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CHAPTER 1 AGRICULTURE AND IRRIGATION IN THE COUNTRY

1.1 Introduction

The Agriculture is the largest sector in the Bangladesh economy, the largest source of employment and the largest water user. The production of rice, the staple food crop has grown 11.9 million tons with milled rice in 1975 to a reported 19.9 million tons in 1998 ~ 1999 and an expected 22.6 million tons in 1999 ~ 2000 respectively. In normal year's the country is virtually self-sufficient in rice. A major factor in this performance has been the growth of privately owned minor irrigation.

1.2 Agricultural Policies and Supporting Services

1.2.1 The National Agricultural Policy (NAP)

NAP policy, which is to expand minor irrigation, promote supplementary Aman irrigation, improve irrigation technology and system efficiency, electrify pumps, exploit surface water sources and encourage crop diversification. Minor irrigation will continue to be largely a private sector activity, but the public sector will develop irrigation in backward and underdeveloped areas (as it has done with DTWs in the High Barind Zone of North West Region). The private sector will be encouraged to expand and improve services to farmers.

1.2.2 Agricultural Supporting Services

In 1996 the Ministry of Agriculture published its New Agricultural Extension Policy (NAEP). Its aims include the promotion of better water management and improved irrigation technology amongst formers. Within the Department of Agricultural Extension (DAE) there is a specialist Water Management and Agricultural Engineering Wing charged with these tasks. Key themes of the NAEP are a decentralised and demand-driven extension approach and better research-extension linkages.

1.3 Present Agriculture

1.3.1 Land Resources

Bangladesh's total area is estimated at 14.7 million ha and the net cultivable area (NCA) is 8.2 million ha. On the otherhand, NWMPP predict that this will drop by about 7% by 2025 to 7.7 million ha mainly as a result of urban growth. Pressure on the land is severe, with the rural population density, being the highest in the world. The need for intensification of agricultural land use and the production is acute. The water sector has a crucial role to play in this process through irrigation and, where justified, the reduction of flooding. From the viewpoint of water sector planning, the most important land resource parameter is that of flood phases. These define liability to flooding, based on flood depth. The following

table defines the five land types (flood phases) and their approximate distribution by region.

Table 1.3.1 Land Areas by Flood Phase

	Highland (F0)	Medium Highland (F1)	Medium Lowland (F2)	Lowland (F3)	Very Lowland (F)
Maximum depth of flooding	0.3m	0.9m	1.8m	3.0m	>3.0m
Seasonally flooded	16%	44%	23%	11%	1%
Percentage of total area in 1995	16%	44%	24%	14%	2%
Flood Phases by Region (%) ⁽¹⁾					
North West	53	33	8	6	-
North Central	34	29	19	18	-
North East	29	18	22	30	1
South West	33	42	17	7	1
South Central	23	58	13	3	3
South East	29	36	23	10	2

Source: Annex C estimates of national totals for 1995, and FAP documents.

Note: ⁽¹⁾ Excluding the Eastern Hills and Rivers and Estuary Regions.

As mentioned above Table 1.3.1, the North West Region is the least vulnerable to flooding and the North East is the most vulnerable.

1.3.2. Land Tenure

According to the 1996 Agricultural Census, average farm size ("operated area") is only 0.68 ha. Fortunately, the slowdown in rural population growth that is already occurring and will continue in the future (NWMPP projections are that the 1998 rural population of 101M will rise to only 108M by 2025) means that farm size is unlikely to fall much further. There is a high degree of fragmentation of holdings. Regional differences are not large, except in the Chittagons Hill Tracts (CHT). Here the poorer quality of the land is reflected in lower population densities.

Farm size distribution recorded in the 1996 Agricultural Census was as follows;

Holding size (ha)	Percentage of total owners	Percentage of total farm area
Small (<1.0ha)	80	41
Medium (1.0 ~ 3.0ha)	18	42
Large (>3.0ha)	2	17

1.3.3 Crops and Crop Production

(1) Cropping Seasons

Cropping patterns and crop production are governed by the pronounced seasonal variations in rainfall. From June to September the South West monsoon season brings heavy rain that is more than enough for crop growth. In fact, too much rain is a production constraint in low-lying areas. From October to May the inadequate amount and reliability of rainfall hampers crop production, especially during the months of December, January and February, when there is very little rain. However, with irrigation, conditions in the dry season are

ideal for growing rice and wide variety of other crops. The main cropping seasons (these overlap each other) are as follows:

Kharif (March to July), essentially the pre-monsoon season. Aus is the type of rice planted in this season. Jute is the other principal crop.

Kharif (July to December), the monsoon and immediately post-monsoon period. Aman rice is the dominant crop.

Rabi (November to April), the winter season. A much wider range of crops is grown, including wheat, pulses, oilseeds, vegetables and spices. Boro paddy, transplanted between December and February and harvested largely in May, is the most widely grown crop yields. Conditions during this season are favourable for high yields, because of high solar radiation, low humidity, the absence of flooding, and wide variations between day and night temperatures. This is the main irrigation season, although some limited supplementary irrigation of aus and aman also takes place in kharif.

(2) Cropped Area and Cropping Intensities

The following Table 1.3.2 shows the BBS (Bangladesh Bureau of Statistics) statistics on Net Cropped Area, the area cropped more than once per annum and the total crop area for the period from 1975 ~ 76 to 1995 ~ 96.

Table 1.3.2 Bangladesh Total Cropped Areas, 1975 ~ 76 to 1996 ~ 97

(in million ha)				
Year	Net Cropped Area	Total Crop Area	Cropping intensity (%)	Area cropped more than once
1975-76	8.49	12.02	142	3.53
1976-77	8.28	11.73	142	3.45
1977-78	8.38	12.03	143	3.65
1978-79	8.42	12.89	153	4.47
1979-80	8.45	12.94	153	4.49
1980-81	8.57	13.17	154	4.60
1981-82	8.59	13.21	154	4.63
1982-83	8.65	13.41	155	4.76
1983-84	8.68	13.37	154	4.68
1984-85	8.64	13.14	152	4.51
1985-86	8.77	13.55	154	4.78
1986-87	8.86	14.12	159	4.49
1987-88	8.29	13.83	167	5.53
1988-89	8.16	13.72	168	5.56
1989-90	8.35	14.07	168	5.72
1990-91	8.18	14.04	172	5.86
1991-92	7.98	13.81	173	5.83
1992-93	7.86	13.71	174	5.85
1993-94	7.73	13.49	174	5.75
1994-95	7.75	13.53	175	5.78
1995-96	7.81	13.51	173	4.62
1996-97	7.85	13.80	176	4.94
Average annual change from 1975-76 ~ 1977-78 to 1994-95 ~ 1996-97	-0.35%	+0.7%	+1.2%	+2.9%

Source: BBS Annual Statistical Yearbooks

Note: ⁽¹⁾ Change between 1975-76 ~ 1977-78 and 1992-93 ~ 1994-95**(3) Crop Area and Cropping Pattern**

The following Table 1.1.3 shows average cropped areas and production and irrigated areas reported by BBS for the whole country for the 1995 ~ 96 and 1996 ~ 97 crop years. Rice takes up 74% of the total crop area (the national cropping pattern); this percentage has been more or less unchanged since the mid-1980s. The remainder is taken up by rabi crops, mainly wheat (5%), pulses (5%) oilseeds (4%), sugarcane (1%), and high value annual crops such as potatoes, vegetables and spices (5%).

