Faridpur District in respect of area, population and high potential for agriculture production. Major land uses are agriculture, settlement, river water bodies, and fallow char land. Bangladesh has been divided into 30 Agro Ecological Zones based on soil, landform and climatic characteristics. Faridpur Sadar Upazila falls into 02 Agro Ecological Zones: (i) Active Ganges Floodplain (AEZ-10) and (ii) Lower Ganges River Floodplain (AEZ-12) (BARC 1997). The landscape is complex and seasonally flooded. General soil color of Faridpur Sadar Upazila is grey to dark grey. The top soil is composed of moderately permeable loamy soils and some parts are clayey. In Faridpur Sadar Upazila organic matter contents are low in the high land, but moderate in the lower parts. Moisture holding capacity of soil is low to medium. General fertility is relatively poor. The top soil pH level ranges from 6.0-8.5(SRDI 2005 and BARC 1997). Most of the people of this Upazila are directly or indirectly dependent on agriculture. Wide range of rabi and kharif crops are grown here. The newly accreted Chars and Islands have special uses also.

3.2 Faridpur Sadar Upazila and Union Wise Farm Families

Farmers in Faridpur Sadar Upazila lead their livelihood from land based agricultural activities. I t is the main source of their employment and income. Agricultural production is highly dependents on adaptable climatic conditions. Faridpur Sadar Upazila has 11 Unions and 01 Paurashava. It has 164 Mauza and 363 villages. This Upazila has 34 agricultural blocks under DAE. Farm family is categorized according to farmer holding own land. There are five categories of farm family in Bangladesh. These are: landless (0.05-0.50 acre land), marginal (0.51-1.50 acre land), and small (1.51-2.50 acre land), medium (2.51-7.50 acre land) and larger (above 7.50 acre land). Union and category wise farm family under Faridpur Sadar Upazila is shown in Table 3.1. There are 67,446 number of farm families in Faridpur Sadar Upazila. About 10,742(15.93%) farm families are landless, 27,533(40.82%) farm families are marginal, and 20,021 (29.68%) farm families are small, 8,107 (12.02%) farm families are medium and 1044(1.55%) farm families are larger farmer (Table 3.1 and Figure 3.1). Majority peoples of this Upazila are directly or indirectly involved in agricultural activities. However, with the increasing number of population the pressure on land is increasing day by day. As a result the number of landless farm families is gradually increasing that create pressure on livelihood in the Upazila.

Table 3. 1: Union and Category Wise Farm Family under Faridpur Sadar Upazila

Name of Union	Landless (%)	Marginal (%)	Small (%)	Medium (%)	Larger (%)	Total
	(.05-.50 acre)	(.51-1.50 acre)	(1.51-2.50acre)	(2.51-7.50 acre)	(above 7.50 acre)	
Aliabad	632(12.75)	1873(37.80)	1708(34.48)	681(13.74)	61(1.23)	4954
Ambikapur	840(20.07)	2125(50.78)	1037(24.78)	167(3.99)	16(0.38)	4185
Char Madhabdia	1048(14.84)	3427(48.55)	2125(30.10)	375(5.31)	85(1.20)	7060
Decreer Char	1578(36.94)	1310(30.66)	860(20.13)	430(10.07)	94(2.20)	4272
Greda	988(14.64)	2840(42.09)	1980(29.35)	852(12.63)	87(1.29)	6747
Ishan Gopalpur	640(11.80)	2916(53.77)	1271(23.44)	481(8.87)	115(2.12)	5423
Kaujuri	1324(12.05)	3980(36.23)	3495(31.82)	1986(18.08)	200(1.82)	10985
Kanaipur	2074(29.05)	3105(43.49)	1083(15.17)	767(10.75)	110(1.54)	7139
Krishnagar	774(12.00)	2595(40.23)	2120(32.87)	824(12.78)	137(2.12)	6450
Maj Char	342(6.37)	2472(46.02)	1928(35.89)	582(10.83)	48(0.89)	5372
Uttar Channel	431(10.23)	736(17.46)	2067(49.05)	906(21.50)	74(1.76)	4214
Faridpur Paurashava	71(11.01)	154(23.88)	347(53.80)	56(8.68)	17(2.63)	645
Total	10742(15.93)	27533(40.82)	20021(29.68)	8107(12.02)	1044(1.55)	67446

Source: SAAOs & UAO Faridpur Sadar Upazila, DAE 2016

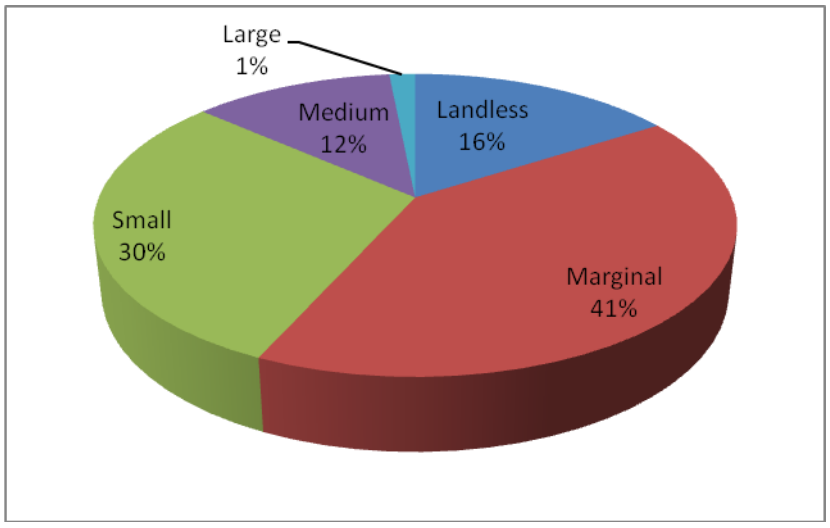


Figure 3. 1: Percentage of Category wise Farm Family under Faridpur Sadar Upazila.

3.3 Present Agricultural Land Use

3.3.1 Present Upazila Land Use

Faridpur Sadar Upazila is an erosion prone Upazila and being used for mixed purposes. Major land uses are agriculture, settlements, river water bodies and fallow char land. The urban built up area is increasing due to unplanned industrialization and rapid expansion of commercial activities and housing. The Upazila is mainly agro-based economy and it is famous for producing high quality of jute, rabi crops, rice and fish production. This Upazila holds an important arena in Faridpur district with her natural resources and ecosystem. The scenario of Faridpur Sadar Upazila present different land utilized is shown in Table 3.2. Types of lands are 7025 ha high land, 9990 ha medium high land, 4677 ha medium low land, 2830ha low land and 66ha very low land respectively. Faridpur Sadar Upazila covers 24548 ha of net cropped area of which about cultivated area is 56891 ha. The highest land area is 14257 ha is used as double crop and followed by triple crop of 9037ha and remaining 1250 ha is used as single crops and only 4 used for cultivation of more than three crops under this Upazila. Other purposes land use: Permanent Fruit Garden 1610ha, and Fish cultivation 4753 ha. It has 956ha permanent fallow land and 2250 ha forest land. Percentage of single, double, triple cropped area used in Upazila is shown in Figure 3.2. The highest percentage is double cropped area (58%) followed by triple cropped area (37%), and single crop area (5%) under Faridpur Sadar Upazila. The cropping intensity of Faridpur Sadar Upazila is 232% which is higher than average Faridpur District cropping intensities (227%). Union-wise Present Agriculture Land Use Information and Identified land Zoning of Faridpur Sadar Upazila are shown in Table 3.3. There are six types of land zoning proposed for Faridpur Sadar Upazila by National Land Zoning project 2016 which is shown in Table 3.4. These are: (1) Agriculture Zone, (2) Agriculture –Historical Place Zone (Poet Jashimuddin), (3) Mixed Use Zone (Agriculture-Semi Urban and Commercial), (4) Agriculture-Farm Land Forest Zone, (5) Agriculture- Erosion Prone Char Land Zone and (6) Paurashava Area Upazila Land used Map shown in Map 3.1.

Table 3. 2: Faridpur Sadar Upazila Present Land Use

Sl. No.	Upazila Land use	Total Area (ha)
1.	Total Agricultural land	24588
2.	High land	7025
3.	Medium high land	9990
4.	Medium low land	4677
5.	Low land	2830
6.	Very Low land	66
7.	Single cropped area	1250
8.	Double cropped area	14257
9.	Triple cropped area	9037
10.	More than three cropped area	4

Sl. No.	Upazila Land use	Total Area (ha)
11.	Net Cropped area	24548
12.	Total cropped area	56891
13.	Cropping Intensity (%)	232
14.	Permanent Fallow Land	956
15.	Current/seasonal fallow land(with fallow period) → Rabi Season fallow	40
16.	→ Kharif-1 seasonal fallow	90
17.	→Kharif-11 seasonal fallow	205
18.	Irrigated land area	4550
19	Water land (River, Ponds and others)	4753.35
20.	Forest Area	2250
21.	Permanent Fruit Garden	1610
22.	Roads	723Km

Source Upazila Agriculture Office Faridpur Sadar Upazila, DAE 2016

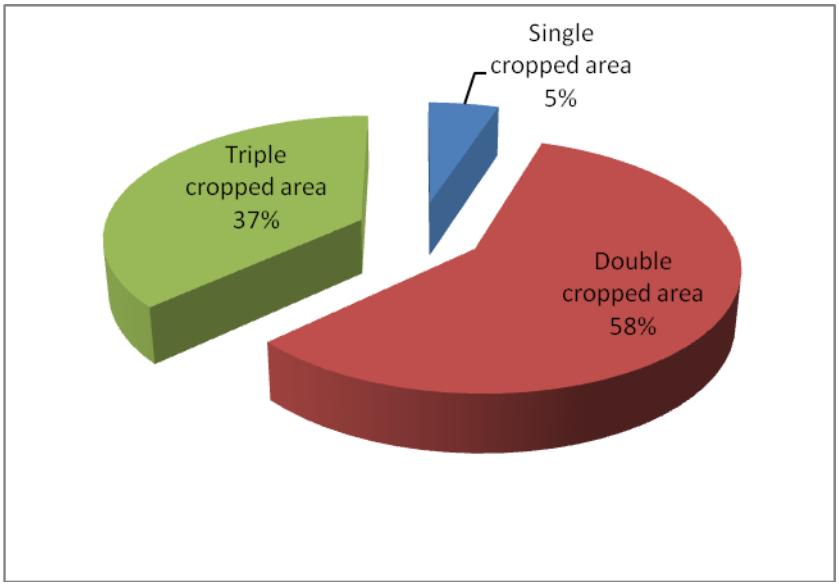


Figure 3. 2: Percentage of single, double, & triple cropped land used Faridpur Sadar Upazila

Table 3. 3: Union-wise Present Land Use Information and Identified Land Zoning

Union	Area (Hectare)	Top Soil Texture	Cropping Intensity (%)	Land Use (Summarized)	Area (Hectare)	%	Recommended Land Zoning
Aliabad	2466	Silt Loam to Clay Loam	225	Agricultural Land	1344.90	54.54	Mixed Use Zone (Agriculture-Semi Urban and Commercial)
				Fallow Char Land	173.60	7.04	
				Important Places	11.59	0.47	
				Road	29.79	1.21	
				Rural Settlement & HV	509.25	20.65	
				Urban Built-up Area	204.78	8.30	
				Water Bodies	191.92	7.78	
Ambikapur	1708	Loam to Clay Loam	258	Agricultural Land	1033.99	60.55	Agriculture - Historical Place Zone (Poet Jashimuddin)
				Fallow Char Land	1.95	0.11	
				Farm Land Forest	10.02	0.59	
				Important Places	5.03	0.29	
				Industrial Area	1.35	0.08	
				Brick-field	49.31	2.89	
				Road	27.87	1.63	
				Rural Settlement & HV	461.90	27.05	
				Urban Built-up Area	61.09	3.58	
				Water Bodies	55.10	3.23	
Char Madhabdia	2535	Clay Loam to Loam	202	Agricultural Land	2022.58	79.79	Agriculture Zone
				Road	38.75	1.53	
				Rural Settlement & HV	442.65	17.46	
				Water Bodies	31.03	1.22	
Decreerchar	2256	Silt Loam to Clay	200	Agricultural Land	120.90	5.36	Agriculture-Erosion Prone Char Land Zone
				Fallow Char Land	1554.30	68.91	
				Brick-field	12.35	0.55	
				Road	6.67	0.30	
				Rural Settlement & HV	72.39	3.21	
				Urban Built-up Area	83.91	3.72	
				Water Bodies	405.13	17.96	
Greda	2271	Clay Loam to Silt Loam	252	Agricultural Land	1298.90	57.20	Agriculture Zone
				Industrial Area	2.65	0.12	
				Brick-field	5.60	0.25	
				Road	39.19	1.73	
				Rural Settlement & HV	798.20	35.15	
				Urban Built-up Area	22.39	0.99	
				Water Bodies	104.03	4.58	
Ishan Gopalpur	3290	Clay Loam to Silt Loam	251	Agricultural Land	2509.03	76.25	Agriculture Zone
				Industrial Area	1.32	0.04	
				Brick-field	5.49	0.17	
				Road	31.67	0.96	
				Rural Settlement & HV	688.40	20.92	
				Water Bodies	54.59	1.66	
Kaijuri	4153	Clay Loam to Clay	273	Agricultural Land	2711.62	65.30	Agriculture Zone
				Farm Land Forest	13.20	0.32	
				Industrial Area	3.67	0.09	
				Brick-field	20.47	0.49	
				Road	41.81	1.01	
				Rural Settlement & HV	1110.25	26.74	
				Urban Built-up Area	137.55	3.31	
				Water Bodies	114.12	2.75	
Kanaipur	3699	Clay Loam to Loam	252	Agricultural Land	2056.50	55.59	Mixed Use Zone (Agriculture-Semi Urban and Commercial)
				Sugarcane	244.70	6.61	
				Farm Land Forest	100.61	2.72	
				Industrial Area	40.40	1.09	
				Brick-field	11.23	0.30	
				Road	32.72	0.88	
				Rural Settlement & HV	748.15	20.22	
				Urban Built-up Area	351.89	9.51	
				Water Bodies	113.12	3.06	

Source: National Land Zoning Project Report, May 2016

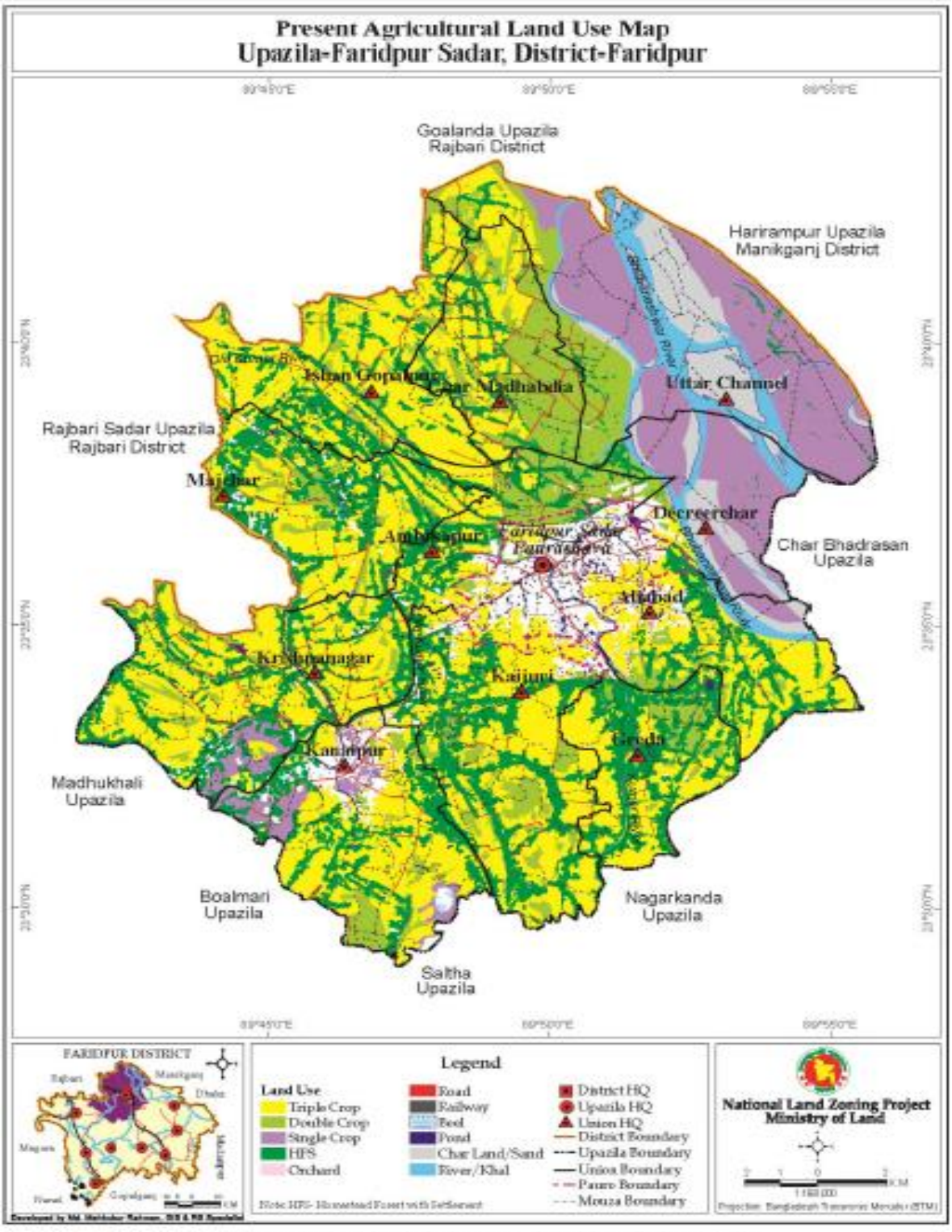
Union	Area (Hectare)	Top Soil Texture	Cropping Intensity (%)	Land Use (Summarized)	Area (Hectare)	%	Recommended Land Zoning
Krishnanagar	4302	Clay Loam to Silt Loam	240	Agricultural Land	2714.10	63.09	Agriculture-Farm Land Forest Zone
				Farm Land Forest	106.79	2.48	
				Sugarcane	221.06	5.14	
				Industrial Area	5.86	0.14	
				Brick-field	7.33	0.17	
				Road	45.80	1.06	
				Rural Settlement & HV	1132.39	26.32	
				Water Bodies	68.67	1.60	
Majchar	2890	Clay Loam to Loam	255	Agricultural Land	1754.55	60.72	Agriculture-Farm Land Forest Zone
				Farm Land Forest	107.11	3.71	
				Industrial Area	5.94	0.21	
				Brick-field	20.75	0.72	
				Road	49.84	1.72	
				Rural Settlement & HV	888.86	30.76	
				Water Bodies	62.52	2.16	
Uttar Channel	5920	Clay Loam to Silt Loam	204	Agricultural Land	1689.52	28.54	Erosion Prone Char Land Zone
				Fallow Char Land	2993.30	50.56	
				Road	9.74	0.16	
				Rural Settlement & HV	249.79	4.22	
				Water Bodies	977.78	16.52	
Faridpur Paurashava	2122	Clay Loam to Silt Loam	217	Agricultural Land	530.46	24.99	Paurashava Area
				Industrial Area	1.79	0.08	
				Important Places	59.66	2.81	
				Brick-field	10.38	0.49	
				Road	51.21	2.41	
				Rural Settlement & HV	74.38	3.50	
				Urban Built-up Area	1289.92	60.77	
				Water Bodies	104.64	4.93	