Table 1.3.3 Reported Bangladesh Crop Areas, Irrigated Areas and Crop Production, 1995 ~ 96

Crop	Crop area (Mha)	% of total area	Output (M tonnes)	Average yield (t/ha)	Irrigated area (Mha)	% of crop irrigated	% of total irrigated area
1. Rice ⁽¹⁾							
-Aus	1.57	11.5	1.77	1.13	0.11	7.0	3.0
-Aman	5.73	41.9	9.17	1.60	0.29	5.1	8.0
-Boro	2.76	20.2	7.34	2.66	2.57	93.1	71.0
Total	10.6	73.6	18.28	1.82	2.97	29.5	82.0
2. Other Crops							
Wheat	0.71	5.2	1.41	1.99	0.31	43.7	8.6
Jute	0.48	3.5	0.81	1.69	-	-	-
Pulses	0.69	5.1	0.52	0.75	-	-	-
Oilseeds	0.55	4.0	0.47	0.85	0.02	3.6	0.6
Sugarcane	0.17	1.2	7.34	43.18	0.02	11.8	0.6
Potatoes	0.13	1.0	⁽²⁾	-	0.11	84.6	3.0
Vegetables	0.19	1.4	⁽²⁾	-	0.08	42.1	2.2
Spices	0.14	1.0	⁽²⁾	-	0.11	16.2	0.11
Others	0.54	4.0	⁽²⁾	-			
Total	3.60	26.4	-	-	0.65	18.1	18.0
3. Grand Total	13.66	100.0	-	-	3.62	26.5	100.0

Source: BBS

Note: ⁽¹⁾ Output is in milled rice⁽²⁾ Output data for these crops are not presented in a consolidated form in the BBS Annual Statistical Yearbooks

Of the non-rice crops, wheat is expanding most rapidly and is also the largest user of irrigation, with about 9% of the total irrigated area. Rice is by far the largest irrigation user, with 82% of the total irrigated area in 1995-96. All HYV boro is irrigated, whereas only a very small proportion of the aus and aman crops (3% and 8% respectively) receives any irrigation. Wheat, potatoes and vegetables are the other main irrigation users, with over 40%, 80% and 40% respectively of their total areas under irrigation. HYV boro cropping has been the driving force behind STW and LIP irrigation expansion.

Regarding the Cereals, Tubers, Oil Seeds, Vegetables, Fruits and Fiber, in Bangladesh, the cropping calendar show in the following Figures 1.3.1 based on BBS data.

Figure 1-3-1 CROPPING CALENDAR OF BANGLADESH

CROP	পৌ	মাঘ	ফালগুন	চৈত্র	বৈশাখ	জ্যৈষ্ঠ	আষাঢ়	শ্রাবণ	ভাদ্র	আশ্বিন	কার্তিক	অগ্রহায়ণ	পৌ
	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	
CEREALS													
Aus(Local:Broadcasted)													
Aus(HYV:Transplant)													
Aus (HYV:Broadcasted)													
Aman(Local:Broadcasted)													
Aman(Local:Transplant)													
Aman(HYV:Transplant)													
Boro(Local:Transplant)													
Boro(HYV:Transplant)													
Wheat													
Maize													
TUBERS													
Potato													
PULSES													
Lentil													
Chickpea													
Mungbean													
Blackgram													
OILSEEDS													
Soybean													
Soybean													
Mustard/Rape													
Groundnut													
Groundnut													
Sesame													
Sesame													
Sunflower													
VEGETABLES													
Bottle Gourd													
Bitter Gourd													
Cucumber													
Snake Gourd													
Sweet Gourd													
Cauliflower													
Chinese Cabbage													
Radish													
Indian Spinach (Pui Sak)													
Leaf amaranth (Lal Sak)													
Stem amaranth (Danta Sak)													
Kang kong (Kolmi Sak)													
Egg Plant													
Tomato													
Green Pea													
Hyacinth Bean													
Yard long bean													
Okra													
Onion													
Spinach													
FRUITS													
Papaya													
FIBRE													
Jute (Capsularies)													
Jute (Olitorius)													

Explanatory key:
Rice Growing Seasons Aus,Aman,Boro

Shade Indicates Seed Bed
HYV=High Yielding Variety

Prepared by : National Data Bank

(4) Crop Yields

Based on data from a wide variety of other sources as well as official statistics, the following paddy (unmilled rice) yields have been assumed for major rice crop types for NWMP planning purposes. These are national average yields - in practice, there is some variation between regions, but the degree of variation is relatively small.

Rice crop type	Assumed average paddy yield (t/ha)
Aus: Broadcast (local varieties)	1.25
Irrigated HYV*	2.75
Aman: Deepwater (mainly B) aman (local varieties)	1.50
Local T aman	2.20
HYV T aman (rainfed)	3.25
HYV T aman (irrigated)*	3.75
Boro: HYV irrigated	4.50

1.3.4 Agricultural Extension Services

Agricultural extension activities in Bangladesh are carried out by the Department of Agricultural Extension (DAE) through Thana Agriculture Officers (Upazila) supervised by Deputy Directors in each District headquarters. Each Thana (Upazila) Agriculture Officer (TAO) is supported by a Subject Matter Officer, an Additional Thana Agriculture Officer (ATAO), and Assistant Agricultural Extension Officer (AAEO), a Junior Agricultural Extension Officer (JAEO), and Block Supervisors.

Diffusion and adoption of modern technologies are under the responsibility of this extension personnel. Extension activities are mainly organized through regular visits by the Block Supervisors to sub-blocks. In each sub-block there are contact farmers through which messages concerning improved practices are passed on to the farming community. In addition, the Block Supervisors attends training and conference sessions where farmers' problems are discussed. He also maintains demonstration plots in farmers' fields. The extension activities are supported by the Agricultural Support Services Program whose aim is to concentrate activities in key areas including minor irrigation operation and on-farm water management.

1.4 Irrigation

1.4.1 Irrigation Categories and Area

Irrigation in Bangladesh is divided into two categories, major and minor irrigation. Major irrigation, which now accounts for only 8% of the total irrigated crop area (see Table 1.4-1) comprises the BWDB irrigation schemes. Most of these are FCDI schemes, because they have FCD as well as BWDB irrigation supply. Minor irrigation comprises tubewell irrigation and low lift pump (LLP) surface water irrigation, largely farmer-owned, "traditional" irrigation based on either gravity supply and manual lifting devices, and a small

area of modern public sector irrigation, mainly gravity schemes developed by LGED (Local Government Engineering Department).

Table 1.4.1 Irrigated Crop Areas in 1997-98

Category	Million ha
Minor Irrigation ⁽¹⁾	
1. Modern irrigation:	
- Shallow tubewells	2.18
- Deep tubewells	0.47
- Low lift pumps	0.62
Sub-total	3.27
2. Traditional and unmechanised irrigation	0.26
Total	3.53
Major Irrigation (BWDB schemes)	0.30
Total irrigation	3.83

Source: National Minor Irrigation Census.

Note: ⁽¹⁾ These are the crop areas irrigated in the rabi season. In 1997-98 there were another 0.23Mha irrigated in kharif, mainly for aman.

Tubewell and LLP irrigation accounted for 85% of the total irrigated area of 3.83Mha in 1997 ~ 98, the latest year for which NMIC (National Minor Irrigation Census) data are available. This has been the principal factor behind the rapid growth in total irrigated area (Figure 1.4.1). Data for subsequent years are not available, but the estimated 0.5Mha increase in boro area in 1998 ~ 99, following the very severe 1998 flood, would indicate that the area may now have risen to 4.3Mha or more. This is equivalent to over 50% of the total NCA. Average command areas are around 3.2ha for diesel-powered shallow tubewells, 4.4ha for electric STWs, 16ha and 22ha for diesel and electric DTWs respectively, 8ha for diesel-powered LLPs and 16ha for electric LLPs.

Groundwater has become an increasingly important water source, accounting for at least 70% of the 1997 ~ 98 total irrigated crop area. Further expansion of private LLPs is constrained by the fact that most dry season usable surface water resources outside the three main rivers are already fully exploited. In contrast, considerable scope still exists for further groundwater irrigation expansion, as NWMPP resource assessments have shown. Most of the country except for the North East Region, the coastal zone, the Chittagong Hill Tracts and some parts of South East Region has good aquifer conditions and suitable water quality for low-cost STW abstraction. In most areas annual recharge is sufficient to fully replenish the aquifer in all but the driest years, so groundwater mining is not a serious danger.