Table 3.4: Proposed Land Zoning for Faridpur Sadar Upazila

Name of Zone	Union	Remarks
1. Agriculture Zone	Char Madhabdia, Greda, Ishan Gopalpur and Kaijuri	Considering present agriculture land use, land suitability analysis and as per opinion of local people these unions are identified as agriculture zone
2. Agriculture-Historical Place Zone (Poet Jashimuddin)	Ambikapur	Jasimuddin, the popular Bengali poet known for his poems about the folk lore culture is situated in this union which is a very famous historical place and picnic spot in the area
3. Mixed Use Zone (Agriculture-Semi Urban and Commercial)	Aliabad and Kanaipur	River Research Institute, housing estate etc. are situated along the highway in Aliabad union, industrial and commercial zone other commercial infrastructure are increasing at Kanaipur union
4. Agriculture-Farm Land Forest Zone	Krishnanagar and Majchar	Plantation forest in the farm land has been increased remarkably reducing the fertile agricultural land in the area
5. Agriculture-Erosion Prone Char Land Zone	Decreerchar and Uttar Channel	These unions are consisting of newly accreted char land which is vulnerable due to river erosion and other natural hazards
6. Paurashava Area	Faridpur Paurashava	Paurashava urban development activities should be carried out without degrading fertile agriculture land

Source: National Land Zoning Project Report, May 2016

Map 3. 1. Present Agricultural Land use Map of Faridpur Sadar Upazila



Present Agricultural Land Use Map of Faridpur Sadar Upazila

3.4 Union-Wise Present Agriculture Land Use:

Land resources of different Unions and Paurashava under Faridpur Sadar Upazila are used for multiple purposes. Faridpur Sadar Upazila has 11 Unions and 01 Paurashava. Land types are the dominant factor guiding choice of crops and cropping patterns of each Union. The present lands used in different Unions and Paurashava are given below.

3.4.1 **Aliabad Union Land Use**

General Description

It is situated along the highway at Aliabad Union about 2km toward south of Faridpur town. River Research Institute (RRI) has been established in Aliabad Union in view of devising plans and actions to develop water resources in a sustainable manner to meet the development needs of Bangladesh. Aliabad Union has got high potentials for its land and agriculture production as well as commercial uses. Aliabad union consists of 8 Mauza and 10 villages. This union consists of 8 Mauza and 10 villages. Union falls into 2 Agro-ecological zones are (i) Active Ganges Floodplain (AEZ-10) and (ii) Lower Ganges River Floodplain (AEZ-12). National Land zoning project, May 2016, Aliabad Union was identified and proposed as Mixed Use Zone (Agriculture-Semi Urban and Commercial). This Union having agriculture cultivated area of 4880 ha of land of which net cropped area is 1902 ha. The highest land area is 1175(61.78%) ha is used as triple crops and followed by double crops of 627(32.96%) ha and remaining 100(5.26%) ha is used as single crops. The land types of this union are highland (82%), medium high land (13%), Medium low land (5%) and soil texture is silt loam to clay loam which indicates lands are suitable for different Rabi crops and Kharif crops production (SAAO, 2016). The soil P^H is 6.1-7.8. Multiplicity of cropping system has been one of the main features of the Union. Aliabad Union is highly suitable for cultivation of paddy, Ground nut, Wheat, Sugarcane, Jute and year round vegetables and also Rabi crops (Land Zoning Report, May 2016 & SAAOs November 2016). Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water. Rice and wheat are two principal cereals. At present fifteen cropping patterns are practiced under Aliabad Union which is shown in Table 3.5. The cropping intensity of this union is 257%. Banana and papaya are widely grown in this Union

Table 3. 3: Present Cropping Patterns of Aliabad Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Aliabad	1902	Boro(HYV)□Fallow□T.Aman(HYV)	257.57	270	14.20
		Boro (HYV)□Fallow□ Fallow		67	3.52
		Vegetables□ Vegetables □ Vegetables		135	7.10
		Wheat/Maize□Jute□ T.Aman		770	40.48
		Mustard□Boro (HYV)□ T.Aman		74	3.89
		Mustard□ Jute□ T.Aman		45	2.37
		Vegetables□ Fallow□ T.Aman		220	11.57
		Spices□Jute-□T.Aman		30	1.58
		Sweet Potato□Fallow□T.Aman		15	0.79

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
		Pulses□Fallow□ T.Aman		120	6.31
		Banana/ Papaya□Banana.Papaya□Banana		20	1.05
		Spices□ Fallow□ T.Aman		47	2.47
		Pulses□ Groundnut/Til□ T.Aman		44	2.31
		Sugarecane□Sugarecane□Sugarcane		25	1.31
		Orchard□Orchard□Orchard		20	1.05
		Total		1902	100.00

Source: SAAOs of Aliabad Union 2016

Major Problems on Crop Cultivation

The major problems in Aliabad Union crop cultivation are: (i) River silted and erosion, (ii) Shortage of supply quality agricultural inputs (HYV seeds, power tiller/ tractor, thresher, sprayer/ foot pump etc) and high price, (iii) No cold storage for vegetables and Seed store, (iv) Canals are silted and Kutcha drainage system, (v)Water stagnation, (vi) Lack of vegetables and fruits wholesale market infrastructure, (vii) Prolonged to partial drought or excessive rain and early flood, (viii) Higher cost of LLP,STW, fuel,& pesticides etc, (ix) Low market price of agricultural commodities,and (x) The valuable agriculture land is reducing rapidly due to unplanned construction of houses, settlement, brick field and for various infrastructural development.

Recommendation

Agricultural productivity is measured in terms of agricultural outputs to agricultural inputs. It will increase agricultural production, generate cultivator income, increase purchase capacity and improve rural livelihoods.

(1) Ensure availability of improve quality crop production inputs (HYV crop seeds & equipments) in subsidized price, (2) Re-excavation of canals/rivers, (3) wholesale market infrastructures development , (4) Construction of cold storage and seed store,(5) Uninterrupted power supply to irrigation pumps, (6) Training on modern agriculture practices and proper uses of organic and inorganic fertilizers and pesticides,(7) Kutcha Irrigation drainage need to be converted into pucca, (8) Construction of vegetables and fruits processing, grading and packaging industry/facility and establishment of agro-based industry , and (9) Conversion of productive agriculture land to non- agriculture purposes need to be stopped by implementation of land zoning law and village improvement act.

3.4.2 Ambikapur Union Land Use

General Description

Bengali Poet Jasimuddin was born in Ambikapur Union in 01 Janury 1903. The name of his village is Ambikapur which is just about 2 km apart from the Faridpur town. His house is situated by the river Kumar. Jasimuddin is noted for his depiction of rural life and nature

from the view point of rural people. This had earned him fame as Pollikabi (the rural poet).There is a picnic spot outside the house premise for visitors. During the month of January there used to be a Mela at this ground to commemorate the birth day of the poet**.** National Land Zoning project, May 2016, Ambikapur Union was identified and proposed as Agriculture-Historical Place Zone (Poet Jashimuddin). Ambikapur union consists of 14 Mauza and 17 villages. The land of this Union is moderate fertile, productive and potential for agriculture uses. The land types of this union are highland (12.71%), medium high land (49.17%), medium low land (34.31%), low land (3.99%) and very low land (0.32%). This Union having agriculture cultivated area of 3830 ha of land of which net cropped area is 1480 ha. The highest land area is 910(61.49%) ha is used as triple crops and followed by double crops of 530(35.81%) ha and remaining 40(2.70%) ha is used as single crops. Soil texture is loam to clay loam which indicates lands are suitable for multiple crops production round the year (SAAO, 2016). The soil P^H is 6.5-7.6. The cropping intensity of this union is 259%. This Union is highly suitable for cultivation of paddy, Pulses, Onion, Jute, Mustard, Wheat, Maize and year round vegetables and also Rabi crops (Land Zoning Report, May 2016 & SAAOs November 2016). Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water. At present 18 cropping patterns are practiced under Ambikapur Union which is shown in Table 3.6. Cropping patterns clearly indicated diversified crops are grown in this Union. There are 30 Mango, 20 Banana and 4 litchi garden in this Union. Cultivable agricultural lands are reducing rapidly due to unplanned construction and development activities.

Table 3. 6: Present Cropping Patterns of Ambikapur Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Ambikapur	1480	Wheat□Jute□ T.Aman	259	270	18.24
		Weat□Jute□ Fallow		80	5.41
		Boro□ Fallow□ T.Aman		45	3.04
		Boro□ Fallow-□ Fallow		33	2.23
		Mustard□Boro---Fallow		50	3.38
		Mustard□Jute□T.Aman		135	9.12
		Spices□Jute□ Fallow		39	2.64
		Onion□Jute□ T.Aman		55	3.72
		Onion/Garlic□Jute--Fallow		150	10.14
		Pulses□ Til□ T.Aman		100	6.76
		Pulses□ Jute-□ T.aman		170	11.49
		Pulses□Til□ Fallow		50	3.38
		Pulses□Aus□T.Aman		40	2.70
		Vegetables□Vegetables□ Vegetables		150	10.14
		Boro□ Fallow□T.Aman		30	2.03
		Onion□ Aus□ Fallow		20	1.35
		Sugarcane□Sugarcane□Sugarcane		50	3.38
		Banana/Papaya□ Banana/Papaya□		13	0.88
		Total		1480	100.00

Source: SAAOs of Ambikapur Union 2016

Major Problems on Crop Cultivation

The major problems of Ambikapur Union crop cultivation are: (i) Water stagnation, River erosion and sand deposition on agricultural land and also top soil cutting, (ii) Kutcha irrigation drainage system, (iii) No cold storage for vegetables and Seed store, (iv) Lack of vegetables and fruits wholesale market infrastructure, (v) Shortage of supply quality agricultural inputs (HYV seeds, power tiller/ tractor, thresher, sprayer/ foot pump etc) and high price, (vi) Prolonged to partial drought or excessive rain and early flood, (vii) Higher cost of LLP,STW, fuel, pesticides etc, (viii) Low market price of agricultural commodities and labor shortage during crop harvesting time, (ix) Draught, inadequate electricity supply and early flood, and (x) Productive agricultural land converted into non- agricultural land.

Recommendation

(1) Development of irrigation facilities by excavation or re-excavation of canals/rivers, (2)Kutcha irrigation drainage need to be converted into pucca, (3) Construction of multipurpose cold storage, wholesale market infrastructure and seed store, (4) Ensure availability of improve quality crop production inputs (HYV crop seeds & equipments) in subsidized price, (5) Uninterrupted power supply during Boro crop season, (6) Farmers training on modern agriculture practices and proper uses of organic and inorganic fertilizers and pesticides, (7) Construction of vegetables and fruits processing, grading and packaging industry/ facility and establishment of agro-based industry, (8) Many of the rural infrastructures and construction work for urban expansion and commercial activities are done without having a proper plan. Proper plan are essential for infrastructural development activities which will save the productive agricultural lands, (9) Improvement of road communication system and (10) Ensure supply of drought and water logging tolerant and early crop variety of BRRI, BARI, BINA.

3.4.3 Char Madhabdia Union Land Use

General Description

Char Madhabdia Union is situated Northern part of Faridpur Sadar Upazila and outside the embankment. It is a flood prone Union because beginning of the rainy season all fields are inundated by flood water every year. The land types of this union are medium high land (64.92%), Medium low land (25.54%), and low land (9.54%). Land are moderate fertile, productive and potential for agriculture uses. Char Madhabdia union consists of 4 Mauza and 75 villages with the area of 2438.87 ha. National Land zoning project, May 2016, Char Madhabdia Union was identified and proposed as Agriculture Zone. Soil texture is loam to clay loam and the soil P^H is 6.0-7.8. This Union having agriculture cultivated area of 3205 ha of land of which net cropped area is 1600 ha. The highest land area is 1405(87.81%) ha is used as double crops and followed by triple crops of 100(6.25%) ha and remaining 95(5.94%) ha is used as single crops. The cropping intensity of this union is 200%. Char Madhabdia Union is suitable for cultivation of paddy, Ground nut, Jute, Mustard, Wheat, Potato, Onion, Garlic and year round vegetables (Land Zoning Report, May 2016 & SAAOs November 2016). Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water. At present sixteen cropping patterns are practiced under **Char Madhabdia** Union

which is shown in Table 3.7. Jute and Onion, Garlic are principal cash crops in this Union. In agriculture, multiple cropping is practice of growing two or more crops in the same space during a single growing season. Farmers of this Union did not cultivate Aman rice due to risk of flooding.

Table 3.7: Present Cropping Patterns of Char Madhabdia Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Char Madhabdia	1600	Wheat□Til□ Fallow	200	30	1.88
		Weat□Jute□ Fallow		80	5.00
		Potato□ Jute□ Fallow		15	0.94
		Boro□ Fallow-□ Fallow		60	3.75
		Mustard□Boro---Fallow		140	8.75
		Onion□ Boro□Aus		55	3.44
		Garlic□ Boro□ Fallow		120	7.50
		Onion□ Boro□ Fallow		185	11.56
		Onion/Garlic□Jute--Fallow		676	42.25
		Spices□ Jute□ Fallow		55	3.44
		Pulses□ Jute-□ Fallow		15	0.94
		Pulses□Til□ Fallow		33	2.06
		Maize□Aus□ Fallow		15	0.94
		Vegetables□Vegetables□ Vegetables		62	3.88
		Vegetables□ Jute□ Fallow		44	2.75
		Chili□ Aus□ Fallow		15	0.94
		Total		1600	100.00

Source: SAAOs of Char Madhabdia Union 2016

Major Problems on Crop Cultivation

The major problems in Char Madhabdia Union crop cultivation are: (i) Risk of early flood and excessive rainfall, (ii) Shortage of cold storage and poor transportation damage perishable agricultural products , (iii) Lack of vegetables wholesale market infrastructure, (iv) Scarcity of quality seed and lack of modern agricultural equipments and farmers knowledge reduce crop yield and crop diversification, (v) Higher cost of LLP,STW, fuel, pesticides etc, (vi) lack of electricity supply hampers irrigation for boro and other irrigated crops,(vii) Essential plant nutrient deficiencies, lack of awareness on proper management of land and over & under uses of pesticides and chemical fertilizers. (viii) Cultivable agricultural lands are reducing due to unplanned construction of houses and industries on agriculture land and sand deposition on agricultural land.

Recommendation

(1) Development of irrigation and other quality crop production inputs facilities, (2) Cold storage facility should be provided to preserve the perishable products, (3) Ensure required electricity supply during irrigation period,(4) Farmers training on modern agriculture practices and proper uses of organic and inorganic fertilizers and pesticides, (5)Construction of vegetables and spices processing, grading and packaging industry/ facility and Establishment of agro-based industry, (6) Improvement of road communication system and

(7) Ensure supply of drought and water logging tolerant and early crop variety of BRRI, BARI, BINA, (8) Proper plan are essential for this union infrastructural development activities which will save the productive agricultural lands, (9) Development of irrigation facilities by excavation or re-excavation of old canals/ khals and connecting with nearest river and khal, (10) Following fertilizer recommendation by soil testing and (11)Arranging and allocating sufficient credit for farmers.

3.4.4 Decreer Char Union Land Use

General Description

This Union is covered by char land. Decreer Char Union is situated to the east with Char Bhadrasan Upazila. Most of these char land is newly accreted in the river Ganges which is isolated from main land and they are thinly populated. Land is fertile in the char areas but it is unstable and vulnerable due to early flood and natural calamities remains fallow due to sand deposition. Some land remains uncultivated and covered by wild grass like Kashbon. The land types of this union are high land (11%), medium high land (48%), Medium low land (22%), and low land (18%) and also fallow land (1%). Decreer Char union has 5 Mauza and 30 villages with the area of 2305.67 ha. National Land zoning project, May 2016, Decreer Char Union was identified and proposed as **Agriculture –Erosion Prone Char Land Zone**. Soil texture is silt loam to clay loam and the soil P^H is 6.3-7.5. Decreer Char Union having agriculture cultivated area of 3029 ha of land of which net cropped area is 1512ha. The highest land area is 987(65.28%) ha is used as double crops and followed by triple crops of 265(17.52%) ha and remaining 260(17.20%) ha is used as single crops. The cropping intensity of this union is 200%. The land of Decreer Char Union is suitable for cultivation of paddy, Ground nut, Jute, Mustard, Wheat, Potato, Onion, year round vegetables and Rabi crops (Land Zoning Report, May 2016 &SAAOs November 2016). At present twenty three cropping patterns are practiced under Decreer Char Union which is shown in Table 3.8. Jute and Onion, Garlic, Groundnut are principal cash crops in this Union. Land use is changeable and duration of crop period is short and uncertain due to flood and natural hazards. More than thirty different crops are suitable for cultivation in char land during Rabi and early Kharif season and large number of them are high value cash crops.

Table 3.8: Present Cropping Patterns of Decreer Char Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Decreer Char	1512	Wheat□Jute□ T.Aman	200	35	2.31
		Weat□Jute□ Fallow		158	10.45
		Mustard/Kheshari□ Aus□ Fallow		110	7.28
		Boro□ Fallow-□ Fallow		128	8.47
		Mustard□Boro-□T.Aman		60	3.97
		Mustard/Kheshari□Fallow□ Aman		92	6.08
		Groun nut□ Fallow□ Aman		78	5.16
		Wheat□ Jute□Mungbean		47	3.11
		Pulses□ Ground nut□ Fallow		90	5.95
		Onion/Garlic□Boro□Mungbean		30	1.98

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
		Onion Aus Fallow		43	2.84
		Onion/Garlic Jute--Fallow		88	5.82
		Mustard Jute Fallow		40	2.65
		Pulses Jute- Fallow		50	3.31
		Pulses Boro Fallow		98	6.48
		Ground nut Til B.Aman		116	7.67
		Spices Aus Fallow		25	1.65
		Ground nut Fallow Mungbean		112	7.41
		Til Jute Fallow		35	2.31
		Vegetables Vegetables Vegetables		27	1.79
		Vegetables Jute Fallow		25	1.65
		Chili Jute Fallow		15	0.99
		Banana Banana Banana		10	0.66
		Total		1512	100.00

Source: SAAOs of Char Decreer Char Union 2016

Major Problems on Crop Cultivation

The major problems in Decreer Char Union crop cultivation are: (i) Early flood damages the crops, (ii) Sand deposition on agricultural land affecting normal crop cultivation,(iii) Severe river erosion damages valuable land and properties, (iv) Kutcha irrigation drainage system, (v) Water stagnation, (vi) lack of quality seed & equipments supply,(vii) Kutcha road and damaged ,(viii) Oppression of jotdars(land grabber) and their hooligans in the char land areas, (ix) Acute shortage of food, drinking water and proper sanitation and (x) Communication and marketing facilities are very poor and (xi) Affected people have to migrate for their livelihood in city area.

Recommendation

(1) Construction of embankment for controlled of river erosion and protecting crops from early flood,

(2) Development of irrigation and other quality crop production inputs facilities, (2) Cold storage facility should be provided to preserve the perishable products, (3)Improvement of road communication system,(4) Farmers training on modern agriculture practices and proper uses of organic and inorganic fertilizers and pesticides ,(5) Large scale tree plantation by social forest program, 6) Char infrastructural development plan are essential for this union, (7) Construction of vegetables and spices processing, grading and packaging industry/ facility and Establishment of agro-based industry ,and(8) Communication & market facilities need to developed, (9) Re-excavation of old and silted canals ,and(10) Needs sustainable development of agricultural plan for char land areas.

3.4.5 Greda Union Land Use

General Description

Greda Union is situated to the south with Nagarka Upazila. Land type is the dominant factor guiding choice of crops and cropping patterns of Greda Union. Selection of crop largely

depends on topographic position of land. The land types of this union are high land (16.24%), Medium high land (35.06%), medium low land (39.61%) and low land (6.82%) and also fallow land (2.27%). Land are moderate fertile, productive and highly potential for agriculture uses. This Union has 13 Mauza and 16 villages with the area of 2323.48 ha. Greda Union falls into 2 Agro-ecological zones are (i) Active Ganges Floodplain (AEZ-10) and (ii) Lower Ganges River Floodplain (AEZ-12). National Land zoning project, May 2016, Greda Union was identified and proposed as Agriculture Zone. Soil texture is loam to silt loam and the soil P^H is 6.0—8.5. Greda Union having agriculture cultivated area of 4089 ha of land of which net cropped area is 1520 ha. The cropping intensity of this union is 269%. The highest land area is 1095(72.04%) ha is used as triple crops and followed by double crops of 363(23.88%) ha and remaining 60(3.95%) ha is used as single crops and 35(0.13%) is used for more than three crops. This Union is suitable for diversify crops cultivation of paddy, Wheat, Jute, Onion, Sesame, Mustard and year round vegetables (Land Zoning Report, May 2016 & SAAOs, November 2016). Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water. At present twenty different cropping patterns are practiced under Greda Union which is shown in Table 3.9. In agriculture, multiple cropping is practice of growing two or more crops in the same space during a single growing season. This union is mainly aro-based economy and it is famous for producing high quality of Jute, rabi crops and rice. This Union has 3 brick fields.

Table 3.9: Present Cropping Patterns of Greda Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Greda	1520	Kheshari□Jute□ T.Aman	269	105	6.91
		Weat□Jute□ T.Aman		400	26.32
		Boro□ Fallow□ Fallow		25	1.64
		Boro□ Fallow-□ T.Aman		215	14.14
		Mustard□Jute□T.Aman		85	5.59
		Onion□ Jute□T.Aman		50	3.29
		Garlic□ Boro□ T.Aman		10	0.66
		Garlic/Malon/Lentil□Fallow□ T.Aman		8	0.53
		Onion□ Boro□ T.Aman		30	1.97
		Mustard/Lentil□Til□T.Aman		20	1.32
		Wheat□Jute□ B.Aman		50	3.29
		Spices□ Jute□ T.Aman		220	14.47
		Pulses□ Jute-□ T.Aman		82	5.39
		Pulses□Aus□ T.Aman		55	3.62
		Til□Jute□ T.Aman		5	0.33
		Onion□Vegetables□T.Aman		27	1.78
		Vegetables□Vegetables□ Vegetables		71	4.67
		Sugarcane□ Sugarcane□ Sugarcane		18	1.18
		Orchard□Orchard-□Orchard		14	0.92
		Wheat□ Aus/Jute□ Fallow		30	1.97
		Total		1520	100.00

Source: SAAOs of Greda Union 2016

Major Problems on Crop Cultivation

The major problems in Greda Union crop cultivation are: (i) High potential cultivable agricultural lands are reducing rapidly due to unplanned infrastructural activities, river erosion, silted most of the canals, (i) Risk of early flood and excessive rainfall and water stagnation,(ii) Shortage of cold storage and wholesale market infrastructure , (iii) Scarcity of quality seed and lack of modern agricultural equipments and lack of knowledge reduce crop yield and crop diversification, (iv) Higher cost of LLP,STW, fuel, pesticides etc, (vi) lack of electricity supply hampers irrigation for boro and other irrigated crops,(vii) Essential plant nutrient deficiencies, lack of awareness on proper management of land and over & under uses of pesticides and chemical fertilizers,(viii)Drought and cold wave create negative impact on crop diversification of crops,(ix) Lack of farmers knowledge on modern crop production technology and (x) Agriculture labor crisis and high wage rate.

Recommendation

(1) Development of irrigation facilities by excavation of new and old canals and river , (2) Kutcha irrigation drainage need to be pucca, (3) Multipurpose Cold storage facility should be provided to preserve the perishable products, (4) Ensure uninterrupted power supply to irrigation pumps, (5) Farmers training on modern agriculture practices and proper uses of organic and inorganic fertilizers and pesticides, (6)Construction of vegetables and fruits processing, grading and packaging industry/ facility and establishment of agro-based industry, (7) Proper plan are essential for this union infrastructural development activities which will save the productive agricultural lands, and (8) Ensure HYV of short duration and drought & water logging tolerant crop variety seeds, (9) select best available seeds from market, (10) Following fertilizer recommendation by soil testing, (11) Developing market infrastructures and road communication at local level, (12) Arranging farmers technological training on crop production and also allocating sufficient credit for farmers and (13) Need to be reduced new or existing unplanned infrastructure and urban expansion by implementing land zoning law, village development act and preparation of development plan fourteen Upazila package-03.

3.4.6 Ishan Gopalpur Union Land Use

General Description

Multiplicity and diversify of cropping system has been one of the main feature of the Union. Union is situated bordering to the north with Goalanda and Rajbari Sadar Upazila . This Union has got high potentials for its lands and agricultural production. National Land zoning project, May 2016, Ishan Gopalpur Union was identified and proposed as **Agriculture Zone**. This union has 13 Mauza and 13 villages with the area of 3552.63ha. Field study data shows that Ishan Gopalpur Union comprises predominantly with Medium high land (45.51%), followed by medium low land (23.40%), high land (15.76%), low land (6.11%), very low land (0.99%) and fallow land (8.23%). Ishan Gopalpur Union organic matter contents are low in the high land, but moderate in the lower parts. Moisture holding capacity of soil is low to medium. The top soil P^H level ranges from 6.0-7.9.[1] Ishan Gopalpur Union having total agriculture cultivated area of 6344 ha of land of which net cropped area is 2329 ha. Major

land area is 1775(76.21%) ha is used for triple crops and followed by double crops of 360(15.46%) ha and remaining 159(6.83%) ha is used as single crops and 35(1.15%) is used for more than three crops. The cropping intensity of this union is 272% which is higher than average Faridpur Sadar Upazila cropping intensity (232%). At present twenty four different cropping patterns are practiced Ishan Gopalpur Union which is shown in Table 3.10. This Union is suitable for cultivation of paddy, Wheat, Jute, Onion, pulses, Mustard and year round vegetables and rabi crops (Land Zoning Report, May 2016 & SAAOs November 2016. This Union has 3 brick fields.

Table 3.10: Present Cropping Patterns of Ishan Gopalpur Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Ishan Gopalpur	2329	Wheat□Jute□ T.Aman	272	345	14.81
		Weat□Jute□ Fallow		80	3.43
		Boro□ Fallow□ Fallow		95	4.08
		Boro□ Fallow-□ T.Aman		80	3.43
		Boro□Fallow□ B.Aman		60	2.58
		Pulses□Jute□T.Aman		247	10.61
		Mustard□ Jute□T.Aman		85	3.65
		Spices□ Jute□ T.Aman		145	6.23
		Pulses□Jute□ Fallow		120	5.15
		Spices□ Jute□ Fallow		33	1.42
		Spices□Aus□ T.Aman		45	1.93
		Onion□Jute□T.Aman		395	16.96
		Onion/Garlic□Jute□ Fallow		40	1.72
		Pulses□ Til□ T.Aman		130	5.58
		Pulses□ Til-□ Fallow		30	1.29
		Pulses□Aus□ B.Aman		130	5.58
		Pulses□ Aus□ T.Aman		15	0.64
		Oilseeds□Jute□ Fallow		40	1.72
		Pulses/Oilseed-□Chili-□ Chili		15	0.64
		Vegetables□Vegetables□ Vegetables		105	4.51
		Tobacco□ Jute□ T.Aman		18	0.77
		Potato□Aus□ T.Aman		5	0.21
		Sugarcane□ Sugarcane□ Sugarcane		7	0.30
		Banana/Papaya□Banana/Papaya□ contd		64	2.75
		Total		2329	100.00

Source: SAAOs of Ishan Gopalpur Union 2016

Major Problems on Crop Cultivation

The major problems in Ishan Gopalpur Union crop cultivation are: (i) Less supply of quality HYV/Hybrid different crop seeds and modern agricultural equipments, (ii) Drought and inadequate electricity supply hampers irrigation for boro and other irrigated crops,(iii) No cold storage and seed store for vegetables , (iv) Higher cost of LLP,STW, fuel, pesticides etc,(v) Most of canals are silted and irrigation drainage are kutcha, (vi) Less market price for

produce crops, agricultural labor crisis and high wage rate, (vii) Converted highly productive agricultural land to non-agricultural purposes is a acute problem in this Union,(viii) There is no infrastructural development plan for this Union, (ix) Poor communication and market infrastructure rural level , (x) Lack of awareness on proper management of land and improper use of pesticides and chemical fertilizers and (xi) Top soil cutting and decrease of productive agricultural land.

Recommendation

(1) Adopting modern cultivation techniques and growing vegetables predominantly, (2) Ensure quality high yield and drought tolerant and early crop varieties,(3) Excavation and re-excavation of canals and also connecting with river or khal, (4) Kutcha irrigation drainage need to be pucca or underground pipe system, (5) Multipurpose Cold storage facility should be provided to preserve the perishable products, (6) Ensure required electricity supply during irrigation period, (7) Following fertilizer recommendation by soil testing (8) Construction of vegetables and fruits processing, grading and packaging industry/ facility and establishment of agro-based industry,(9) Preparation of long term infrastructural development plan for this Union which will save the productive agricultural lands,(10) Protect productive agricultural land by implemented and maintained through the enforcement of land zoning law and village improvement act and preparation of development plan for fourteen Upazila, pakage-03 and (11) Training on modern agriculture practices and proper uses of fertilizer and pesticides.

3.4.7 Kaujuri Union Land Use

General Description

In Kaujuri Union land is highly suitable and potential for diversified agricultural crop cultivation. This Union is situated bordering to the south with Nagarkanda Upazila. Kaujuri union consists of 21 Mauza and 40 villages with the area of 4172.06ha. National Land zoning project, May 2016, Kaujuri Union was identified and proposed as **Agriculture Zone**. Kaujuri Union falls into Agro-ecological zones is Lower Ganges River Floodplain (AEZ-12). Field study data shows that Kaujuri Union comprises predominantly with Medium high land (58.07%), followed by medium low land (26.39%), low land (8.91%), high land (5.74%), and very low land (0.89%). General soil color of Kaujuri Union is grey to dark grey. Moisture holding capacity of soil is low to medium. The top soil P^H level ranges from 6.4-7.5. Kaujuri Union having total agriculture cultivated area of 9817 ha of land of which net cropped area is 3650 ha. The highest land area is 2533(69.40%) ha is used for triple crops and followed by double crops of 1020(27.94%) ha and remaining 70(1.92%) ha is used as single crops and 27(0.74%) is used for more than three crops. The cropping intensity of this union is 269% which is higher than average Faridpur Sadar Upazila cropping intensity (232%). This Union is suitable for cultivation of paddy, Maize, Jute, Onion, pulses, sugarcane and year round vegetables and Rabi crops (Land Zoning Report, May 2016 & SAAOs, November 2016). This Union has 7 brick fields. At present nineteen different cropping patterns are practiced by Kajuri Union farmers which are shown in Table 3.11. This indicates that farmers have access to crop diversification and cultivated high value crops.

Table 3.11: Present Cropping Patterns of Kaujuri Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Kaujuri	3650	Wheat□Jute□ T.Aman	269	800	21.92
		Weat□Jute□ Fallow		155	4.25
		Boro□ Fallow□ Fallow		55	1.51
		Boro□ Fallow-□ T.Aman		410	11.23
		Boro□Fallow□ B.Aman		90	2.47
		Pulses□Jute□T.Aman		305	8.36
		Mustard□ Jute□T.Aman		159	4.36
		Spices□ Jute□ T.Aman		195	5.34
		Pulses□Aus□ T.Aman		96	2.63
		Onion□Jute□T.Aman		814	22.30
		Wheat□Aus□ T.Aman		50	1.37
		Pulses /mustard□ Til□ T.Aman		63	1.73
		Pulses□□Aus□ B.Aman		59	1.62
		Mustard□ Boro□ Fallow		25	0.68
		Pulses-□Chili-□ Chili		15	0.41
		Vegetables□Vegetables□ Vegetables		312	8.55
		Potato□□Vegetables□ Vegetables		12	0.33
		Sugarcane□ Sugarcane□ Sugarcane		20	0.55
		Banana/Papaya□Banana/Papaya□ contd		15	0.41
		Total		3650	100.00

Source: SAAOs of Kaujuri Union 2016

Major Problems on Crop Cultivation

The major problems in Kaujuri Union crop cultivation are: (i) Most of the canals and river are silted and water logging and irrigation drainage are kutcha, (ii) No cold storage and lack of seed store, (iii) No vegetables wholesale market and infrastructure, (iv) Less supply of quality HYV different crop seeds, (v) Farmers lack of knowledge on modern crop production technology, (vi)) Lack of awareness on proper management of land and improper uses of pesticides and chemical fertilizers, (vii Converted highly productive agricultural land to non-agricultural purposes is a acute problem in this Union, (viii)Less supply of cultivator and irrigation equipment & high price,(ix) Top soil cutting & decrease agricultural land ,(x) Inadequate electricity supply during Boro season and (xi) Temperature fluctuate & changes in rainfall pattern .