Table 1.4.2 shows the 1997 ~ 98 rabi season minor irrigated areas by region and the percentages of NCA which they occupied. In that year the two most intensively developed regions, North Central, had 62% and 53% of their NCA under minor irrigation. In the South West the percentage was somewhat lower, at 42%. Considering that irrigation water availability in this region is more constrained, due to surface water salinity, the proportion of the minor irrigation potential already exploited there is probably broadly similar to that in the

North West and North Central Regions.

Of the three regions with little groundwater potential, the North East has sufficient dry season surface water resources to support considerable LLP irrigation. This is not the case in most of the coastal region or in the CHT. Potential for minor (private) irrigation development is correspondingly limited. Unlike the CHT, there is plentiful irrigable land in the coastal region. With the scarcity of local sources of usable (fresh) surface water, however, GoB intervention to make more surface water available is the only means by which irrigation there can be expanded.

Table 1.4.2 1997 ~ 98 Minor Irrigated Crop Areas By Region ('000ha)(1)

Category	Region							Grand Total
	SW	SC	NW	NC	NE	SE	EH	
1. Modern Irrigation:								
-Private shallow tubewells	446.1	35.7	1,138.0	367.8	148.8	70.7	11.2	2,218
-Deep tubewells (mainly private)	63.4	1.5	226.4	113.6	32.3	52.7	2.8	493
-Low-lift pumps	28.5	69.5	35.3	60.9	150.7	140.9	73.0	559
Sub-Total	538.1	106.7	1,399.7	542.3	331.8	264.3	87.0	3,270
2. Traditional and unmechanised irrigation	34.3	6.5	48.2	17.9	98.2	15.4	22.2	243
Total Minor Irrigation	572.4	113.2	1,447.8	560.2	430.1	279.7	109.2	3,513
Net Cultivable Area (NCA)	1,378	931	2,353	1,056	1,408	743	483	8,353
Minor Irrigation as % of NCA	42%	12%	62%	53%	30%	38%	23%	42%

Source: National Minor Irrigation Census 1997-98.

Note: ⁽¹⁾ These are the areas irrigated in the rabi season. In 1997-98 there were another 0.23Mha irrigated in the Kharif, mainly for a man.

With the growth of farmer-owned minor irrigation, irrigation in Bangladesh has become a largely private sector activity. No major new BWDB schemes have been started since the 1980s. Apart from running the existing schemes, GoB intervention in the sector is now slight. This is reflected in the GoB 1999 ~ 2000 Annual Development Programme (ADP). This contains only six irrigation-related projects involving a 1999 ~ 2000 expenditure of over Tk100M, namely the Barind DTW development, the ADB-funded Command Area Development Project (CADP), the National Minor Irrigation Development Project, Teesta Barrage CADP, repair and overhauling of the GK (Ganges-Kobadak) pumps and the BADC (Bangladesh Agricultural Development Corporation). Irrigation and Mechanised cultivation Expansion Project. The National Minor Irrigation Census (NMIC), revitalized under NMIDP and transferred to DAE, has proved to be a valuable data source. However, although the data for the 1998 ~ 99 and 1999 ~ 2000 seasons data were collected, processing is not complete and they are yet to be published.

CHAPTER 2 PRESENT AGRICULTURE AND IRRIGATION IN THE STUDY AREA

2.1 Background of the Study

In response to the Government of the People's Republic of Bangladesh, the Government of Japan decided to conduct the Study for Rural Development Focusing on Flood Proofing in the People's Republic of Bangladesh (hereinafter referred to as "the study") through JICA.

The Study covers eight districts concerning flood vulnerable areas of Char and Haor: four (Kurigram, Gaibandha, Sirajganj and Jamalpur) in Char area and another four (Netrokona, Sunamgani, Kishoreganj and The Study aims at: (i) formulating a master plan of flood proofing in the Study area. (ii) carrying out a feasibility study on priority project(s), and (iii) transferring technology to counterpart personnel in the course of the study.

The Survey on Agriculture and Water Use has been conducted as a part of the Study, for the purposes of (i) knowing the existing conditions of land use, farming activities and water utilization of the study areas, (ii) improving agricultural productivity and living condition in relation to water supply.

2.2 Survey Methodology

In order to collect required information on different aspects of the survey, several sets of questionnaire have been designed for the field survey. The survey questionnaire are divided into three categories (a) Census of Land use, (b) Census on Farming and Irrigation and (c) Survey on water supply. These three categories contain near about 35 numbers of questions. The survey team collected primary data as well as secondary data. About 40% of this questionnaire are secondary data and the rest are primary data. The team members have collected first secondary data from district and thana level in discussion with all concerned – agriculture, fisheries, livestock and others officials. After collection of secondary data the team moved to Union Parishad and then visited mouza level to collect primary data from the representatives of Union Member of their nominee. The primary data has been considered as one of the main data source of this survey. Keeping in mind to collect reliable primary data, group discussion was conducted with farmers, fishermen, women, local elites, officials, etc. on the basis of the questionnaire.

Regarding the preparation of land use map mouza maps were collected from DLRS, Dhaka office. Each of mouza map contains one or more sheets. The survey team's assignment required to visit mouza levels with the mouza sheets in order to complete a baseline landuse map showing road, home stead land, cultivated, uncultivated land, river, canal, etc. available in the mouza in discussion with the local officials, block supervisor, Union Parishad members and field work with the help of local elite persons. Finally, these baseline maps are sent to drafting section of head office to prepare final landuse map.

2.2.1 Present Agriculture

(1) Land Pattern

The existing agricultural practice is very much dependent of the land type. According to FAO's classification, the maximum flood depth condition of the land has been classified as follows:

Land Type		Maximum Flood Depth (m)
F ₀	High Land	0 - <0.3
F ₁	Medium High Land	0.3 - <0.9
F ₂	Medium Low Land	0.9 - <1.8
F ₃	Low Land	1.8 - <3.0
F ₄	Very Low Land	3m and above

According to this classification Table 2-1 gives a summary of the eight district's land pattern which represent to the flooding condition.

(2) Land Pattern of Agriculture & Homestead Land in Sample Area

Depend on the FAO's land Classification, the sample area has been classified as following Table 2-1.

Table 2-1 Land Pattern of Agricultural & Homestead Land

District Name	Agricultural Land (Ha.)						Homestead Land (Ha.)						Gross Area	Agricultural Land (%)
	Total Area	F ₀	F ₁	F ₂	F ₃	F ₄	Total Area	F ₀	F ₁	F ₂	F ₃	F ₄		
Kurigram	6,418	nil	1,560	2,865	2,000	nil	1,010	nil	665	345	nil	nil	16,932	38
Gaibandha	4,647	26	2,082	1,729	810	nil	677	78	432	164	3	nil	9,982	46
Jamalpur	5,935	836	1,295	1,374	1,695	733	685	205	356	124	nil	nil	12,183	48
Sirajganj	4,473	214	2,055	1,074	1,062	78	594	233	271	83	6	nil	8,110	55
Total	21,473	1,076	6,992	7,042	5,567	811	2,966	516	1,724	716	9		47,207	
Netrokona	8,008	nil	nil	31	1,731	6,245	180	158	7	16	nil	nil	12,650	63
Sunamganj	18,100	nil	26	1,061	2,068	4,775	142	79	63	nil	nil	nil	23,900	75
Kishorganj	19,347	nil	39	473	15,395	3,438	298	132	98	67	nil	nil	25,095	77
Habiganj	8,945	nil	18	810	3,701	4,415	178	131	44	nil	nil	nil	11,250	79
Total	54,400		83	2,375	22,895	8,873	798	500	212	83			72,895	

The total gross area of the Char area is approximately 47,207 ha and that of Haor area is 72,895 ha. Out of the total gross are of 47,207 in the Char area the cultivable land is 21,473 which is approximately 45 per cent (average) of the gross area. The Haor area consisting of 72,895 ha gross area, the total agricultural land area is 54,400 which is 74.5 per cent of the gross area. Though the percentage of cultivable land is more in Haor area but the cropping intensity is much lower than the Char area.

(3) Agricultural Land in Study Area

According to the ratio of Agricultural Land the Gross Area in each district of sample area, Agricultural land estimated, which is shown as following Table 2-2.

Table 2-2 Agricultural Land

The Char Area					
Districts	1. Gaibandha	2. Jamalpur	3. Kurigram	4. Sirajganj	Remarks
Gross Area	50,377	52,760	85,483	77,912	Total (ha)266,532
Agricultural Land	(46%) 23,173	(48%) 25,325	(38%) 32,484	(55%) 42,852	Total (ha)123,834
Poipulation	102,536	192,335	170,998	247,712	Male
	98,515	184,793	164,293	237,998	Female
	201,051	377,128	335,291	485,710	Total 1,399,180

Density (525/Km²)

The Haor Area					
Districts	1. Gaibandha	2. Jamalpur	3. Kurigram	4. Sirajganj	Remarks
Gross Area	139,389	169,377	70,122	271,305	Total (ha)650,193
Agricultural Land	(79%) 110,117	(77%) 130,420	(63%) 44,177	(75%) 203,479	Total (ha)488,193
Poipulation	382,119	640,022	138,497	612,679	Male
	367,134	614,925	133,066	588,654	Female
	749,253	1,254,947	271,563	1,201,333	Total 3,477,096

Density (535/Km²)

Note: (%) is estimated with Sample Area Survey's results.

(4) Crops and its acreage in the Study Area

Crops and its harvested areas are estimated based on the distribution ratio on each crop including the crop intensities in the sample area. The details of crops and acreage are compiled in the Table 2-3 to 2-6.

(5) Cropping Intensity

Cropping Intensities evaluated with the sample area survey in Char Area and Haor Area. There are being much different between the Char Area and the Haor Area, namely, the Char Area shows 171.8 percent and 105.4 percent as average intensities respectively. The details of computations summarized in Table 2-7.

(6) Cropping Pattern

In the study area, existing cropping pattern is predominantly rice based, but there are variation when compared to Char and Haor area, because of land elevation, soil and climatic condition and as a result, crop production and cropping intensity.

Table 2-3 Information of Crops and Acreage in the Study Area

CHAR AREA (1)

Unit; (ha)

District; GAIBANDHA		District; JAMALPUR	
CROPS	ACREAGE	CROPS	ACREAGE
<u>Rabi</u>		<u>Rabi</u>	
Boro (Lv)	2,420	Boro (Lv)	4,779
Boro (HYV)	9,426	Boro (HYV)	10,757
Wheat	3,515	Wheat	3,774
Lentils/Pulse	644	Lentils/Pulse	964
Potato	729	Potato	642
Sweet potato	1,672	Sweet potato	1,043
Vegetables	429	Vegetables	762
Spices	919	Spices	2,127
G. Nut	1,715	G. Nut	2,368
Water Melon	-	Water Melon	-
Sugar cane	387	Sugar cane	602
Mustard Oil	566	Mustard Oil	1,325
Seed	-	Seed	-
Others	566	Others	-
Sub Total	22,988	Sub Total	29,143
<u>Kharif</u>		<u>Kharif</u>	
Aus (Lv)	276	Aus (Lv)	843
Aus (HYV)	1,434	Aus (HYV)	1,163
Vegetable	644	Vegetable	241
Jute	2,205	Jute	2,931
Others	148	Others	2,769
Sub Total	4,707	Sub Total	7,947
<u>Kharif</u>		<u>Kharif</u>	
Aman (Lv)	7,483	Aman (Lv)	1,525
Aman (HYV)	7,692	Aman (HYV)	1,525
Sub Total	15,175	Sub Total	3,050
Total	42,870	Total	40,140
Crop Intensity=1,850 23,173x1,850=42,870 (ha)		Crop Intensity=1,585 25,325x1,585=40,140 (ha)	

Table 2-4 Information of Crops and Acreage in the Study Area

CHAR AREA (2)		Unit; (ha)	
District; KURIGRAM		District; SIRAJGANJ	
CROPS	ACREAGE	CROPS	ACREAGE
<u>Rabi</u>		<u>Rabi</u>	
Boro (Lv)	2,199	Boro (Lv)	1,632
Boro (HYV)	6,658	Boro (HYV)	11,770
Wheat	7,294	Wheat	2,128
Lentils/Pulse	2,662	Lentils/Pulse	4,043
Potato	520	Potato	142
Sweet potato	2,894	Sweet potato	710
Vegetables	2,489	Vegetables	142
Spices	1,158	Spices	8,866
G. Nut	2,199	G. Nut	2,198
Water Melon	-	Water Melon	-
Sugar cane	695	Sugar cane	639
Mustard Oil	3,010	Mustard Oil	5,177
Seed	-	Seed	-
Others	2,546	Others	-
Sub Total	34,324	Sub Total	37,447
<u>Kharif</u>		<u>Kharif</u>	
Aus (Lv)	2,954	Aus (Lv)	2,837
Aus (HYV)	116	Aus (HYV)	71
Vegetable	1,794	Vegetable	71
Jute	6,078	Jute	12,411
Others	4,400	Others	8,722
Sub Total	15,342	Sub Total	24,112
<u>Kharif</u>		<u>Kharif</u>	
Aman (Lv)	3,936	Aman (Lv)	9,361
Aman (HYV)	4,284	Aman (HYV)	-
Sub Total	8,220	Sub Total	9,361
Total	57,886	Total	70,920
Crop Intensity=1,782 32,484x1,782=57,886 (ha)		Crop Intensity=1,655 42,852x1,655=70,920 (ha)	

Table 2-5 Information of Crops and Acreage in the Study Area

HAOR AREA (1)		Unit; (ha)	
District; HABIGANJI		District; KISHOREGANJ	
CROPS	ACREAGE	CROPS	ACREAGE
<u>Rabi</u>		<u>Rabi</u>	
Boro (Lv)	242	Boro (Lv)	10,604
Boro (HYV)	97,210	Boro (HYV)	106,185
Wheat	2,055	Wheat	137
Lentils/Pulse	-	Lentils/Pulse	-
Potato	121	Potato	2,754
Sweet potato	-	Sweet potato	964
Vegetables	121	Vegetables	827
Spices	-	Spices	964
G. Nut	-	G. Nut	3,718
Water Melon	-	Water Melon	-
Sugar cane	-	Sugar cane	137
Mustard Oil	1,572	Mustard Oil	5,371
Seed	-	Seed	-
Others	-	Others	-
Sub Total	101,321	Sub Total	131,661
<u>Kharif</u>		<u>Kharif</u>	
Aus (Lv)	3,869	Aus (Lv)	-
Aus (HYV)	1,209	Aus (HYV)	276
Vegetable	-	Vegetable	276
Jute	-	Jute	827
Others	-	Others	-
B. Aman	5,925		
Sub Total	11,003	Sub Total	1,379
<u>Kharif</u>		<u>Kharif</u>	
- Aman (Lv)	1,209	- Aman (Lv)	1,377
- Aman (HYV)	7,375	- Aman (HYV)	3,307
Sub Total	8,584	Sub Total	4,684
Total	120,908	Total	137,724
Crop Intensity=1,098 110,117x1,098=120,908 (ha)		Crop Intensity=1,056 130,420x1,056=137,724 (ha)	

Table 2-6 Information of Crops and Acreage in the Study Area

HAOR AREA (2)		Unit; (ha)	
District; NETROKONA		District; SUNAMGANJ	
CROPS	ACREAGE	CROPS	ACREAGE
<u>Rabi</u>		<u>Rabi</u>	
Boro (Lv)	11,104	Boro (Lv)	71,462
Boro (HYV)	27,467	Boro (HYV)	119,105
Wheat	90	Wheat	-
Lentils/Pulse	-	Lentils/Pulse	-
Potato	2,357	Potato	2,530
Sweet potato	408	Sweet potato	842
Vegetables	1,133	Vegetables	2,530
Spices	453	Spices	1,897
G. Nut		G. Nut	210
Water Melon		Water Melon	-
Sugar cane		Sugar cane	-
Mustard Oil	1,496	Mustard Oil	1,897
Seed	-	Seed	-
Others	-	Others	-
Sub Total	44,508	Sub Total	200,473
<u>Kharif</u>		<u>Kharif</u>	
Aus (Lv)	362	Aus (Lv)	422
Aus (HYV)	-	Aus (HYV)	-
Vegetable	-	Vegetable	-
Jute	228	Jute	-
Others	-	Others	422
Sub Total	590	Sub Total	844
<u>Kharif</u>		<u>Kharif</u>	
- Aman (Lv)	228	- Aman (Lv)	1,687
- Aman (HYV)	-	- Aman (HYV)	7,800
Sub Total	228	Sub Total	9,487
Total	45,326	Total	210,804
Crop Intensity=1,026		Crop Intensity=1,036	
44,177×1,026=45,326 (ha)		203,479×1,036=210,804 (ha)	