Recommendation

(1) Ensure quality high yield and pest & disease resistant, drought tolerant crop varieties,(2) Development of communication and wholesale vegetables market infrastructure (3) Kutcha irrigation drainage need to be made pucca or underground pipe system, (4) Multipurpose Cold storage facility should be provided to preserve the perishable products, (5) , Excavation and re-excavation of canals and river, (6) Growing one leguminous crop (Dhaincha/Pulses/ Fodder etc.) between two cereal crops,(7) Following fertilizer recommendation by soil

testing, (8) Farmers Technological training for adopting modern crop production technology, and (9) Preparation of long term infrastructural development plan for this Union which will save the productive agricultural lands (10) Uninterrupted power supply to irrigation pump, and (11) observing weather conditions and follow weather forecast

3.4.8 Kanaipur Union Land Use

General Description

The industrial and commercial zone has been established at Kanaipur located about 5km west of Faridpur town on the Faridpur-Jessore Highway. There is a big market, jute purchasing centre and other commercial infrastructure located here. Due to good communication and other facilities the urbanization and commercial activities are expanding on agricultural land. National Land zoning project, May 2016, Kanaipur Union was identified and proposed as **Mixed Use Zone (Agriculture-Semi Urban and Commercial).** In Kanaipur Union land is highly suitable and potential for multiple agricultural crop cultivation. This Union consists of 24 Mauza and 32 villages with the area of 3780.16ha. Kanaipur Union falls into Agro-ecological zones is Lower Ganges River Floodplain (AEZ-12). 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. Field survey data shows that Kanaipur Union comprises predominantly with medium low land (41.02%), followed by medium high land (27.78%), low land (15.88%), very low land (7.94%), high land (6.61%), and fallow land (0.77%). The top soil P^H level ranges from 6.0-7.5. This Union having agriculture cultivated crop area of 8171 ha of land of which net cropped area is 2917 ha. Major land area is 2487(85.26%) ha is used for triple crops and followed by double crops of 280(9.60%) ha and remaining 15(5.14%) ha is used for single crops. This Union is suitable for cultivation of paddy, Maize, Jute, Onion, pulses, sugarcane and year round vegetables and Rabi crops (Land Zoning Report, May 2016 & SAAOs November 2016). At present nineteen different cropping patterns are practiced Kanaipur Union which is shown in Table 3.12. The cropping intensity of this union is 280% which is higher than average Faridpur Sadar Upazila cropping intensity (232%).

Table 3.12: Present Cropping Patterns of Kanaipur Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Kanaipur	2917	Wheat□Jute□ T.Aman	280	970	33.25
		Weat□Jute□ Fallow		80	2.74
		Boro□ Fallow□ Fallow		10	0.34
		Boro□ Fallow-□ T.Aman		87	2.98
		Rabi crops□Boro□T.Aman		20	0.69
		Spices□Jute□ Fallow		29	0.99
		Lentil□Jute□T.Aman		412	14.12
		Mustard□ Jute□T.Aman		175	6.00
		Spices□ Jute□ T.Aman		175	6.00
		Pulses□B .Aus□ B.Aman		10	0.34
		Onion□Jute□T.Aman		315	10.80

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
		Onion/Garlic Jute Fallow		80	2.74
		Pulses Til T.Aman		40	1.37
		Kheshari B .Aus B.Aman		145	4.97
		Mustard Boro Fallow		45	1.54
		Pulses- Aus T.Aman		150	5.14
		Vegetables Vegetables Vegetables		95	3.26
		Sugarcane Sugarcane Sugarcane		75	2.57
		Banana/Papaya Banana/Papaya contd		4	0.14
		Total		2917	100.00

Source: SAAOs of Kanaipur Union 2016

Major Problems on Crop Cultivation

The major problems in Kanaipur Union crop cultivation are: (i) Productive agricultural lands are reducing due to construction of houses and industries on agricultural land, river erosion, sand deposition on agricultural land and top soil cutting, (ii) Most of the canals and river are silted, water stagnation and irrigation drainage are kutcha, (iii) Farmers lack of knowledge on modern crop production technology, (iv) Shortage of cold storage , (v) Lack of awareness on proper management of land and improper uses of pesticides and chemical fertilizers,(vi) Agriculture labor crisis, high wage rate and Less market price of produce agricultural crops and production cost is high, vii) Bank loan interest is high, and (viii) Industrial effluent, (ix)High cost LLPs, STWs, fuel and pesticides ,(x)Risk of flooding and(xi) Drought and cold wave create negative impact on diversification of crops and (xii) Unplanned expansion of commercial and urban area.

Recommendation

(1) Development of irrigation facilities by excavation and re-excavation of canals, (2) Kutcha irrigation drainage need to be made pucca or construction of underground pipe system, (3) Ensure quality high yield and Hybrid vegetables and spices seeds, ((4) Construction of modern and multipurpose cold storage and food go-down, (5) Development of wholesale vegetables market infrastructure, (6) Farmers training on adopting modern crop production technology, use of vermi-compost, proper use fertilizer and pesticides, (7) Arranging allocating sufficient credit in less interest rate for farmers and (8) Preparation of long term infrastructural development plan for this Union which will save the productive agricultural lands,(9)Protection of double & triple crop land need to be Implemented land zoning law, village improvement act and preparation development plan for fourteen Upazila, pakage-03,(10)Integrated effort for industrial effluents and waste management, (11) Information on quality seed and monitoring water quality and (12) Rice and non-rice integrated farming.

3.4.9 Krishnanagar Union Land Use

General Description

Plantation programs are getting priority in both public and private sectors. The plantations of forest have some advantages over agriculture due to very easy management, less labor intensive, low input cost and relatively high economic output. Afforestation programs also helps in improving the socio-economic condition of the rural people by generating employment in raising nursery and plantation activities. Land of Krishnanagar Union is highly potential for agriculture crop production and also popular for forest area. This Union has 80ha land used as forest. National Land zoning project May 2016, Krishnanagar Union was identified and proposed as **Agriculture-Farm Land Forest Zone**. This Union is situated bordering to the west with Madhukhali Upazila. This union consists of 28 Mauza and 29 villages with the area of 4387.04ha. Krishnanagar Union falls into 2 Agro-ecological zones are (i) Active Ganges Floodplain (AEZ-10) and (ii) Lower Ganges River Floodplain (AEZ-12). Land type is the dominant factor guiding choice of crops and cropping pattern in Krishnanagar Union. This Union comprises predominantly with medium low land (26.25%), followed by medium high land (32.08%), high land (21.26%), low land (13.49%), very low land (0.55%), and fallow land (6.37%). The top soil P^H level ranges from 6.0-7.2. Krishnanagar Union having agriculture cultivated crop area of 9145 ha of land of which net cropped area is 3776 ha. Selection of crops depends on topographic position of land. The highest land area is 1841(48.76%) ha is used for double crops and followed by triple crops of 1722(45.60%) ha and remaining 185(4.90%) ha is used for single crops and 28(0.74) ha used as more than three crops. Wide range of Rabi and Kharif crops are grown here such as paddy, Maize, Jute, Onion, pulses, Sugarcane, Garlic, and year round vegetables (Land Zoning Report, May 2016 & SAAOs November 2016). The cropping intensity of this union is 242% which is higher than average Faridpur Sadar Upazila cropping intensity (232%). At present fourteen different cropping patterns are practiced Krishnanagar Union which is shown in Table 3.12. Among the present cropping pattern, the highest contribution cropping pattern are Wheat –>Jute→T.aman (34.30%) and Lentil→Jute-→T.Aman(17.16%).

Table 3.13: Present Cropping Patterns of Krishnanagar Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Krishnanagar	3776	Wheat□Jute□ T.Aman	242	1295	34.30
		Boro□ Fallow□ Fallow		185	4.90
		Boro□ Fallow-□ T.Aman		234	6.20
		Lentil□Jute□T.Aman		648	17.16
		Mustard□ Jute□T.Aman		150	3.97
		Spices (Dhania/Kaligira))□ Jute□ T.Aman		372	9.85
		Pulses□T .Aus□ B.Aman		59	1.56
		Onion□Jute□T.Aman		240	6.36
		Lentil□ Chili□ T.aman		65	1.72
		Lentil□ Til□ T.Aman		162	4.29
		Kheshari□ Fallow□ T.Aman		81	2.15

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
		Vegetables□Vegetables□ Vegetables		140	3.71
		Sugarcane□ Sugarcane□ Sugarcane		130	3.44
		Banana/Papaya□Banana/Papaya□ contd		15	0.40
		Total		3776	100.00

Source: SAAOs of Krishnanagar Union 2016

Major Problems on Crop Cultivation

The major problems in Krishnanagar Union crop cultivation are: (i) Farmers lack of knowledge on modern crop production technology, (ii) Shortage of cold storage & seed store and lack of wholesale market infrastructure, (iii) Bad road communication and poor transportation, (iv) Shortage of high quality HYV & Hybrid crop seeds and cultivation equipments,(v) Agriculture labor crisis, high wage rate and Less market price of produce agricultural crops and production cost is high, (vi) Productive agricultural lands are reducing due to construction of houses and industries on agricultural land and top soil cutting, (vii) Lack of awareness on proper management of land and improper uses of pesticides and chemical fertilizers,(viii) Risk of early flood, (ix) Most of the canals silted, water stagnation and irrigation drainage are kutcha, and (x) Decrease agricultural land due to Non-agricultural development on productive agriculture land and also unplanned infrastructure and urban expansion is a chronic problem.

Recommendation

(1) Farmers Technological training for adopting modern crop production technology, (2) Construction of modern and multipurpose cold storage and seed store, (3) Ensure quality high yield and Hybrid vegetables and other crop seeds and cultivation & irrigation equipments, (4) Development of irrigation facilities by excavation and re-excavation of canals, (5) construction of underground irrigation pipe system, (6) Development of wholesale vegetables market infrastructure, (7) Arranging allocating sufficient credit in less interest rate for farmers, (8) Preparation of long term infrastructural development plan for this Union which will save the productive agricultural lands, and (9)Increasing awareness among the people and land users for conservation of land, (10) Uninterrupted power supply to irrigation pumps and (11) Choosing high yield and drought tolerant varieties.

3.4.10 Maj Char Union Land Use

General Description

Since the national forests in Bangladesh are shrinking rapidly due to encroachments resulting from serious population pressure, so in recent year's plantation forest in the vacant land especially in farm land have been increased remarkable in the Upazila. The plantations of forest have some advantages over agriculture due to very easy management, less labor

intensive, low input cost and relatively high economic output. As because of the acute shortage of timber and fuel wood in Bangladesh, a priority program of introducing fast growing tree species was taken up. Afforestation programs also help in improving the socio-economic condition of the rural people. This Union is situated bordering to the west with Rajbari Sadar Upazila of Rajbari district. Maj Char union consists of 12 Mauza and 14 villages with the area of 4402.02ha. Land of Maj Char Union is highly suitable for multiple crop production and also suitable for plantation of forest tree. Maj Char Union has established 125ha plantation forest land. National Land zoning project, May 2016, Maj Char Union was identified and proposed as **Agriculture-Farm Land Forest Zone.** This Union land falls into Lower Ganges River Floodplain (AEZ-12). Union comprises predominantly with medium high land (61.28%), followed by high land (24.49%), medium low land (8.86%), low land (2.97%), and fallow land (2.40%). The top soil P^H level ranges from 6.5-7.9. Maj Char Union having agriculture cultivated crop area of 4992 ha of land of which net cropped area is 1873 ha. Selection of crops depends on topographic position of land and also ecological conditions and irrigation facilities. The highest land area is 1261(67.33%) ha is used for triple crops and followed by double crops of 552(29.47%) ha and remaining 45(2.40%) ha is used for single crops and 15(0.80%) ha is used for four crops. The cropping intensity of this union is 266% which is higher than average Faridpur Sadar Upazila cropping intensity (232%). At present twenty-five different cropping patterns are practiced in Maj Char Union which is shown in Table 3.14. Among the present cropping pattern, the highest contribution cropping pattern are Wheat –>Jute→T. Aman (31.13%) and Boro→ Fallow-→T. Aman (12.81%).This clearly indicated that Farmers are producing diversify crops round the year. Wide ranges of Rabi and Kharif crops are cultivated such as Rice (Boro, Aus, T. Aman), Jute, Onion, pulses, Sugarcane, Garlic, and year round vegetables grown here (Land Zoning Report, May 2016 & SAAOs November 2016). This Union has 12 brick field.

Table 3.14: Present Cropping Patterns of Maj Char Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Maj Char	1873	Wheat□Jute□ T.Aman	266.52	583	31.13
		Wheat□Jute-□Fallow		135	7.21
		Wheat□ Aus□T.Aman		35	1.87
		Boro□ Jute□ T.Aman		110	5.87
		Boro□ Fallow-□ T.Aman		240	12.81
		Boro□Dhaincha□T.Aman		17	0.91
		Boro□Fallow□Fallow		40	2.14
		Boro□Aus□ T.Aman		55	2.94
		Mustard□Boro□Fallow		50	2.67
		Mustard□Til□T.Aman		40	2.14
		Mustard□Jute□T.Aman		65	3.47
		Lentil□Til□T.Aman		95	5.07
		Lentil□ Jute□T.Aman		80	4.27
		Spices (Dhania/Kaligira))□ Jute□ T.Aman		99	5.29

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
		Kheshari□.Aus□ Fallow		30	1.60
		Pulses(Mator/Mungbean)□Jute□T.aman		12	0.64
		Onion/Garlic□ Boro□T.Aman		14	0.75
		Onion□Jute□ T.aman		13	0.69
		Pulses(Mungbean/Mashkalai□ Jute□ T.aman		6	0.32
		Turmeric□ Turmeric□ Turmeric		7	0.37
		Chili□ Cucumber□ Bean		9	0.48
		Vegetables□Vegetables□ Vegetables		87	4.64
		Water Kachu□Water kachu□Water Kachu		10	0.53
		Sugarcane□ Sugarcane□ Sugarcane		17	0.91
		Banana/Papaya□Banana/Papaya□contd		24	1.28
		Total		1873	100.00

Source: SAAOs of Maj Char Union 2016

Major Problems on Crop Cultivation

The major problems in Maj Char Union crop cultivation are: (i) Irrigation drainage are kutcha which is wastage of water and also reduce the target area, (ii) Scarcity of high quality HYV & Hybrid crop seeds and cultivation & irrigation equipments and high price, (iii) Shortage of cold storage & seed store and lack of wholesale market infrastructure, (iv) Most of the canals are silted,(v) Farmers lack of knowledge on modern crop production technology, (vi) Inadequate supply of electricity during Boro season,(vii) Less market price of produce agricultural crops and production cost is high, and (viii) Decrease agricultural land due to Non-agricultural development on productive agriculture land and also unplanned infrastructure and urban expansion is a acute problem, and (ix) Old canals are silted, sand deposition on agricultural land and top soil cutting etc and (x) Risk of early flood and irregular rainfall.

Recommendation

(1) Kutcha irrigation drainage to be pucca or construction of underground irrigation pipe system which will be reduced wastage of irrigation water, (2) Construction of modern and multipurpose cold storage and seed store, (3) Ensure quality high yield and Hybrid vegetables and other crop seeds and cultivation & irrigation equipments, (4) Development of irrigation facilities by excavation and re-excavation of canals, (5) Development of wholesale vegetables market infrastructure, (6) Ensure required electricity supply during irrigation period, (7) Farmers Technological training for adopting modern crop production technology, (8) Preparation of long term infrastructural development plan for this Union which will save the productive agricultural lands and (9) Protection of agricultural land need to be implemented and maintained through the enforcement of land zoning law and village law and village improvement act and preparation development plan for fourteen Upazila, pakage-03, (10)

Developing market infrastructures and road communication at local level and (11)Increasing agriculture production through optimum use of land and protecting land degradation.

3.4.11 Uttar Channel Union Land Use

General Description

The Union is bordering to the north with Goalanda of Rajbari district and Shibalaya and Harirampur Upazilas of Manikganj district. This Union is covered by char land. Uttar Channel Union is thinly populated. Newly accreted cha land, deposition of sand which is unsuitable for crop production and river erosion prone, and also early flood water damaged crops. Agricultural production is highly dependents on adaptable climatic conditions. Some land remains uncultivated and covered by wild grass like Kashbon. The land types of Uttar Channel union are medium low land (41.19%) followed by medium high land (29.03%), low land (15.24%), and very low land (4.64%) and also fallow land (10%). Uttar Channel union has 9 Mauza and 85 villages with the area of 5365.99 ha. National Land zoning project, May 2016, Uttar Channel Union was identified and proposed as **Agriculture –Erosion Prone Char Land Zone**. Soil texture is loam to silt loam and the soil P^H is 6.0-6.9. This Union land is changeable and duration of crop period is short and uncertain due to flood and natural hazard. Uttar Channel Union having agriculture cultivated area of 3442 ha of land of which net cropped area is 6981ha. The cropping intensity of this union is 203% which is less than average cropping intensity of Faridpur Sadar Upazila (232%). The highest land area is 3035(88.18%) ha is used for double crops and followed by triple crops 252 (7.32%) ha and remaining 155(4.50%) ha is used as single crops. At present 18 cropping patterns are practiced by farmers under Uttar Channel Union which is shown in Table 3.15. Crop land areas are occupied with paddy cultivation in Uttar Channel Union. Other crops like Jute, Mustard, Wheat, Potato, Pulses, Onion, Turmeric, Banana and vegetables are also included in cropping pattern of this Union.

Table 3.15: Present Cropping Patterns of Uttar Channel Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Uttar Channel	3442	Wheat□□Jute□ Fallow	203	415	12.06
		Boro□ Fallow-□ Fallow		160	4.65
		Pulses (Mashkalai)□Boro-□Fallow		280	8.13
		Til□ Jute□ Fallow		97	2.82
		Pulses (Mashkalai)□Ground nut□B.Aman		460	13.36
		Spices□Jute/B.Aus□ Fallow		250	7.26
		Onion/Garlic□ Jute/B.Aus□ Fallow		288	8.37
		Onion/Garlic□Boro/Aus□Fallow		250	7.26
		Pulses/Potato□ B.Aus□ B. Aman		391	11.36
		Mustard□ Boro□ Fallow		90	2.61
		Pulses/Oilseeds□ B.Aus□ Fallow		100	2.91
		Pulses□Til□ Fallow		100	2.91

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
		Pulses Maize Fallow		120	3.49
		Wheat Aus Fallow		150	4.36
		Spices Aus Fallow		50	1.45
		Vegetables Vegetables Vegetables		140	4.07
		Kachu Kachu kachu		10	0.29
		Banana Banana Banana/Papaya		91	2.64
		Total		3442	100.00

Source: SAAOs of Uttar Channel Union 2016

Major Problems on Crop Cultivation

The major problems in Uttar Channel Union crop cultivation are: (i) Sand deposition on agricultural land affecting normal crop cultivation,(ii) Severe river erosion damages valuable land and properties, (iii) Early flood damages the crops, (iv) Water stagnation, silted canals and Kutcha irrigation drainage system, (v) Acute shortage of food, safe drinking water and drought, (vi) lack of quality seed & equipments supply,(vii) Kutcha road and damaged ,(viii) Oppression of jotdars (land grabber) and their hooligans in the char land areas, and(ix) Affected people have to migrated for their livelihood in city area and (x) Shortage of cold storage & seed store and lack of wholesale market infrastructure.