Table 2-7 CROPPING INTENSITY ON SAMPLE AREA IN EACH DISTRICTS

Items Districts	Gross Area (Ha)	Uncultivated Area (Ha)	Cultivated Area (Ha)	Single Cropped Area (Ha)	Double Cropped More Area (Ha)	Cropping Intensity (%)
CHAR AREA						
1. GAIBANDHA	9,981.9	5,334.7	4,647.2 (0.47)	1,498.4	7,019.8	185.0
2. JAMALPUR	1,218.6	6,247.8	5,935.8 (0.49)	2,829.8	6,577.4	158.5
3. KURIGRAM	16,931.4	10,512.7	6,418.7 (0.38)	2,385.2	9,054.4	178.2
4. SIRAJGANJ	8,110.5	3,637.1	4,473.4 (0.55)	1,690.4	5,710.5	165.5
HAOR AREA						
1. HABIGANJ	11,250.1	2,306.1	8,944.0 (0.80)	8,084.2	1,734.6	109.8
2. KISHOREGANJ	25,095.6	5,748.4	19,347.5 (0.77)	18,333.1	2,165.9	105.6
3. NETROKONA	12,649.0	4,640.5	8,008.5 (0.63)	7,798.9	419.3	102.6
4. SUNAMGANJ	23,911.3	5,778.4	18,132.9 (0.76)	17,521.7	1,221.1	103.6

Present Cropping Pattern in Char and Haor area delineated in Figure 2-1 and Figure 2-2 under the consideration of single crop, double crop and triple crop respectively.

(7) Crop Yield

Regarding the crop yield. Char area is very productive during Rabi season. Farmer do their best to have maximum land use. The most of the crops one wheat (HYV) and Boro (HYV). On the other hand, Haor area is also very productive during Rabi season. The most of the crops are Boro (HYV), spices, and mustard oil/seed.

Crop Yield of main crops indicated following Table 2-8.

Table 2-8 Crop Yield in CHAR and HAOR Area

Average Crop Yield in the Char Area					(Unit: t/ha)
Crop	Gaibandha	Jamalpur	Kurigram	Sirajganj	Average
Boro (LV)	2.09	3.15	2.28	2.17	2.42
Boro (HYV)	4.23	3.96	4.62	5.13	4.49
Wheat	2.67	2.62	2.40	2.16	2.46
Pulses (Lentils)	1.31	1.05	1.46	1.33	1.29
Grund Nut	3.72	4.52	4.41	2.60	3.81
Sugar Cane	62.97	40.43	74.27	1.52	44.80
Oil seed (Mustard)	1.04	1.21	1.64	0.65	1.13
Aus (LV)	2.14	2.96	2.02	1.80	2.23
Aus (HYV)	3.44	5.03	3.12	2.01	3.40
Jute	2.20	2.78	2.93	1.52	2.36
Aman (LV)	2.55	2.95	2.36	2.14	2.50
Aman (HYV)	3.61	3.95	3.11	0.00	3.56

Source: The Survey on Agricultural and Water Use, July 2001

Average Crop Yield in the Haor Area

(Unit: t/ha)

Crop	Habiganj	Kishoreganj	Netrokona	Sunamganj	Average
Boro (LV)	2.97	3.09	3.34	2.49	2.97
Boro (HYV)	5.37	5.57	4.33	4.45	4.93
Wheat	3.57	2.69	1.50	2.12	2.47
Pulses (Lentils)	0.00	0.00	0.00	1.36	1.36
Spices	0.00	4.23	4.86	4.85	3.49
Oil seed (Mustard)	2.40	1.23	1.54	1.70	1.72
Aus (LV)	2.78	1.80	3.95	1.76	2.57
Aus (HYV)	3.00	2.46	0.00	0.00	2.73
Aman (LV)	2.99	2.24	3.95	2.43	2.90
Aman (HYV)	3.45	4.39	0.00	3.01	3.62

Source: The Survey on Agricultural and Water Use, July 2001

Note: Yield of the Boro, Aus and Aman are unmilled rice.

(8) Crops production

Concerning the agricultural production in the study area, the sample area survey's information have been applied and estimated the production of main crops in each district of Char and Haor Area respectively and tabulated as following (Table 2-9 to 2-12).

According to the Tables, the cereals have been estimated and compared with the demands of the district, which is satisfied the demands.

Basic data; Population of the district and the demand of 160 kg/one person/one year.

Table 2-9 Crop Production in Study Area (Char Area) (1)

District Crops	GAIBANDA			JAMALPUR		
	Area (ha)	Yield (t/ha)	Production (t)	Area (ha)	Yield (t/ha)	Production (t)
Boro (LV)	2,420	2.09	¹ 5,058	4,779	3.15	¹ 15,054
Boro (HYV)	9,426	4.23	² 39,872	10,757	3.96	² 42,598
Wheat	3,515	2.67	³ 9,385	3,774	2.62	³ 9,888
Pulses (Lentils)	644	1.31	844	964	1.05	1,012
Grund Nut	1,715	3.72	6,380	2,368	4.52	10,703
Sugar Cane	387	62.97	24,369	602	40.43	24,339
Oil Seed (Mustard)	566	1.04	589	1,325	1.21	1,603
Aus (LV)	276	2.14	⁴ 591	843	2.96	⁴ 2,495
Aus (HYU)	1,434	3.44	⁵ 4,933	1,163	5.03	⁵ 5,850
Jute	2,205	2.20	4,851	2,931	2.78	8,148
Aman (LV)	7,483	2.55	⁶ 19,082	1,525	2.95	⁶ 4,499
Aman (HYU)	7,692	3.61	⁷ 27,768	1,525	3.95	⁷ 6,024

Note: Total (1~7) Production in districts are estimated as follows.

GAIBANDA; $106,6689 \times 0.66 = 70,415 \text{ ton} > 32,168 \text{ ton}$

JAMALPUR; $86,408 \times 0.66 = 57,029 \text{ ton} < 60,340 \text{ ton}$

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Demand; GAIBAND; $201,051 \times 0.160 = 32,168$ ton

JAMALPUR; $377,128 \times 0.160 = 60,340$ ton

K ; Milling Rate = 0.66

Table 2-10 Crop Production in Study Area (Char Area) (2)

District Crops	KURIGRAM			SIRAJGANJ		
	Area (ha)	Yield (t/ha)	Production (t)	Area (ha)	Yield (t/ha)	Production (t)
Boro (LV)	2,199	2.28	¹ 5,014	1,632	2.17	¹ 3,541
Boro (HYV)	6,658	4.62	² 30,760	11,770	5.13	² 60,380
Wheat	7,294	2.40	³ 17,506	2,128	2.16	³ 4,596
Pulses (Lentils)	2,662	1.46	3887	4,043	1.33	5,377
Grund Nut	2,199	4.41	9,698	2,198	2.60	5,715
Sugar Cane	695	74.27	51,618	639	1.52	971
Oil Seed (Mustard)	3,010	1.64	4,936	5,177	0.65	3,365
Aus (LV)	2,954	2.02	⁴ 5,967	2,837	1.80	⁴ 5,107
Aus (HYU)	116	3.12	⁵ 362	71	2.01	⁵ 143
Jute	6,078	2.93	17,809	12,411	1.52	18,865
Aman (LV)	3,936	2.36	⁶ 9,289	9,361	2.14	⁶ 20,033
Aman (HYU)	4,284	3.11	⁷ 13,323	-	-	⁷ -

Note; Total (1~7) Production in districts are estimated as follows.

KURIGRAM; $82,221 \times 0.66 = 54,266$ ton > 53,646 ton

SIRAJGANJ; $93,800 \times 0.66 = 61,908$ ton < 77,714 ton

Demand; KURIGRAM; $335,291 \times 0.160 = 53,646$ ton

SIRAJGANJ; $485,750 \times 0.160 = 77,714$ ton

K; Milling Rate = 0.66

Table 2-11 Crop Production in Study Area (Haor Area) (1)

District Crops	HABIGANJI			KISHOREGANJ		
	Area (ha)	Yield (t/ha)	Production (t)	Area (ha)	Yield (t/ha)	Production (t)
Boro (LV)	242	2.97	¹ 719	10,604	3.09	¹ 32,766
Boro (HYV)	97,210	5.37	² 22,018	106,185	5.57	² 91,450
Wheat	2,055	3.57	³ 7,336	137	2.69	³ 369
Pulses (Lentils)	-	-	-	-	-	-
Spices	-	-	-	964	4.23	4,078
Oil Seed (Mustard)	1,572	2.40	3,773	5,371	1.23	6,606
Aus (LV)	3,869	2.78	⁴ 10,756	-	1.80	⁴ -
Aus (HYU)	1,209	3.00	⁵ 3,627	276	2.46	⁵ 679
Aman (LV)	1,209	2.99	⁶ 3,615	1,377	2.24	⁶ 3,084
Aman (HYU)	7,375	3.45	⁷ 25,444	3,307	4.39	⁷ 14,518

Note; Total (1~7) Production in districts are estimated as follows.

HABIGANJI; $573,515 \times 0.66 = 378,520$ ton > 119,880 ton

KISHOREGANJI; $642,866 \times 0.66 = 424,292 \text{ ton} > 200,792 \text{ ton}$
 Demand; HABIGANJI; $749,523 \times 0.160 = 119,880 \text{ ton}$
 KISHOREGANJI; $1,254,947 \times 0.160 = 200,792 \text{ ton}$
 K; Milling Rate = 0.66

Table 2-12 Crop Production in Study Area (Haor Area) (2)

Crops \ District	NETROKONA			SUNAMGANJ		
	Area (ha)	Yield (t/ha)	Production (t)	Area (ha)	Yield (t/ha)	Production (t)
Boro (LV)	11,104	3.34	¹ 37,087	71,462	2.49	177,940
Boro (HYV)	27,467	4.33	² 118,932	119,105	4.45	530,017
Wheat	90	1.50	³ 135	-	-	-
Pulses (Lentils)	-	-	-	-	-	-
Spices	453	4.86	2,202	1,897	4.85	9,200
Oil Seed (Mustard)	1,496	1.54	23,040	1,897	1.70	3,225
Aus (LV)	362	3.95	⁴ 1,430	422	1.76	743
Aus (HYU)	-	-	⁵ -	-	-	-
Aman (LV)	228	3.95	⁶ 901	1,687	2.43	4,099
Aman (HYU)	-	0.00	⁷ -	7,800	3.01	23,478

Note; Total (1-7) Production in districts are estimated as follows.

NETROKONA; $158,458 \times 0.66 = 104,582 \text{ ton} > 43,450 \text{ ton}$

SUNAMGANJ; $277,417 \times 0.66 = 183,095 \text{ ton} < 192,213 \text{ ton}$

Demand; NETROKONA; $271,563 \times 0.160 = 43,450 \text{ ton}$

SUNAMGANJ; $1,201,333 \times 0.160 = 192,213 \text{ ton}$

K; Milling Rate = 0.66

(9) Farming Practices

- Fertilizer

According to the study of the NRWMP (Northeast Regional Water Management Project), the chemical fertilizer are a major input of HYV rice in the rabi season. Nitrogen is the most command and widely used nutrient, with area the main source of nitrogen, and Phosphate is the second most used fertilizer. The most widely consumed Phosphate fertilizer is TSP (Triple Super Phosphate) and the Potask is the third most widely used nutrient, with MP (Murate of Potask) the only source of potask. Fertilizer applications are generally poorly balanced.

The study report informed actual application of fertilizer on main crops as mentioned in Table 2-13.

**Table 2-13 Fertilizer Use
(Actual Application)**

Crop	Fertilizer Use			Remarks
	Urea	TSP	MP	
Local T. <i>Aman</i>	59	59	11	Unit; kg/ha
HYV T. <i>Aman</i>	61	20	5	
Local <i>Boro</i>	42	19	2	
HYV <i>Boro</i>	135	73	26	
Wheat	130	61	-	
Pulse	13	-	-	
Groundnut	54	64	-	
Oilseed	50	22	12	
Potato	96	43	4	
Sweet Potato	15	15	20	
Vegetable	41	27	-	
Spice	116	88	9	

Source; The actual rate of application was obtained from farm monitoring and land use survey in NRWMP (FAP 6)

Furthermore, actual application of fertilizer in sample area are summarized on the main crops in Table 2-14 and 2-15 respectively.

Table 2-14 Fertilizer Use in Sample Area

Crop	Fertilizer Use (Char Area)			Remarks
	Urea	TSP	MP	
Aus (LV)	111.8	70.4	42.5	Unit; kg/ha
Aus (HYV)	161.1	103.8	56.3	
Aman (LV)	84.6	74.0	29.2	
Aman (HYV)	137.1	103.3	41.3	
Boro (LV)	121.5	88.6	39.3	
Boro (HYV)	200.0	126.1	51.3	
Wheat	126.1	76.5	48.0	
Pulses (Lentils)	57.6	37.6	14.0	
Spices	239.6	109.4	72.7	

Source; Consumption of the fertilizer in Char area estimated with averaged value in 4 district.

Table 2-15 Fertilizer Use in Sample Area

Crop	Fertilizer Use (Haor Area)			Remarks
	Urea	TSP	MP	
Aus (LV)	116.5	70.5	49.2	Unit; kg/ha
Aus (HYV)	111.8	80.0	40.0	
Aman (LV)	112.3	72.4	41.0	
Aman (HYV)	112.4	74.5	58.4	
Boro (LV)	112.0	76.2	43.9	
Boro (HYV)	172.4	86.4	43.6	
Wheat	107.6	90.5	43.3	
Pulses (Lentils)	39.0	22.0	-	
Spices	149.7	137.9	57.7	

Source; Consumption of the fertilizer in Haor area estimated with averaged value in 4 district.

- Irrigation

The irrigation has been carried out in CHAE Area and HAOR Area respectively. In CHAR, the most of the irrigation are done with STW as a source of irrigation water (Groundwater). In HAOR Area, Netrokona and Kishoreganji districts are utilizing the STW and LLP respectively, however, other two districts are applied LLP only.

According to the Report of NWMP, August, 2000, there are three kinds of irrigation facilities as the most popular in Bangladesh, namely, DTW, STW and LLP. Capabilities of each facilities are estimated as followings.

STW; 3.2ha(diesel-powered) DTW; 16ha(diesel-powered) LLP;
8.0ha(electric-powered)
STW; 4.4ha(diesel -powered) DTW: 22ha(electric-powered) LLP;
16.0ha(electric-powered)

On the other hand, the irrigated area (hd, number of facilities and acreage of controlled with facilities area summarized for the sample area in Table 2-16.

Furthermore, it is considered that irrigation net-works should be expanded and strengthen its systems due to the increment of the irrigation facilities in the study area as following the prospect.

Present condition of irrigation facilities in the study area.