Recommendation

(1) Construction of embankment for controlled of river erosion and protecting crops from early flood

(2) Development of irrigation and other quality crop production inputs facilities, (3) Ensure supply of quality drought tolerant and HYV/Hybrid short durable crops seeds and equipments in subsidized price (4) Multipurpose cold storage and market infrastructural facility should be provided to preserve the perishable products, (4)Improvement of road communication system,(5) Farmers training on modern agriculture practices and proper uses of organic and inorganic fertilizers and pesticides ,(6) Large scale tree plantation by social forest program, and (7) It is an urgent issue and needs sustainable development plan to solve the problem of this char lands.

3.4. 12 Faridpur Sadar Paurashava Land Use

General Description

Agricultural land is limited in context of increasing population of Faridpur Sadar Paurashava. In Faridpur Sadar Paurashava, a substantial area of agricultural land had shifted to a non-agricultural one viz construction of houses, brickfield, sawmill, road, market, urban expansion and other unplanned infrastructure. National Land zoning project, May 2016, Faridpur Sadar Paurashava was identified and proposed as **Paurashava** area. This paurashava falls into Agro-ecological zones are Lower Ganges River Floodplain (AEZ-12). Faridpur Paurashava consists of 9 Wards and 41 Paura Mahalla with the area of 5365.99 ha. The land

types of this Paurashava are medium high land (70%)and followed by high land (16.67%), medium low land (13.33%). Soil texture is loam to clay loam and the soil P^H is 6.3-7.7. Faridpur Sadar Paurashava having agriculture cultivated area of 536 ha of land of which net cropped area is 240ha. The highest land area is 150(62.50%) ha is used as double crops and followed by triple crops of 73(30.42%) ha and remaining 17(7.08%) ha is used as single crops. The cropping intensity of this union is 223% which is less than average cropping intensity of Faridpur Sadar Upazila. Land is moderately fertile. Faridpur Sadar Paurashava is suitable for cultivation of paddy, Jute, Mustard, Wheat, Pulses, Onion, year round vegetables and Rabi crops (Land Zoning Report, May 2016 & SAAOs November 2016). At present 16 cropping patterns are practiced under Faridpur Sadar Paurashava which is shown in Table 3.16. Paddy, Jute and Onion, Wheat are principal crops in this Paurashava. Less risk of flood.

Table 3.16: Present Cropping Patterns of Faridpur Sadar Paurashava

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Faridpur Sadar Paurashava	240	Wheat□Jute□ T.Aman	223	57	23.75
		Boro□ Fallow□ T.Aman		4	1.67
		Mustard□ Boro□ Fallow		6	2.50
		Boro□ Fallow-□ Fallow		8	3.33
		Pulses□ Aus□T.Aman		5	2.08
		Pulses□Jute□T.Aman		14	5.83
		Oilseeds□Jute□ T. Aman		10	4.17
		Spices□ Jute□ T. Aman		20	8.33
		Onion□ Jute□T.Aman		5	2.08
		Pulses□ Til□ T.Aman		10	4.17
		Pulses□ Aus□B.Aman		30	12.50
		Wheat□Fallow□T.Aman		13	5.42
		Pulses□ Fallow□ T.Aman		45	18.75
		Boro□ Fallow-□ B.Aman		1	0.42
		Vegetables□Vegetables□ Vegetables		7	2.92
		Banana□Banana□ Banana		5	2.08
		Total		240	100.00

Source: SAAOs of Char Faridpur Sadar Paurashava 2016

Major Problems on Crop Cultivation

(1) The major problems in Faridpur Sadar Paurashava crop cultivation are: (1) Sand filling on fertile agricultural land and unplanned expansion of housing, settlements and infrastructure, (ii) Unplanned expansion of urban and commercial areas, (iii) Drainage Congestion in some areas creates livelihood hazard,(iv) Silted canals, irrigation drainage is kutcha which is wastage of water,(v) Farmers lack of knowledge on modern crop production technology, and (vi)Lack of urban facilities,(vii) Industrial effluents ,(vii) Top soil cutting and (ix) Decrease agricultural productive land.

Recommendation

(1) Excavation and re-excavation of silted canals and irrigation drainage system made pucca or underground pipe system, (2) Farmers training on modern agriculture practices and proper uses of organic and inorganic fertilizers and pesticides, (3) Construction of vegetables and spices processing, grading and packaging industry/ facility and establishment of agro-based industry,(4)Ensuring planned and economic use of agricultural productive land and need to minimizing agricultural land degradation and also introducing regulatory measure like adopting land zoning law and urban rural development plan are necessary to protect the agricultural land which will be ensuring "food security" for all.(5) Preparation of Development Plan for Fourteen Upazila Package-03 needs to be followed which will helpful to control unplanned human intervention as well as to ensure proper uses of agricultural land , (6) The urban area need to be well planned and also should have all facilities for the dwellers.

In agriculture, multiple cropping is the practice of growing two or more crops in the same land during a single growing crop season. All 11 Unions and 01 Paurashava percent of land used for single, double and triple crops under Faridpur Sadar Upazila is shown in Table 3.17 and Figure 3.3. It shows that four highest percentage of single cropped area cultivated were in Decreer Char Union (17.20%) followed by Ishan Gopalpur (6.83%), Char Madhabdia (5.94%), and Aliabad Unions (5.26%). Similarly, out of all Unions 4 highest areas were cultivated double crops in Uttar Channel (88.18%) followed by Char Madhabdia (87.81%), Decreer Char (65.28), and Faridpur Paurashava(62.50). Further, 4 highest land used unions for triple crops are Ishan Gopalpur Union (76.21%) followed by Greda (72.04%), Kaujuri (69.40%) and Maj Char Union (67.33%). Out 11 Unions and 01 Paurashava only 5 Unions land were used for 4 crops (Table 3.17).

Table 3.17: Union Wise Land Used of Single, Double & Triple cropped Area in Faridpur Sadar Upazila

Name of Union	Present Land Used in ha (%)						
	Cultivated Area	Single Cropped Area	Double Cropped Area	Triple Cropped Area	Four Cropped area	Net Cropped Area (ha)	Cropping intensity (%)
Aliabad	4880	100(5.26)	627(32.96)	1175(61.78)	00	1902	257
Ambikapur	3830	40(2.70)	530(35.81)	910(61.49)	00	1480	259
Char Madhabdia	3205	95(5.94)	1405(87.81)	100(6.25)	00	1600	200
Decreer Char	3029	260(17.20)	987(65.28)	265(17.52)	00	1512	200
Greda	4089	60(3.95)	363(23.88)	1095(72.04)	2(0.13)	1520	269
Ishan Gopalpur	6344	159(6.83)	360(15.46)	1775(76.21)	35(1.50)	2329	272
Kaujuri	9817	70(1.92)	1020(27.94)	2533(69.40)	27(0.74)	3650	269
Kanaipur	8171	150(5.14)	280(9.60)	2487(65.26)	00	2917	280
Krishnagar	9145	185(4.90)	1841(48.76)	1722(45.60)	28(0.74)	3776	242
Maj Char	4992	45(2.40)	552(29.47)	1261(67.33)	15(0.80)	1873	267
Uttar Channel	6981	155(4.50)	3035(88.18)	252(7.32)	00	3442	203
Faridpur Paurashava	536	17(7.08)	150(62.50)	73(30.42)	0	240	223

Name of Union	Present Land Used in ha (%)						
	Cultivated Area	Single Cropped Area	Double Cropped Area	Triple Cropped Area	Four Cropped area	Net Cropped Area (ha)	Cropping intensity (%)
Total	65019	1336(5.09)	11150(42.49)	13648(52.01)	107(0.41)	26241	

Source: SAAOs and UAO Faridpur Sadar Upazila, DAE 2016

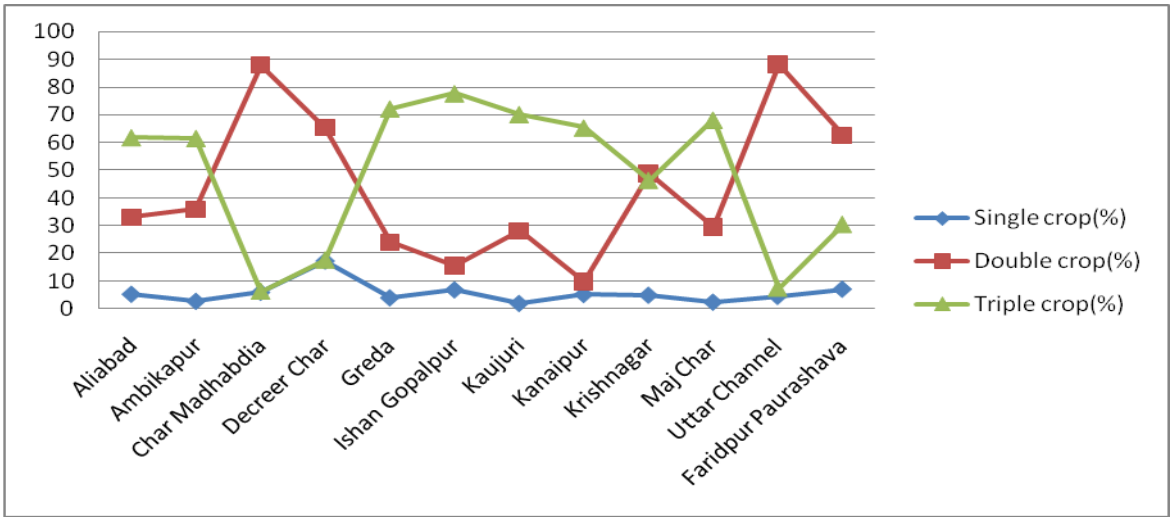


Figure 3. 3: Percent of Union Wise Single, Double and Triple Cropped area under Faridpur Sadar Upazila

CHAPTER-FOUR: CROPPING PATTERN AND CROPPING INTENSITIES

4.1 Cropping Pattern

A cropping pattern is the yearly sequence and spatial arrangement of crops and fallow on a given area. Mixed farming involves the raising of crops, animals and trees. Multiple cropping is the growing of more than one crop on the same land in the period of a year, and sole cropping, or solid planting, is when one crop variety is grown at normal density, alone and in pure stands. The repeated growing of the same sole crop on the same land is monoculture, and crop rotation is the repetitive cultivation of an ordered succession of crops or crops and fallow on the same land. The term 'Cropping pattern' as it applies to the area of reclamation can be defined as the acreage distribution of different crops in any one year in a given farm area such as a water agency, or farm. Thus, a change in a cropping pattern from one year to the next can occur by changing the relative acreage of existing crops, and/or by introducing new crops, and/or by cropping existing crops'. Information that defines a cropping system consists of the number of crops on a given field per year including the accompanying cropping periods from sowing to maturity for each crop cycle and whether each crop is grown under rain fed or irrigated conditions.

Multiplicity of cropping system has been one of the main features of the Faridpur Sadar Upazila. Farmers are harnessing their livelihood by producing various crops round the year. Land utilization and cropping pattern in Faridpur Sadar Upazila depend on effective/planned use of land resources, availability of irrigation facilities, and use of technologies etc.

The scenario of present cropping pattern under Faridpur Sadar Upazila is predominantly Boro (HYV/Hybrid), Aus & T. Aman (HYV/LV) Rice, Jute, potato, Wheat, Maize, Vegetables, Onion/Garlic Oilseeds, Pulses, Spices, Sugarcane, Groundnut, Chili, vegetables and orchard etc. are also included in cropping pattern . Detailed Upazila cropping patterns by season are presented in Table 4.1. Study finding shows that 19 different cropping pattern are practiced by Faridpur Sadar Upazila farmers. Faridpur Sadar Upazila present five main cropping pattern are: Pulses/oilseeds/Spices→Jute→T. Aman(HYV) (16.06%),Onion/Garlic→Fallow→T.Aman(15.45%),Wheat→Jute→T.Aman(12.20%), Wheat→ Jute→ fallow (10.37%), and Boro (HYV/Hybrid)→Fallow→T. Aman (8.13%). Both winter and summer vegetables cropping pattern covering about 5% of the NET Cultivable Area. This finding clearly indicated that Faridpur Sadar Upazila soil and climate are suitable for diversified crop production such as, paddy, wheat, maize, jute, oilseeds, chili, winter and summer vegetables, onion/garlic, pulses, sugarcane, and different fruits (Mango, Litchi, Papaya and Guava) production.

Table 4. 1: Present Cropping pattern under Faridpur Sadar Upazila

Major Cropping Pattern			Area(ha)	Contribution %
Rabi	Kharif-1	Khari-2		
Wheat	Jute	T.Aman	3000	12.20
Wheat	Jute	Fallow	2550	10.37

Major Cropping Pattern			Area(ha)	Contribution %
Rabi	Kharif-1	Khari-2		
Boro (HYV/Hybrid)	Fallow	T. Aman	2000	8.13
Boro (HYV/Hybrid)	Fallow	Fallow	1550	6.30
Pulses/Oilseeds/Spices	Jute	T. Aman (HYV)	3950	16.06
Pulses/Oilseeds/Spices	Jute	Fallow	1000	4.07
Onion/Garlic	Fallow	T.Aman	3800	15.45
Onion/Garlic	Jute	Fallow	1250	5.08
Pulses	Til	T.Aman	500	2.03
Pulses	Til	Fallow	400	1.63
Pulses	Aus	B.Aman	700	2.85
Pulses	Aus	T.Aman	300	1.22
Pulses (Maskalai)	Maize	Fallow	250	1.02
Pulses/Oilseeds	Chili	Chili	200	0.81
Potato	Aus	B.Aman	250	1.02
Vegetables	Vegetables	Vegetables	1200	4.88
Maskalai	Groundnut	B .Aman	1100	4.47
Sugarcane	Sugarcane	Sugarcane	500	2.03
Orchard	Orchard	Orchard	88	0.36
Total			24588	100.00

Source: SAAOs and UAO, Faridpur Sadar Upazila, DAE 2016, Note: Rabi Season= Month of November-February, Kharif-1 Season= Month of March-June and Kharif-2 Season= Month of July- October.

4.2 Cropping Intensity

Cropping intensity is the number of times a crop is planted per year in a given agricultural area. It is the ratio of effective crop area harvested to the physical area. Cropping intensity is an important index of utilization of land. Crop intensity is the index of assesses farmers actual land use in area and time relationship for each crop or group of crops compared to the total available land area and time, including land that is temporarily available for cultivation. It is calculated by summing the product of area and duration of each crop divided by the product of farmers total available cultivated land area and time periods plus the sum of the temporarily available land area. For a specific crop, the cropping intensity is the number of times that crop is grown in one year on the same field. It is distinguishing single, double and triple cropping systems respectively.

The present Union wise (11 Unions) and Paurashava cropping intensity is shown in Figure-4.1. The average cropping intensity under Faridpur Sadar Upazila is 232% which is higher than cropping intensity of 3 Unions & paurashava and also less than 8 Unions (Fig.4.1). The highest cropping intensities were achieved in Kanaipur (280%), Greda and Kaujuri(269%) and lowest cropping intensity under Char Madhabdia and Decreer Char Union(200%).The

average cropping intensity under Faridpur Sadar Upazila is 232% which is higher than Faridpur district (227%) and national average cropping intensity (192%) (Krishi Diary 2017). Figure 4.1 shows all the 11 unions & Puarashava under Faridpur Sadar Upazila cropping intensities are higher than national average cropping intensity (192%). Study finding clearly indicated that markedly increase crop diversification in this Upazila and it is attributed to agriculture and prevailing socio-economic situations of the farming community.

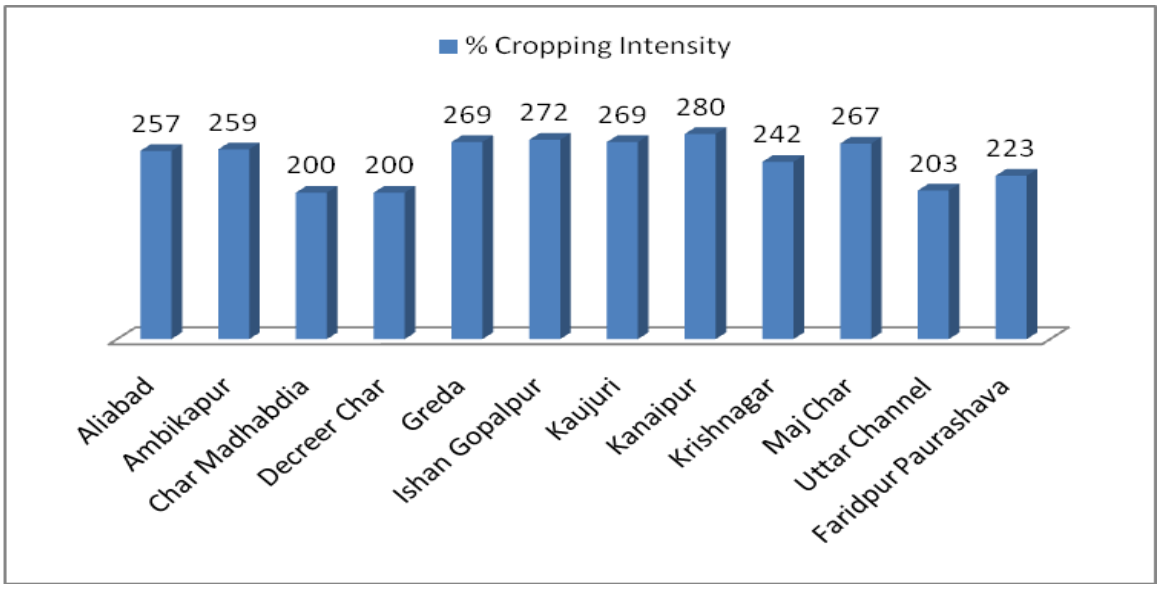


Figure 4. 1: Union wise Cropping Intensities under Faridpur Sadar Upazila

4.3 Present Cropped Area

In Faridpur Sadar Upazila soil and climatic conditions are suitable for growing wide range of both tropical and temperate crops. Rice, Jute, Wheat, Maize, winter and summer vegetables, potato, mustard, groundnut, chili, pulses, and various fruits crops are grown in 11 Unions and Paurashava under this Upazila. Faridpur Sadar Upazila present scenario of different cropped area, yield rate and production levels are shown in Table-4.2. The present total diversified cropped area is 42749 ha of which rice cropped area are 16415 ha and the rest 26334 ha is covered by non-rice crops (Jute, Potato, W & S. vegetables, pulses, and oilseeds and Fruits etc.). The rice and non-rice cropped area are about 38% and 62% respectively of the total cropped area. The highest land area was used for T. Aman (HYV) rice, Pulses, Wheat and Spices cultivation.