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Char Area;

$$\text{Gaibandha; } \frac{23,173 \text{ (ha)} \times 0.66}{6.0} = 2,549 \text{ unit}$$

$$\text{Jamalpur; } \frac{25,325 \times 0.76}{6.6} = 2,916 \text{ unit}$$

$$\text{Kurigram; } \frac{32,484 \times 0.50}{7.8} = 2,082 \text{ unit}$$

Sirajganj Not Considerable

Required STW for each district in Char Area are estimated as follows;

$$\text{Gaibandha; } 2,549 \times \frac{6.0}{3.2} = 4,588 \text{ unit}$$

$$\text{Jamalpur; } 2,916 \times \frac{6.6}{3.2} = 5,832 \text{ unit}$$

$$\text{Kurigram; } 2,082 \times \frac{7.8}{3.2} = 2,082 \text{ unit}$$

$$\text{Total; } \underline{\underline{15,417 \text{ unit}}}$$

Regarding the required irrigation facilities (LLP) in Haor Area are estimated as follows;

(Kishoreganj and Netrokona are not considerable)

$$\text{Habiganj; } \frac{110,117 \times 0.9}{26.1} = 3,797 \text{ unit (at present)}$$

$$\text{Sunamganj; } \frac{203,479 \times 0.94}{23.5} = 8,139 \text{ unit (at present)}$$

$$\text{Habiganj; } 3,797 \times \frac{26.1}{8.0} = 12,378 \text{ unit}$$

$$\text{Sunamganj; } 8,139 \times \frac{23.5}{8.0} = 23,928 \text{ unit}$$

$$\text{Total; } \underline{\underline{30,306 \text{ unit}}} \text{ (Required Facilities)}$$

Table 2-16 List of Irrigation Facilities in Sample Area

Items Districts	Irrigated Area (Ha)		DTW			STW			LLP			Treadle			Remarks
			01	02	03	01	02	03	01	02	03				
CHAR AREA	(%)														
1. GAIBANDHA	3,060	(66)	-	-	-	60	267	169	-	-	-	(38) 11	-	-	6.0 ha/unit
2. JAMALLPUR	4,521	(76)	-	-	-	288	305	79	6	-	-	(25) 7	-	-	6.6 ha/unit
3. KURIGRAM	3,190	(50)	-	-	-	95	21	185	-	-	-	(358) 107	-	-	7.8ha/unit
4. SIRAJGANJ	1,626	(36)	-	-	-	735	13	-	-	-	-	-	-	-	2.2 ha/unit
HAOR AREA	(%)											HTW			
1. HABIGANJ	8,081	(90)	-	-	-	-	-	5	164	54	87	-	-	-	26.1 ha/unit
2. KISHOREGANJ	17,430	(90)	-	4	2	533	331	111	155	158	325	-	-	-	10.8 ha/unit
3. NETROKONA	7,009	(88)	1	-	-	528	171	194	8	31	92	-	-	-	6.8 ha/unit
4. SUNAMGANJ	16,982	(94)	-	-	-	11	1	-	698	-	23	-	-	-	23.5 ha/unit

Note; DTW-Deep Tube-well Facility Owned-01 Treadle capability for Irrigation is estimated at 30 percent of
 STW-Shallow Tube-well Facility Shared-02 STW and the number (38.25 and 3.58) is shown No. of
 LLP-Low Lift Pump Facility Rented-03 Treadle in the Sample Area.
 HTW-Hand Tube-well (%) of Irrigated means percentage of irrigated for the
 agricultural lands in sample area.

2.2.2 Supporting Services

(1) Agricultural Extension

- Flow of the Extension Services

According to the organization, the Department of Agricultural Extension (DAE) is carried out with cooperation of Thana (Upazila) Agricultural officers. At the same time, Thana officer are supervised by in each District headquarters (Deputy Directors). On the other hand, Thana Agriculture officer (TAO) are supported by a Subject Matter Officer, an Additional Thana Agriculture Officer (ATAO), a Junior AEO, and Block Supervisors, so that, Thana Agricultural Officer is situated as the pivot of Study Area.

Diffusion and adoption of modern technologies are under the responsibility of the extension personel. Extension activities are manly organized through regular visits by the Block Supervisors to sub-blocks. In each sub-block there are contact farmers through which messages concerning improved practices are passed on to the farming community. In addition, the Block Supervisors attends training and conference sessions where farmer's problems are discussed.

- To Strengthen and Improvement of Extension Services

(1)Development of Suitable Crop Varieties

Quick-maturing varieties with high yield potential are needed in the project area. Cold tolerant boro rice varieties need to be developed for early transplantation. Suitable varieties of non-rice crops are also needed which can grow in the winter season before modern boro rice varieties can be transplanted.

(2)Platforms for Intensive Cultivation of Non-rice Crops

The raised platforms which are proposed to be built from dredge spoil will, with proper management, contribute to an increase in the cultivation throughout the year of homestead vegetables, pulses, spices and fruits. This in turn will improve nutrition and increase household income. The raised platforms will also provide improved facilities for threshing and crying crops.

(3)Crop Seeds

Usually, farmers save their seeds from the harvested crop. They sometimes exchange them among themselves. Seeds of HTVs or improved varieties are available at thana BADC seed distribution centers. But they are not available in sufficient quantity and the total amount of seeds distributed to the farmer is lower than the average requirements for the cultivation of most crops. In addition, seeds are often not available on time at thana distribution centers. The net effect of this shortcomings is a reduction in the potential yield.

(4)Efficient Management of Surface Water Used for Irrigation

Surface water irrigation can be improved with the following measures:

- Excavation of khals to provide supplementary storage.
- Providing control structures at suitable locations.
- Improvement in the efficiency of surface water use.
- Ensuring equitable water distribution.
- Improved irrigation management.

(2) Bangladesh Rice Research Institute (BRRI)

Bangladesh Rice Research Institute (BRRI) is one of the largest agricultural research institute of Bangladesh. It was established in October 1970.

- Plant Breeding Strategy of BRRI:

Development of dwarf, photoperiod insensitive varieties for all regions of Bangladesh were the major focus of BRRI research up to 1980. But after 1980, BRRI is putting more importance to intermediate height plant, mild photosensitive and pest tolerant varieties for specific ecologies.

- BRRI's Achievements:

BRRI has so far developed 31 modern rice varieties for cultivation in different rice growing seasons. BRRI varieties are grown both under rainfed and irrigated condition. BRRI varieties cover 52 percent of the rice area and 70 percent of the total rice production in Bangladesh. Popular BRRI varieties are shown as following Table 2-17.

Table 2-17 Varieties Released Since 1980

Variety Name	Year released	Ecology	GD (days)	Yield (T/ha)	Others
BR17	1985	IRR	150-155	5.0-5.5	Boro
BR18	1985	IRR	170-175	5.0-6.0	Boro
BR19	1985	IRR	160-165	5.5-6.0	Boro
BR28	1994	IRR	135-140	4.0-4.5	Boro
BR29	1994	IRR	155-160	5.5-6.0	Boro
BR35	1997	IRR	150-155	4.5-5.5	Boro
BR36	1997	IRR	140-145	4.5-5.5	Boro
BR11	1980	RFL	140-145	5.5-6.5	T. Aman
BR22	1988	RFL	135-150	4.5-5.5	T. Aman, Photoperiod sensitive
BR23	1988	RFL	135-150	4.5-5.5	T. Aman, Photoperiod sensitive
BR25	1992	RFL	135-140	4.0-4.5	T. Aman
BR26	1993	RFL	110-115	3.5-4.0	Aus
BR27	1994	RFL	115-120	3.0-3.5	Aus
BR30	1994	RFL	140-145	4.5-5.0	T. Aman
BR31	1994	RFL	135-140	4.0-5.0	T. Aman
BR32	1994	RFL	130-135	4.0-4.5	T. Aman
BR33	1997	RFL	112-118	4.0-4.5	T. Aman
BR34	1997	RFL	135-140	2.3-2.8	T. Aman, Aromatic
BR15	1983	RFL, IRR	150-160	5.0-5.5	Boro
BR16	1983	RFL, IRR	160-165	5.0-6.0	Boro
BR20	1986	UPL	110-115	3.0-3.5	Aus

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BR21	1986	UPL	95-110	3.0-3.5	Aus
BR24	1992	UPL	100-105	2.5-3.0	Aus

Note; IRR = Irrigated; RFL = Rainfed Lowland; UPL = Upland; DPW = Deepwater; TDL = Tidal

2.2.3 Fishery

(1) Present Situation of Fishery in Sample Area

According to the sample area survey's results, Number of Existing ponds, acreage and its productivities are shown as following's Tables;

Table 2-18 Fisheries Production in CHAR Area

CHAR AREA					
District Items	Gaibandha	Jamalpur	Kurigram	Sirajganj	Remarks
Fisheries (Closed)					
No. of Ponds	(282) 282	(108) 108	(189) 156	(38) 36	
Area (ha)	(42.6) 42.6	(22.8) 22.8	(32.2) 27.8	(14.4) 14.2	
Annual catch	79.0	152.0	45.6	14.1	(ton)
ton/ha	1.9 t/ha	6.7 t/ha	1.6 t/ha	1.0 t/ha	
Fisheries (Open)					
(Fish) Annual Catch	111.6	332.7	45.64	-	(ton)
(Shrimp) Annual Catch	9.2	79.6	89.0	-	(ton)

Note; No. of Ponds () are total No. of ponds, 282, 108, 156 and 36 are total No. of fish-pond.