4.4 Present Crop Production

Crop yield depends on soil fertility, variety, irrigation facility and other management. HYV/Hybrid rice or others crops gives higher yield in compared to local variety crops. Total crop production is 212754.95 metric tons of which rice production is 75444.35 metric tons and non-rice production is 137310.6 metric tons (Table-4.2). Among the rice crops the highest contributions of T. Aman (HYV) and Boro (HYV) are about 60% and 34% respectively. The highest contribution among the non-rice crops are spices (48%) followed by Wheat (15%) & winter vegetables (11%), and pulses (8%) respectively and other crops

contribution are shown in Table-4.2. Overall, rice and non-rice production difference is 35% and 65% in this upazila. The spices crops (onion,garlic etc) are very popular in this Upazila.

Table 4. 2: Present Cultivated Area, Yield and Production under Faridpur Sadar Upazila

Crop Grown	Crop area (ha)	Yield/ha (mt)	Production (mt)	Contribution (%)
Aus (LV)	175	2.12	371	0.49
T.Aus (HYV)	650	3.23	2099.5	2.78
T. Aman (LV)	475	2.72	1292	1.71
T. Aman (HYV)	11045	4.09	45174.05	59.88
Boro (HYV)	3960	6.46	25581.6	33.91
Boro (Hybrid)	110	8.42	926.2	1.23
Sub Total Rice	**16415**		**75444.35**	100.00
Summer Vegetables	480	15	7200	5.24
Winter vegetables	720	20	14400	10.49
Wheat	7050	3	21150	15.40
Maize	250	7.5	1875	1.37
Jute	1100	3.5	3850	2.80
Sweet Potato	50	40.5	2025	1.47
Potato	140	27.74	3883.6	2.83
Spices (Onion & Garlic etc)	6718	9.85	66172.3	48.19
Oil seeds (Mustard, Til, Groundnut)	2416	1.2	2899.2	2.11
Pulses	7272	1.5	10908	7.94
Sugarcane	50	14.95	747.5	0.54
Fruits (Orchard)	88	25	2200	1.60
Sub-Total	**26334**		**137310.6**	100.00
Total	**42749**		**212754.95**	

Source: SAAOs and UAO, Faridpur Sadar Upazila, DAE 2016

4.5 Irrigation Facilities under Different Unions

Irrigation is the lifeline of agriculture, because without irrigation facility crops diversification or HYV /Hybrid cultivation would be impossible. Irrigation facilities assured production of crops in the dry season as well as stabilized production through supplemental irrigation of the rain fed crops and ensured greater productivity. The main source of water is both surface and ground water. For Boro Rice cultivation ground water conservation and proper utilization in this Upazila is very important. This study is assessed the present scenario of irrigation facilities and problems. For irrigation purposes, generally, Deep Tube Wells (DTW), Shallow Tube Well (STW) and Low Lift Pump (LLP) and also traditional instrument are used. Union wise DTW, STW and LLP under Faridpur Sadar Upazila is shown in Table-4.3. A total of 6607 machine were used for irrigation under Unions in Faridpur Sadar Upazila. A total 22 DTW, 6573 STW and 12 LLP along with other indigenous irrigation tools are used for lifting water. This indicates that farmers have access to irrigation water that through ground water

lifting causing an adverse impact both in agricultural production and surrounding environment. In many cases small and marginal farmers are involved in operation and maintenance of irrigation equipments. All 22 DTW, 439 STW and 6 LLP has electricity facilities but 6134 STW & 6 LLP has no electricity. Electricity user's farmers reported that failed or disruption of electricity supply during Boro season were acute problems under Faridpur Sadar Upazila. Framers wanted nonstop electricity supply during Boro season. Majority of the Farmers reported irrigation drainage system of DTW, STW and LLP 95-100% drain is kutcha which is causes wastage of irrigation water. Farmers wanted pucca drainage system.

Table 4. 3: Union Wise Irrigation Machine under Faridpur Sadar Upazila

Name of Union	DTW		STW		LLP		Remarks	
	Electricity	Diesel	Electricity	Diesel	Electricity	Diesel	% Pucca drain	% Kutch drain
Aliabad	0	0	26	170	01	0	LLP=50	STW=100,LLP=50
Ambikapur	0	0	45	313	0	0		STW=100
Char Madhabdia	0	0	54	710	0	0		STW=100
Decreer Char	0	0	5	159	0	0		STW=100
Greda	02	0	70	270	03	02	DTW=40,STW=5,LLP=3	DTW=60,STW=95,LLP=97
Ishan Gopalpur	01	0	38	760	0	0	DTW=80, STW=01	DTW=20,STW=99
Kaujuri	06	0	40	960	0	0	DTW=100,STW=01	STW=99
Kanaipur	05	0	35	450	0	0	DTW=01	DTW =99 & STW=100
Krishnagar	03	0	34	1003	0	02	DTW=10	DTW=90,STW & LLP=100
Maj Char	04	0	82	497	02	0	STW=5	DTW &LLP=100,STW=95
Uttar Channel	0	0	04	787	0	0		STW=100
Faridpur Paurashava	01	0	06	55	0	02	STW=02	DTW & LLP=100,STW=98
Total	22	0	439	6134	06	06		

Source: SAAOs under Faridpur Sadar Upazila, DAE 2016

Now-a- days, irrigation is considered as a basic input for producing cereals and many other high value crops. Most of the farmers are dependent on irrigation. Good coordination between land and water is required for ensuring food security. In rabi season mechanized irrigation can help to increase crop diversification. Status of Union wise irrigation and ground and surface water used under Faridpur Sadar Upazila is shown in Table 4.5. It shows that 9 Unions & Paurashava 81-99 % land area covered by irrigation water in rabi season. Only Uttar Channel and Krishnagar Unions 46-70% land are covered by irrigation water. Data of Table 4.5 shows that 1-19% Unions land were not developed irrigation facilities in this Upazila. This indicates that most of the farmers have access to irrigation water which is a good sign for intensive farming. But in the long term, excessive ground water lifting may cause an adverse impact both in agricultural production and in the surrounding environment.

Farmers have given supplementary irrigation in drought prone and water logged areas in this Upazila.

Table 4. 4: Status of Union wise Irrigation and Ground & Surface Water Used Area

Union	Irrigated Area (%)	Non Irrigated Area (%)	Irrigated Area						Availability of Surface Water	Drought Prone Area (in ha)	Char Land Area (in ha)	Water Logged Area (in ha)	Remarks
			Ground				Surface						
			DTW		STW		LLP						
			No	Area (%)	No	Area (%)	No	Area (%)					
Aliabad	90	10	2	2	430	97	1	1	√	5	120	15	Supplemental Irrigation Drought prone & Waterlogged area
Ambikapur	96	4	0	0	534	100	0	0	√	0	150	0	
Char Madhabdia	97	3	0	0	900	92	25	8	√	0	0	0	
Decreer Char	81	19	0	0	135	100	0	0	-	100	250	50	
Greda	79	21	3	22	414	47	24	31	√	0	15	15	
Ishan Gopalpur	97	3	1	1	1032	99	0	0	-	0	150	10	
Kaujuri	91	9	6	11	700	89	0	0	-	220	0	20	
Kanaipur	91	9	4	2	845	98	0	0	-	0	0	200	
Krishnagar	70	30	2	1	1200	98	5	1	√	0	0	50	
Majh Char	99	1	3	5	640	92	2	2	√	90	0	95	
Uttar Channel	46	54	0	0	821	100	0	0	-	80	2869	150	
Faridpur Paurashava	88	12	1	5	61	90	2	5	√	10	0	40	

Source: National Land Zoning Project Report, May 2016

4.6 Cultivation Practices

Most of the cultivators of this Upazila are directly or indirectly depends on agriculture. Wide range of rabi and karif crops such as Boro HYV/Hybrid variety of rice and Transplanted Aman (HYV) rice, Jute, wheat, maize, potato, sugarcane, onion, garlic, groundnut, till, turmeric, pulses and different kinds of winter and summer vegetables which are cultivated under both rain fed and irrigation condition. Fruits grow well here are Banana, Mango, Litchi, Papaya and Coconut cultivation are very famous in Faridpur Sadar Upazila. Farmers cultivate different vegetables such as Brinjal, Potato, Chili and Cabbage etc. The main thrust of mechanization is to reduce dependence on human labor and draft/animal power for tillage, planting, intercultural operation and harvesting crops. It contributed to timely cultivation and thus increased cropping intensity, reduce yield losses and wastage. Use of machines has also cut down the cost of threshing. All the SAAOs and UAO reported that about 80% farmers used power tiller and 20% farmers used tractor during land preparation. Generally, per hector cultivation cost is Tk. 6000-7000/-. Boro and T. Aman rice seedlings grown in seedbed are uprooted when they are about 30-45 days old and transplanted in the main fields. They transplanted Boro and T. Aman rice practiced line sowing. Generally, in rice field weeding is done once, about a month after transplanting and this exercise is closely followed by top dressing with urea. Majority of the farmers did not use balance dose of chemical fertilizers due to lack of knowledge. Farmers reported pests are acute problems for crop production. Farmers used pesticides over and under dose as preventive and curative measures for controlling different pests because of lack of knowledge.

4.7 Major Types of Crops Cultivated

Char Land Agriculture: Ganges-Padma River System one of the three major river systems of Bangladesh. Its flow –tendencies and geo-tectonic situation produced a 'by-product" called Char. Most char land soil is sand or sandy type. Besides sand, the char land soils also variation as to texture, their being a different textures found through the char lands. Physical, social, economic and political vulnerabilities are the underlying cause of chronic and persistent poverty in char land areas of this Upazila. Majority of char dwellers rely on agriculture for their livelihood. More than thirty different crops are suitable for cultivation in char land during Rabi and early kharif season and large number of them are high value cash crops. Behind flood water leave, the silted sand plain 'Char' lands are basically infertile. By sandbar cropping (a new methods) dried-up riverbeds and river basins has been turned into crop product. By simply digging holes in these sandy residues and filling those with manure, compost and pumpkin and other crop seeds have thrived. Sandbar and other innovative technologies farmers has been planting tree like mango, Jujube and banana on these char lands, with diversified crops including maize, chili, lentil, groundnut, sesame, mustard and vegetables including sweet gourd, melon, cucumber, onion, garlic, cabbage and tomato etc.

Rice: Rice is a primary crop and a staple food of this Upazila. The rice production has significantly increased with the adoption of modern rice varieties and introduction of latest appropriate technological innovation and technology: => Replacement of local varieties by modern HYV/Hybrid varieties in Boro, Aus and T. Aman season; =>Increase of irrigation areas in both Boro and T.Aman season; and=> Use of quality seeds.

Jute: It is a primary and one of the main cash crops of this Upazila. Jute is an eco-friendly fiber. Jute cultivation requires less labor and less input. Despite the relative decline in importance of jute in agriculture, potential still exists for the fiber to increase its contribution to the economy through productivity increases and diversification. Yield increase, availability of better quality seeds, and improved provision of extension and credit support to growers for this crop. Jute leaf is a common and favorable vegetable item to the farmer.

Maize Cultivation: Maize is third important cereal after rice and wheat. It is a versatile crop and is more nutritious and requires less irrigation. Low risk in maize production is another privilege taken by farmers. Marginal and poor farm families are showing interest in maize cultivating. This is possible due to the adaption of modern maize varieties since production has been expanding fast. Its price, demand, and supply are increasing in domestic market. Pop-corn as an alternative food has been getting priority. It has diversified usages in small business and poultry feed production. Farmers can earn more by maize cultivation. Lack of capital as well as high price of inputs is a barrier to its higher production. Maize cultivation is becoming profitable than other cereals among farmers in Faridpur Sadar Upazila.

Sugarcane: Sugarcane is the principal raw material for sugar, gur, and cane juice. It is only dependable industrial crop in Faridpur Sadar Upazila. Based on sugarcane, the sugar mill in Mudhukhali and gur (Molasses) industries of this region has developed. The by-products obtained from sugarcane include fuel and livestock feed. It is considered as one of the most

efficient converters of solar energy. The soil and climate of Faridpur Sadar Upazila found very suitable for sugarcane plant growth. High humidity during the growing period and dry weather at maturation lead to high production. Family labor cost, cost of fertilizer, number of fertilizing, sowing/planting time of intercrop, cost of sett were the important factors which influence the profitability of sugarcane production both as intercrop and as monoculture. High prices of inputs, lack of scientific knowledge are the major problems in sugarcane production.

Potato/Sweet potato: Potato, a tuber crop, is cooked and eaten as a vegetable. In the context of nutrient, potato is comparable with rice and wheat. It is widely cultivated in winter with huge potential in area. The soil and climate conditions of Faridpur area are favorable for potato/sweet potato production. Sunny land with cool and moisture in soil is appropriate for potato cultivation. But unavailability of quality inputs (seeds, fertilizer and pesticide), lack of knowledge on proper cultivation techniques and finally low investment capacity of the farmers are some of the major challenges in potato farming.

Oilseed crops: Mustard, Groundnut, Sunflower and Til are popularly cultivated in Faridpur sadar Upazila. Mustard as an oilseed crops takes first place in respect of cultivated area in Bangladesh. Farmers of Faridpur Sadar Upazila generally cultivate mustard before Boro cultivation. Mustard oilcake is a nutritious food for cattle. This oilcake also used as organic fertilizer and the dry mustard plants can use as fuel.

Vegetables: Tomato, Sweet potato, Brinjal,, Radish, Cauliflower, Cabbage, Bean, Chili, Lalshakh, Loncho, Kolmi, Peas, Kochu, Bitter gourd, Pumpkins, Gourd, Rai- Shakh, Ladies finger, Palong, Spinach, Cucumber etc. Potato is a tuber crop which cooked and eaten as a vegetable. Encouraging homestead level vegetables cultivation could be alternative source of household income generation. It is widely cultivated in winter with huge potential in Faridpur Sadar Upazila. The soil and climate conditions of this Upazila area are favorable for multiple vegetables production. But unavailability of quality inputs (seeds, fertilizer and pesticide), lack of knowledge on proper cultivation techniques and finally low investment capacity of the farmers are some of the major challenges in vegetables farming.

Spices: The important spices are Chili, Turmeric, Ginger, Onion & Garlic etc. The soil and climate conditions of this Faridpur Sadar Upazila are favorable for Chili and Onion production. There is wide opportunity to grow onion & garlic as commercial basis to meet up internal demand and also to export.

Pluses: The pulses of Bangladesh comprise of six major crops, namely, lentil, khesari, black-gram, mungbean, chickpea and pigeon pea. The soil and climate of Faridpur Sadar Upazila areas are highly suitable for cultivation of different types of pulses. At present 7272 ha lands used for pulses cultivation. Lentil, mungbean and pigeon pea occupy important place in this area. The cropped area and production of these pulses have been on the decline over the past few years mainly because of the increased emphasis on HYV rice, wheat and maize. But pulses are very important because of their protein supply to the human diet and nitrogen fixation for soil nutrition.

Fruits: Mango, Jackfruit, Litchi, Banana, Coconut, Betel Nut, Country Goose Berry, Guava, Plum, Kul, &
Papaya. Many farmers have established commercial gardening of Mango, Litchi, Papaya and Guava etc.

Conversion of Agriculture Land to Non-agriculture

Agricultural land denotes the land suitable for crop production. It is one of the main resources in agriculture. Many high value crops are grown in Faridpur Sadar Upazila. There is wide opportunity to grow Jute, onion, garlic, pulses, turmeric, and vegetables as commercial basis to export. "Non-agricultural land" means such land which is used for different purposes and is not connected with agriculture. Such kind of land can be called non-agricultural land, if any developmental activity is carried over on the land and makes land unfit for crop production. In Faridpur Sadar Upazila a substantial amount of agricultural land had been shifted to a non-agricultural one viz construction of houses, brickfield, sawmill, industry, road, market and other infrastructures. Absence of proper planning converts the arable land to other uses rapidly. The major components of transforming agricultural land to non-agricultural purposes are as follows:

=>Non –agricultural development activities on agricultural land.
=>New or existing infrastructure and urban expansion.
=>Construction of brick fields and new settlements in agricultural land.
=>Acquisition of agricultural land for non-agricultural purposes.

Plate 1: Preparation of Vermi-compost


Plate 2: Floating rice seed bed

Plate 3: Rice Tran's planter

Plate 4: Irrigation by Deep Tube Well

Plate 5: Demonstration of Rice Seed Production

Plate 6: Sugarcane crop Field

Plate 7: Summer Tomato Field

Plate 8: Chili and Jute field

Plate 9: Flower and Fruit Garden

Plate 10: Banana Garden

Plate 11: Cultivation of Dragon Fruit

Plate 12: Farmer Gourd field

Plate 13: Farmers Leafy Vegetables Field

Plate 14: Bean Field

Plate 15: Demo of pheromone Trap

Plate 16: Monitoring Pest Infestation

Plate 17: Demo of Light trapping for pest control

Plate18: Perching in Rice Field

Plate 19: Discussion with UAO on PDPFUP-03

Plate 20: Discussion with UNO on PDPFUP-03

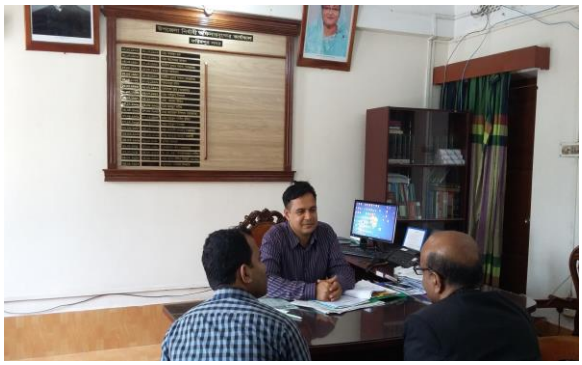


Plate 21: Discussion with Fisheries Officer

Plate 22: Discussion with all SAAOs for data

Plate 23: SAAOs given agriculture data

Plate: 24: UAO given speech to SAAOs

Plate 25: Discussion with SAAOs

Plate 25: AEO given speech to SAAOs

Plate 26: Open discussion on PDPFUP-03 information

Plate 27: Discussion with SAAOs for Agric-

Plate 28: SAAOs of Faridpur Sadar Upazila

Plate 29: SAAOs of Faridpur Sadar Upazila

Plate 30: Consultant discussion with individual SAAO

Plated 31: SAAOs filled up questionnaire

CHAPTER FIVE: PRODUCTION COST OF RICE AND VEGETABLES

5.1 Cost of Rice production

Bangladesh has achieved the self-sufficient in rice production in 2012. In terms of individual crops, rice continuous to dominate the agriculture sector-occupying more than three fourths of cropped area. The production cost of paddy varies depending on crop season, variety (HYV/Hybrid/LV), land preparation (Power tiller/Tractor/Bullock), seeds and seedlings, manure and fertilizer, irrigation (complete irrigated Boro Rice) and rain fed or provided supplementary irrigation), pesticide and labor. To assess farmers cost of rice production, Agriculture Economic Division of BRRI 2014-15 and 2015-2016 were conducted survey all over the country in three rice seasons (Boro, Aus and Aman paddy). BRRI study findings show that Boro and Aus farmers per kg rice production cost is Tk 18.65 and Tk.18.64 and Aman rice production cost is Tk17.61 which is less than Boro and Aus. During 2015-16, BRRI study shows that farmer's average per kg cost of Boro Tk.20.07 followed by Aus Tk.18.37 and Aman Tk.17.83 in the year 2015-16 (Table 5.1). Cost of per kg Boro rice production is increased Tk.1.42.

Department of Agriculture Marketing was estimated production cost for Boro rice Tk.18.08 per kg, Aman Rice Tk.18.20 per kg and Wheat Tk.23.50 per kg in the year 2015-16 and also production cost was calculated for Boro Tk. 22.06, Aman riceTk.19.0 and Wheat Tk. 28.50 per kg in the year 2016-17. Table 5.1 shows that farmers production cost of Boro, Aman and wheat is increased in 2016-17 in compared the rice production cost of 2015-16. Generally, Government has declared the buying rate of Boro, Aman and Wheat from farmers every year. On this basis Government has declared buying rate of Boro rice Tk.20.70, Aman rice Tk18.50 per kg and Wheat 27.02 per kg respectively in 2016. In 2017, Government has declared the buying rate for Boro rice Tk24.00 and Wheat Tk.28.00. Faridpur Sadar Upazila farmers and DAE SAAOs reported that Boro rice per kg or per ha production cost is higher than T. Aman rice because T. Aman rice is cultivated by natural water or rain water. There is no need for supplementary irrigation for Aman rice production. Fertilizers and pesticides are needed more in Boro rice production in compared to Aman rice. Farmers wanted and also need to ensure the profitable farm gate price for rice.

Table 5. 1: Cost of Rice Production (2014-16 and 2015-2017)

Name of Crops	Average per kg crop production cost (Tk.) in 2014-15 (BRRI)	Average per kg crop production cost (Tk.) in 2015-16 (BRRI)	Average per kg crop production cost (Tk.) in 2015-16 (DAM)	Average per kg crop production cost (Tk.) in 2016-17 (DAM)
Boro	18.65	20.07	1808	22.06
Aus	18.64	18.37	-	-
Aman	17.61	17.83	18.20	19.00
Wheat	-	-	23.50	28.50

Source: Agriculture Economic Division, BRRI 2016, and Department of Agriculture Marketing (DAM) 2016 &2017

5.2 Cost of Vegetable Production

Production of vegetables is a key factor in ensuring a continuous supply of raw materials for the development of agribusiness in horticulture. It is often argued that vegetable production in Bangladesh has comparative advantages, but despite these opportunities, agribusiness in horticulture is not flourishing commercially, especially for vegetables. The production cost of vegetables varies depending on crop, variety, time, place, and season. During the present survey, farmers were asked to identify the major types of production costs on which they usually spend. According to the respondents, the production cost of vegetables can be categorized into eight major categories: land preparation, seeds and seedlings, manure and fertilizer, irrigation, pesticide, labor, lease/rent of land, and other expenses like fencing, shedding, mulching etc. Farmers of Faridpur Upazila reported that major cultivation occurred in land preparation (Power tiller/tractor cost), irrigation, pesticides, fertilizers and labor. Farmers reported that per ha land cultivation cost is Tk. 7000-8000/- *(Upazila Agriculture Office, Faridpur Sadar).* Generally, supplementary irrigation provided potatoes, Chili and others winter vegetables. Supplementary irrigation cost is 3000-5000 taka or more depends on crops and number of application. The highest supplementary irrigation provided in winter and summer vegetables crop field. Farmers did not practice supplementary irrigation T. Aman crops. The highest pesticides used in T. Aman and Boro rice fields (Tk.5000-6000/-) and Winter & Summer vegetables fields (Taka 4000-4500/ha). Labor cost day by day increased and per day labor cost more or less Tk. 350-400 depends on crop season.

The present study was assessed financial profitability of Brinjal, Tomato, Potato and Cabbage/cauliflower vegetables production under Faridpur Sadar Upazila which is shown in Table 5.2. Finding shows that Tomato cultivation is more profitable Tk. 925000/-per ha followed by Brinjal Tk. 825000/- per ha, Cabbage/Cauliflower Tk. 455000 per ha and potato Tk 290000per ha respectively. Study finding clearly indicated that all four types of vegetables cultivation are profitable for farmers of Faridpur Sadar Upazila. It is important to develop business based on growing vegetables to encourage the farmers, since horticultural crops have comparative advantages in Bangladesh. Cost-benefit analysis of these crops also suggests that production of vegetables is economically viable for the country. Despite the prevailing opportunity for these crops, the country has not been able to create any successful businesses in this sector.

Table 5.2: Financial Profitability of 4 types of Vegetables Production in Faridpur Sadar Upazila

Vegetables	Yield (Kg/ha)	Price (Tk/Kg)	Gross Return (Tk/ha)	Total Cost (Tk./ha)	Net Return (Tk/ha)
Brinjal	53000	20	1060000	235000	825000
Tomato	55000	25	1375000	450000	925000
Potato	36000	15	540000	250000	290000
Cabbage/ Cauliflower	54000	15	810000	355000	455000

Source: SAAOs and UAO, Faridpur Sadar Upazila 2016

Monsura Zaman, Rokhsan-Ara-Hemel and Tahmina Ferdous (2010) assessed the cost of production of four winter vegetables namely cauliflower, cabbage, tomato and brinjal in five villages under Dhaka district. The study finding shows that 39.2% of the total cost was devoted to labor, 30.3% to fertilizer, 3.4% to seed, 4.8% to pesticides, 7.9 % land rent, 6.3% to land preparation, 4.2% to irrigation and 3.6% to interest on capital, whereas, the result estimated by AVRDC (2001) shows that 48.4% of the total cost was devoted to labor, 24.2% to fertilizer, 6.1% to irrigation, pesticides and 3.7% to seeds (Fig.5.1). Cost of per kg and per 40kg was found approximately the highest for tomato and the lowest for cabbage and cauliflower.

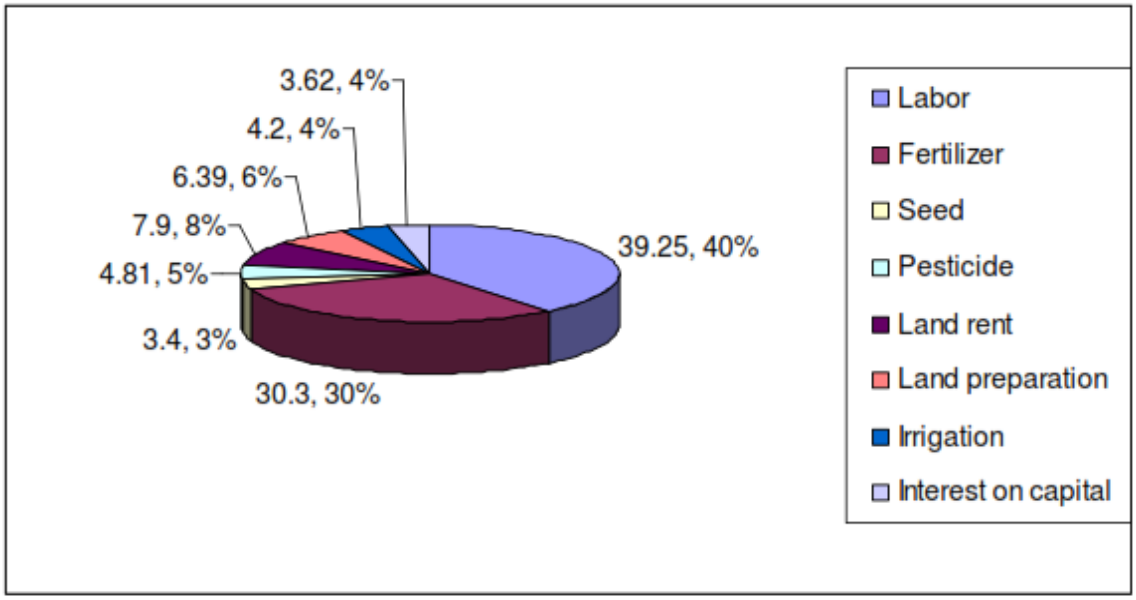


Figure 5. 1: Percentage of Major Types of Production Costs for Vegetables.
(Source: ASA University Review, Vol. 4 No. 1, January–June, 2010)

Brinjal is one of the most popular and important vegetable in Faridpur Sadar Upazila. Farmers are cultivated this vegetables throughout year. Compare the financial profitability of brinjal vegetable production in different region in Bangladesh. Several studies were done to estimate the financial profitability of brinjal vegetable production (Table 5.3). It is evident from the table that productions of brinjal vegetable were increased chronologically. This is due to adoption of farmers for different HYV varieties of brinjal. Price of brinjal vegetable was also increased through time change. Farmers were adjusted their vegetables price due to change the production cost. Now farmers used different insecticide, pesticide and fertilizer to increase production and protect vegetables from disease and pest. For this reason profitability of different vegetables also increased. It is true that total production cost of different vegetables increased but net margin also increased. Farmers were produce different vegetables because vegetables productions were profitable in the present study area which is reflected by high BCR for brinjal vegetable. The previous studies were done several years ago and we can interpret the different return by yield, price and place difference. The prices of brinjal

vegetable are high in all over the country. Finally it is clear that productions of vegetables are more profitable in the study area like other vegetables growing areas.

Table 5. 3: Compare the Financial Profitability of Brinjal Vegetable Production in Different Region

Cultivation year	Study Area	Yield (kg/ha)	Price (Tk/kg)	Gross Return (Tk/ha)	Total Cost (Tk/ha)	Net Return (Tk/ha)	BCR	Sources
1997	Bangladesh	11730	6.0	70372	17,343	53,029	4.06	EPC, 1997
1998	Comilla	24,699	2.51	61,994	31,339	30,655	1.98	Miahet et al., 1998
2002	Jessore	43,899	7.09	3,10,293	1,77,457	1,32,836	1.75	Rashid et al. 2002
2014	Dhaka	55,691	18.00	10,02,438	269,627	732,811	3.72	Hasan et.al 2014

CHAPTER SIX: GROWTH OR DECLINE OF AGRICULTURAL LAND DURING LAST TEN YEARS

Land is the most valuable resource among all the natural resources of a country which provides food, shelter including lifesaving elements to her ever increasing population. A census on land resources reported that everyday 220ha of arable land was converting for other uses like construction of houses, roads, commerce and industries and for other non-agricultural activities, which is very alarming for the sustainability of land resources of our country.

Quantification of various parameters in relation to land use and farming is really a very difficult task, specially, in Bangladesh where record keeping is poor either by an organization or by individual. Beside this difficulty in mind a sincere attempt has been made to collect land use last ten years data (2005 to 2015) from Upazila Agriculture Officer, Upazila Fisheries Officer, Upazila Livestock Officer and discussion with 11 Unions and 01 Paurashava all Sub- Assistant Agriculture Officers of Faridpur Sadar Upazila and review the other documents. The present scenario of growth or decline of agricultural land used during last ten years under Faridpur Sadar Upazila is shown in Table 6.1 & Figure 6.1. Table 6.1 finding shows above 98% local variety rice was decreased during last ten years. The main reason for decreased local variety rice area due to yield is less in compared to HYV & Hybrid rice and farmers dictated to switchover cultivated HYV and Hybrid rice. The HYV/Hybrid paddy cultivation area 204% was increased. The reason for increased HYV rice cultivated area due to higher yield many farmers were cultivated HYV and Hybrid rice. Study finding shows that maize production is 272% increased but wheat production is gradually above 54% decreased. Remarkable significant changed or increased during 10 years was occurred in winter (250%) and summer vegetables (86%) production under this Upazila. The main reason for increase maize, winter & summer vegetables due to farmer's switchover cultivated less risk and high profitable crops. Highly significant changed or increased during ten years was occurred in Spices (335%) followed by Tuber crops (128%), Pulses (20%), and Jute (12%) land use. The main reasons for increases are produce crop market demand and price is high. Table 6.1 shows, among the other purposes remarkable significant changed were occurred in Brick field (215%) and followed by poultry farm (118%), Industries (37%) and fish cultivation (6%) respectively. This finding clearly indicated crop land day by day has gradually decreased which will be reflected on agriculture crop production. Protection of double & triple cultivated agricultural land is very important issue. With rapid population growth the area of per capita land is even decreasing. Life style change of huge numbers of people and growing demand of industry, road and developing various infrastructures cause conversion of agricultural land. As a result, the area of agricultural productive land is decreasing gradually making resource base for fisheries, industries, housing and other uses.
However, alike other parts of the country, the area of agricultural land of Faridpur Sadar Upazila

are reduced gradually because of growing pressure from increased human population and industrial & commercial development. To ensure food supply to an increased population of the country, cultivable land should be protected from being converted to other land uses. Protection of double and triple cropped land area is the top priority issue.

Table 6. 1: Growth or Decline Agriculture Land Use during the Last 10 Years

Sl. No.	Agricultural land use	Land Use (2005) in ha	Land Use (2015) in ha	% Change
1	Paddy (local varieties)	35000	650	-98.14
2	Paddy(HYV)	8085	24588	+204.08
3	Wheat	5600	2550	-54.46
4	Maize	25	93	+272
5	Vegetables (Summer)	740	1375	+85.81
6	Vegetables (Winter)	8699	30519	+250.8
7	Tuber crops	230	524	+127.83
8	Pulse crops	5922	7127	+20.35
9	Oilseed crops	2600	2400	-7.69
10	Spice crops	890	3875	335.39
11	Sugarcane	1960	450	-77.04
12	Jute	6780	5950	+12.24
13	Water body	5750	6116	6.36
14	-Brick field	45.35(15)	142.90 (75)	+215.10
15	-Poultry farm	4.50(5)	12.24(160)	+117.96
16	Industries	28.9(15)	62.99(50)	+36.51

Source: SAAOs, UAO, ULO, UFO and Upazila Statistic Office of Faridpur Sadar Upazila 2016.

Note: #= Number.

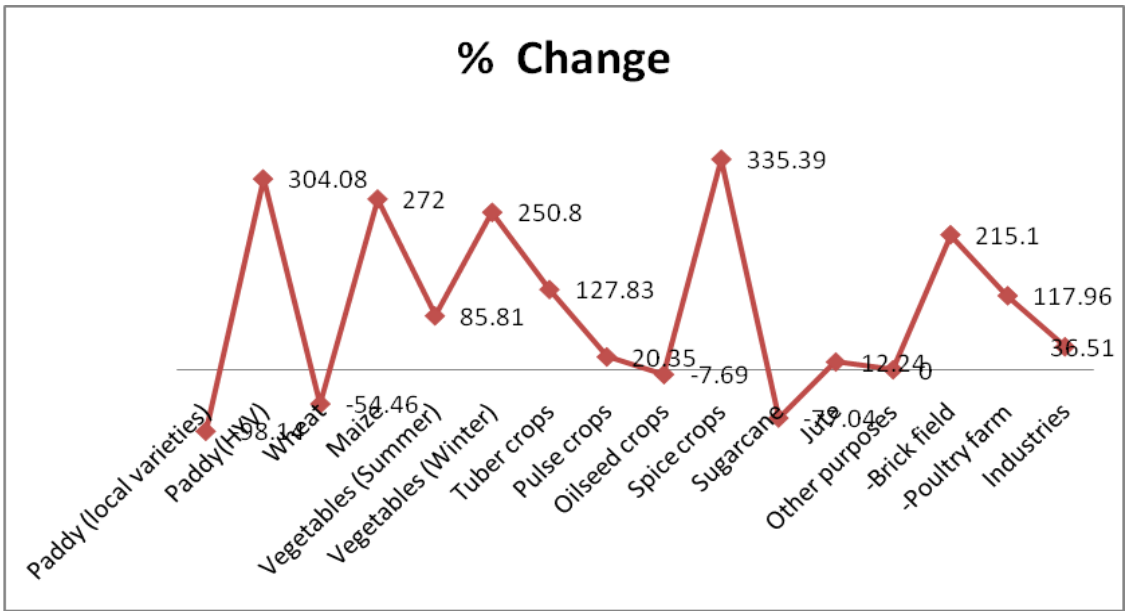


Figure 6.1: Growth or decline Agriculture Land in Faridpur Sadar Upazila during Last 10 Years (2005-2015)

CHAPTER SEVEN: MAJOR PROBLEMS OF CROP PRODUCTION IN FARIDPUR SADAR UPAZILA (11 UNIONS & 01 PAURASHAVA)

Agriculture present survey findings and Participatory Rural Appraisal December 2016 study report findings show farmers some problems are common in different Unions & Paurashava under Faridpur Sadar Upazila such as river erosion, sand deposition, drought, changes in temperature & rainfall, quality planting material and infrastructure. Major problems are:

(1) Severe river erosion damages valuable land and properties,
(2) Sand deposition on agricultural land affecting normal crop cultivation,
(3) Risk of early flood damage the field crops every year,
(4) Water stagnation, silted canals and Kutcha irrigation drainage system,
(5) Acute drought in char land area and no sustainable agricultural planned for char land areas,
(5) Oppression of jotdars (land grabber) and their hooligans in the char land areas,
(6) Less supply of cultivated and irrigation equipment,
(7) Kutcha road and damaged and poor transportation in some of the Unions,
(8) Farmers lack of knowledge on modern crop production technology,
(9) Shortage of cold storage & seed store and lack of wholesale market infrastructure,
(11) Shortage of high quality HYV & Hybrid crop seeds of spices & vegetables
(12) Agriculture labor crisis, high wage rate, Less market price of produce agricultural crops and production cost is high,
(13) Productive agricultural lands are reducing due to construction of houses and industries, expansion of market on Agricultural land,
(14) Lack of awareness on proper management of land and improper uses of pesticides and chemical fertilizers,
(15) Less availability of power tiller/tractor, harvester, sprayer & foot pump and high price,
(16) Prolonged to partial drought during Rabi & Kharif Season and changes in rainfall pattern
(17) Inadequate supply of electricity in Boro crop season,
(18) Poor use of organic matter and soil nutrients deficiency and fertility decrease in agricultural land
(19) Change in rivers and canals morphology,
(20) Post-harvest loss of litchi, mango, potato, spices and other vegetables is high.
(21) Shortage of mechanical tools and equipment (fruit harvesting tool),
(22) Top soil cutting and expansion of brick field,
(23) Increase water & air pollution and decreasing fruit setting,
(24) Farmers are facing increasing pressures of infrastructural development that may encumber Agricultural practices.
(25) There is no agro processing center and industries under Unions level,
(26) Sand filling on fertile agricultural land, unplanned expansion of urban and commercial areas,
(27) Decreasing level of underground water and arsenic problem,
(28) City migration.

CHAPTER EIGHT: POLICY FRAMEWORK AND CONCLUSION

8.1 Policy Framework

As per Sub-Assistant Agriculture Officers, Farmers and District, Upazila level different organizational Officers opinions and field visit following recommendations are made which will help for proper planning and adoption of appropriate crop production measure in future to different Unions beneficiaries under Faridpur Sadar Upazila.

1. Developing Infrastructural Facilities: Construction of embankment for controlled of river erosion and protecting crops from early flood. Road network at local level, agro-processing and whole sale marketing infrastructure development, Re-excavation of canals and irrigation facilities need to be improved for mitigating impacts of crop production related vulnerabilities and climate change. Reconstruction of damaged water management infrastructures need to be made. In each Union, one wholesale market infrastructure needs to be constructed. Further in each Union, one seed store infrastructure need to be constructed and also multiple facilities cold storage and food store need to be established.
2. To Reduce the Irrigation water Wastage, proper utilization and increase the irrigated command crop area the DTW, STW and, LLP kutcha drain need to be converted into pucca drainage system or introduce underground pipe irrigation system. Uninterrupted power supply to irrigation pumps (STW & LLP). Need to be monitoring ground water table every year after Boro season.

3. Farming and Adaptation Practices: Adapt modern farming techniques and Choose high yields and drought tolerant & early crop varieties. By sandbar cropping (a new methods) dried-up riverbeds and river basins has been turned into crop product. There is need for conducting, strengthening and expanding crop demonstrations and block farming based on adaptation practices. Introduction of risk resistant crop varieties in agriculture with emphasis on crop diversification should be an integral part of the ToT, farmers training and demonstrations.

4. Vegetables Production: Different types of winter and summer vegetables are grown under 11 unions and Paurashava area. All the Unions are excellent suitable for vegetables cultivation round the year. There is no cold storage and large vegetable selling center (market) under 11 Unions. As results farmers could not get good price for their produced products. There is a need for establishment of multipurpose cold storage each Union and development of market infrastructure.

5. Crop Production Inputs Availability: Ensure availability of quality HYV and Hybrid crop seeds, fertilizer, pesticides, cultivation and irrigation equipments. Information on quality seed need to be provided up to block level.
6. Availability of Crop Seeds: Drought, early variety and submergence tolerant variety of different quality HYV/Hybrid crop seeds. BRRI, BARI, BSRI and BINA have recommended drought tolerant rice, wheat, maize, potato, pulses and oilseeds. These are BRRI Dhan-71,-72, 55, -57,-66,-67 and BINA Dhan -8, BARI Wheat-25, BARI-28,29,30 Muatard-11,14,17

BARI poato-21,22, 50, widely introduce and 0Management and Soil Health: Chemical fertilizers application in HYV varieties crops trend increasing but decreasing inorganic fertilizer (Green manure, cow dung). As a result, soil nutritional health will be alarming situation which is in future serious affected on yield. There is a need for soil health improving program for Union farmers. DAE may arrange joint collaborative soil testing and recommendation and training program for beneficiaries. Financial support need to be provided to DAE from different Government project. Grow one leguminous crop (Dhaincha / Pulses/Fodder etc.) between two cereal crops. Incorporating organic manure in the soil by changing cropping patterns /crop rotation system need to be practiced. DAE has started preparation and sale vermi-compost by farmers under this Upazila which is improves the soil health and increase the crop yield. This vermi-compost program needs to be strengthening by helping financial assistance as well as technological training & financial support for farmers.

8. Pest Management: Insects, rats, weeds and diseases are a chronic problem which causes considerable damage of crops every season and increase the farmers cultivation cost. For control this pests farmers were applied pesticides under or over dose. Farmers applied pesticides 10-12 times in vegetables crop fields. Judicious use of pesticides needs to be developing and implement pest surveillance, monitoring and forecasting system. Farmers also need to increase knowledge on Integrated Pest Management (IPM) technology through practical oriented program and DAE joint collaborative crop production training. Farmers training budget need to be provided to DAE from different Government project.

9. Agro-based Industries: Establishment of Agro-based processing center & industries in 11 unions and 01 Paurashava. There is a need for construction of infrastructure for some agro-base processing center. Construction of potato, spices, vegetables & fruits processing, grading and packaging industry/facility need to be developed under each Union. There is a need to integrated effort for industrial effluents and waste management.

10. Zoning of land**:** As per its present used and potentialities and the proper implementation of **"Preparation of Development Plan for Fourteen Upazilas**" Package 03 (Faridpur Sadar Upazila, Bagmara Upazila, and Gangni Upazila) which will help to control unplanned human intervention as well as to ensure proper uses of agricultural land. Ensuring planned and economic use of agricultural productive land and need to minimizing agricultural land degradation and also introducing regulatory measure like adopting land zoning law and urban rural development plan are necessary to protect the agricultural land which will be ensuring "food security" for all.

11. The following additional systems may be adapted in an innovated way for sustainable crop production and environmental conditions of Faridpur Sadar Upazila:

- Biodynamic/eco-friendly agriculture.
- Rice and non-rice crops integrated farming
- Grow vegetables predominantly
- Fruit tree based Agro-forestry system
- Integrated pest management
- Natural disasters adaptive, rain fed and resilience farming

- Needs sustainable agricultural development plan for char land areas.

Minimize conversion of agricultural land to non-agricultural use and increase awareness among the people and land users for conservation of land. Ensuring planned and economic use of agriculture land, minimize agricultural land degradation and introducing regulatory measure like adopting land zoning law are necessary to protect the agriculture land.

8.2 Conclusion

Multiplicity of cropping system has been one of the main features of the Fariapur sadar Upazila. Soil and weather conditions are suitable for different vegetables and other high value crops cultivation round the year. There is a need to develop vegetables wholesale market and improvement of communication system different Unions to Upazila. Farmers need modern crop production technological training which will be helpful for crop diversification and proper utilization land and increase crop production. For improvement of irrigation facilities kutcha drain are to be made lined channel which will reduced irrigation water wastage and increase crop production. Integrated pest management need to implement for Banana, Papaya, orchard and vegetable cultivation and reduce the pesticide use. There is a need for char land sustainable agricultural development production plan. Electricity power supply should be ensured during Boro crop season. Construction of potato and vegetables spices & fruits processing, grading and packaging industry/facility need to be developed under each Union. Increase agriculture production through optimum use of land. Many high value crop vegetables are grown in this Upazila. There is wide opportunity to high value different crops such as Maize, Jute, oilseeds, fruits, vegetables and spices (onion/garlic/chili) as commercial basis to export.

However, alike other parts of the country, the area of agricultural land of Faridpur Sadar Upazila is declining gradually because of growing pressure of population and also unplanned industrial & market development. To ensure food supply to an increased population of the country these lands should be protected from being converted to other land uses. Protection of present triple and double cropped land is the top priority issue. Agricultural land identified in the present study should be protected by taking relevant administrative measures. Integration of people's participation and effective monitoring, evaluation, logistics through institutional frame work are essential for successful implementation of **"Preparation of Development Plan for Fourteen Upazilas**" Package 03 (Faridpur Sadar Upazila, Bagmara Upazila, and Gangni Upazila) as a versatile tool to conserve and right uses of agricultural land. The local people are in favor of present Preparation of Development Plan for Fourteen Upazilas Package-03 and found very much positive to protect arable land through implementing proposed plan.

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Annex- 1

Questionnaire for KII

Name---------- Designation---------- Department----------
Upazila----------District---------- Mobile No.---------- Date----------

1. Category wise distribution of farm families

Sl No.	Category		No of farm family	%
1.	Land less (.05-.50 acre)			
2.	Marginal (.51-1.50 acre)			
3.	Small (1.51 -2.50 acre)			
4.	Medium (2.51-7.50 acre)			
5.	Larger (above 7.50 acre)			
	Total			

2. Present Land Use under Union

Sl No.	Type of Land use	Present land used	
		Area (ha)	%
1.	Cultivated Area		
	Single Cropped area		
	Double Cropped area		
	Triple Cropped area		
2.	Net cropped area		
3.	Cropping intensity		

3. Relationship of Land Type and Flood Depth with Area Cultivated

Sl No.	Land type and Flood Depth. (cm)	Present	
		NCA (ha)	%
1.	High land (0-30 cm) F0		
2.	Medium high land (30-90 cm) F1		
3.	Medium low land (90-180 cm) F2		
4.	Low land (180-360 cm) F3		
5.	Very low land above (360 cm) F4		
	Total		

Source: CEIP field data and Upazila Agriculture Office, DAE

4. Major crops/cropping patterns (both improper/exhaustive and sustainable)

Season	Farming Practices
Rabi (Mid October-Mid March)	
Kharif-I (Mid March-Mid July)	
Kharif-II (Mid July-Mid October)	
Irrigated Farming - Rabi (Mid- October to Mid March)	
Kharif-I (Mid March-Mid July)	
Kharif-II (Mid July-Mid October)	
Name major cropping patterns	1. 2. 3. 4.

5. Crop cultivated and variety in polder area

Crop area	Name of crop	Name of variety
Cultivated crops under single crop area=		
Cultivated crops under double crop area=		
Cultivated crops under triple crop area=		
Cultivated crops under irrigated crop area=		
Cultivated crops under non crop area=		
Cultivated crops under homestead garden area=		
Orchard area=		
Seasonal Fallow land =		
How many commercial fruit garden within polder area? Yes ---------- No----------	Name of fruits garden Banana: Papaya: Coconuts: Mango: Others:	Number:
In future which crops will be profitable in your polder area:		

6. Present Crop Production and Area under polder/Upazila

Crop Area (ha)	Yield/ha	Total Production (MT)	Crop Area(ha)	Yield / ha	Total Production (MT)
Aus rice= LV = HYV =			Oilseeds=		
Aman rice= LV = HYV = Hybrid =			Mustard=		
Boro Rice= LV = HYV = Hybrid =			Sesame=		
Total Rice=			Sunflower=		
Wheat =			Groundnut=		
Maize =			Others=		
Pulses =			Winter vegetables=		
Khesari =			Summer vegetables=		
Mung bean =			Total vegetables=		
Soybean =			Fruits Watermelon=		
Cowpea =			Species=		
Chickpea=			Chili=		
Others=			Onion=		
Tuber crops=			Garlic=		
Potato=			Jute=		
Sweet potato=			Sugarcane=		
Bamboo =			Betel nut=		
Betel vine(Pan)=					

7. (a) Short term needs for better crop production under polder

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

3.----------4----------

5----------6----------

(b) Long term needs for better crop production under polder

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

3.----------4----------

5.----------6----------

Annex- 2

Agriculture Questionnaire for Urban and Rural Economy Study

Name: _____ Designation: _____
Department: _____ Name of Block: _____
Name of Union: _____ Upazila: _____
District: _____Mobil No.: _____ Date:_____

1. Category wise distribution of Farm Families in Block

Sl. No.	Category	No. of farm family	%
1.	Land less (.05-.50 acre)		
2.	Marginal (.51-1.50 acre)		
3.	Small (1.51 -2.50 acre)		
4.	Medium (2.51-7.50 acre)		
5.	Larger (above 7.50 acre)		
	Total		

2. Agricultural land and land Use in Block

Sl. No.	Description of agricultural land	Area(ha)
1.	Total agriculture land area	
	High land	
	Medium high land	
	Medium low land	
	Low land	
2.	Permanent fallow land	
3.	Current/seasonal fallow land (with fallow period) -Rabi fallow	
4.	-Kharif-I fallow -Kharif-II fallow	
5.	Net cropped area	
6.	Single cropped area	
7.	Double cropped area	
8.	Triple cropped area	
9.	Total cropped area	
10.	Cropping intensity (%)	
11.	Irrigated land area (%)	

3. Irrigation Facilities
Deep Tube Well (DTW) Yes---------- No---------- Number----------
Shallow Tube well (STW) Yes---------- No---------- Number----------
Low Lift Pump (LLP) Yes---------- No--------- Number---------- Others----------
4. Cultivation Practices

Power tiller----------% Used, Tractor ----------% Used
Bullock ----------% Used

5. Cropping Pattern

Sl. No.	Cropping Pattern			Area of Land	Percentage (%)
1|					
2|					
3|					
4|					
5|					
6|					
7|					
8|					
9|					
10|					
11|					

6. Cropping type and Present Crop Area & Production under Block

Crop Area (ha)	Area (ha)	Yield/ha	Crop Area (ha)	Area (ha)	Yield/ha
Aus rice LV HYV			Oilseeds		
Aman rice LV HYV Hybrid			Mustard		
Boro Rice LV HYV Hybrid			Sesame		
Total Rice			Sunflower		
Wheat			Groundnut		
Maize			Others		
Pulses			Winter vegetables		
Khesari			Summer vegetables		
Mung bean			Total vegetables		
Soybean			Fruits Watermelon		
Cowpea			Species		
Chickpea			Chilli		
Others			Onion		
Tuber crops			Garlic		
Potato			Jute		
Sweet potato			Sugarcane		
Bamboo			Betel nut		
Betelvine (Pan)			Banana		
Other crops			Mango		
			Papaya		

7. Growth or Decline Agriculture Land During the Last 10 year.

SL No.	Agricultural land use	Land use (2005-06) in ha	Land use (2015-16) in ha	Causes of increase or decline
01	Paddy (local varieties)			
02	Paddy (HYV)			
03	Vegetables (Summer)			
04	Vegetables (Winter)			
05	Tuber crops			
06	Pulse crops			
07	Oilseed crops			
08	Spice crops			
09	Fruit crops			
10	Wheat			
11	Maize			
12	Sugarcane			
13	Jute			
14	Other purposes -Brick field			
	-Poultry farm			
	-Fish/shrimp culture			
	-Gardening/forestry			
	-Industries			
	-Housing			
	-Others			

9. Major problems to Crop Production in Block/Union

1. _____
2. _____
3. _____
4. _____
5. _____

10. Future Need for Sustainable Crop production.

a) _____
b) _____
c) _____
d) _____
e) _____

11. Major problems related to crop production system Under Union

1.
2.
3.
4.
5.

12. Future Need for Sustainable Crop production under Union

1.
2.
3.
4.
5.

13. Conclusion and Recommendation

1.
2.
3.
4.
5.