Fisheries open is existing beel and rivers etc.

(2) Introduction of Fisheries Developments.

- Fishery Habitats

The Haor area is divided into two categorical area due to the hydrological aspect, namely, the area should be covered with flood in monsoon season (June ~ October). On the other hand, the area shall be appeared its features except existing ponds, beels and the river courses in dry season (November ~ May).

The Haor area has been two kind of habitats in Natural Habitats and Artificial Habitats respectively.

- Fish Biodiversity

According to the existing study data on Fishery of Haor area, A total of 71 species of fish have been recorded from Haor area. Important groups are major carp, other carps, large catfish, knifefish, ilish, prawns, small catfish, small cyprinids, and other small species.

The small species are used primarily for local consumption, and large species are commercially important at urban. Several species that were formerly abundant are now rare or locally extinct because of over exploitation and sedimentation.

- Fishing Practices

The long tradition of fishing in Haor are is an important determinant of fishing technology. Diverse fishing practices are used in the floodplain and beels. Fishing boats that are being used to operate the gear and transport fish also vary greatly in size, and are predominantly non-mechanized country boats using sail, paddle or pole or pole propulsion.

- Nominal Fish Production Data

According to the Department of Fisheries (DOF) operates a fisheries statistics data for the Upper Meghna River, the production in annual fish catch peaked at about 9,600 tonnes (t) in 1988/89, and then declined to about 3,500 tonnes by 1992/1993.

- Proposed one of Development method for the Fish-Culture.

(3) Floating Cage Culture

This will be introduced in association with pond culture as a preventative measure against losses resulting from monsoon flooding and for increasing grow-out periods. It will also be used as a fattening operation for both wild and cultured fish. The advantage of floating cages in areas prone to intensive monsoon flooding over other types of aquaculture practices will need to be tested through a pilot study before scaling up.

Table 2-19 Fisheries Production in HAOR Area

HAOR AREA					
District Items	Habiganj	Kishoreganj	Netrokona	Sunamganj	Remarks
Fisheries (Closed)					
No. of Ponds	(230) 87	(285) 272	(126) 29	(142) 67	
Area (ha)	(29.0) 12.3	(90.3) 88.1	(27.7) 9.4	(42.6) 20.4	
Annual catch	42.2	86.8	24.3	47.3	(ton)
ton/ha	3.4 t/ha	1.0 t/ha	2.6 t/ha	7.3 t/ha	
Fisheries (Open)					
(Fish) Annual Catch	271.0	1,669.0	4.3	1,640.5	(ton)
(Shrimp) Annual Catch	-	37.0	-	4.0	(ton)

Note; No. of Ponds () are total No. of ponds, 87, 272, 29 and 67 are total No. of fish-pond.

Fisheries open is existing beel and rivers etc.

Comments;

- During flood season, the ponds are usually over flowed resulting in loss of culture fish.

2.2.4 Live Stock and Poultry

The present condition of live stock and poultry summarized in Table 2-20 and 2-21 depend on the sample area survey. During the flood season misery of the live stocks are beyond description. But, the Char and Haor area people have the courage to defend against any natural calamities. They are adjusted to maintain live stock under adverse conditions.

The main source of cattle feed is rice straw complemented with rice fields, roadside grazing and communal grazing fields in winter. About 87% of all animal feeds come from cultivated land. Only 13% comes from other sources such as embankments, road sides, and low lands which are usually used on a community basis and therefore are not available for managed forage production. The small areas of communal grazing lands are now over-grazed. Animals hardly receive any concentrated feed except a small quantity of salt and a handful of rice bran/polishing which is produced in the households.

Table 2-20 Nos. of Live Stock and Poultry

CHAR AREA				
District Items	Gaibandha	Jamalpur	Kurigram	Sirajganj
Cattle	17,043	32,935	17,284	23,335
Buffalo	854	304	809	27
Goat	12,714	32,960	21,223	17,327
Sheep	5,396	9,475	8,151	1,788
Ducks	13,138	22,358	15,252	4,479
Cocks & Hens	34,639	81,065	221,362	68,466

Table 2-21 Nos. of Live Stock and Poultry

HAOR AREA				
District Items	Habiganj	Kishoreganj	Netrokona	Sunamganj
Cattle	14,066	32,008	29,400	28,760
Buffalo	117	1,527	1,340	583
Goat	3,096	9,748	7,720	1,878
Sheep	1,386	2,409	1,652	3,482
Ducks	42,335	125,105	110,900	109,915
Cocks & Hens	21,372	144,325	49,800	58,863

CHAPTER 3 CONSTRAINTS / PROBLEMS

3.1 Agriculture

3.1.1 Crop Damage

Local and HYV *boro* rice varieties are damaged when they are in the reproductive or ripening stage. Yield of local *boro* will decrease by 50% when 75% of the plant is submerged for 3 days during the ripening stage. When completely submerged, farmers still manage to collect the partially matured panicles. *Boro* is also damaged in winter when young plants are inundated. The winter inundation follows heavy rainfall and occurs mainly in low depressions which do not have sufficient drainage outlets. The flood conditions intensify when the major rivers are also high and their waters spill into the project area.

In particular, Sunamanj, Habiganj and a part of Netrokona district in Haor Area are damaged to *Boro* rice by early floods (March ~ May).

3.1.2 Crop Seeds

Usually, farmers save their seeds from the harvested crop. They sometimes exchange them among themselves. Seeds of HYVs or improved varieties are available at thana BADC seed distribution centers. But they are not available in sufficient quantity and the total amount of seeds distributed to the farmers is lower than the average requirements for the cultivation of most crops. In addition, seeds are often not available on time at thana distribution centers. The net effect of this shortcomings is a reduction in the potential yield.

3.1.3 Irrigation Facilities

Existing irrigation facilities are preparing owing to private efforts in the study area, however it should seem to be limited, so that the government is required to support them as well as possible.

3.2 Fishery

Existing Risks to Fisheries

Fish production in the study area is subject to 5 principal negative risks;

- sedimentation of key habitats (river channels, duars, beels);
- poor water quality due to stagnation and contamination;

- fish disease outbreaks, and
- undermining of sound biological management due to revenue collection.
- At the same time, increased river discharge due to a long-term trend of increased rainfall in the catchment area is exerting a positive region-wide impact on fish production.

3.3 Live Stock and Poultry

As informed present condition on live stock and poultry in the sector report (2.2.4), there are mentioned problems and constraints as follows;

- Insufficient spaces for the stock-yard in the study area during the flood season.
- Not available for the management of forage production in flood season.
- Lacking of knowledges for the diseases of live-stock and poultry.

3.4 Improvement of Extension Services

- Development of Suitable Crop Varieties

Quick -maturing varieties with high yield potential are needed in the project area. Cold tolerant boro rice varieties need to be developed for early transplantation. Suitable varieties of non-rice crops are also needed which can grow in the winter season before modern boro rice varieties can be transplanted.

- To strengthen and Improve the supporting services networks for the live stock and poultry.

Table (A.1) Fisheries Production

Items	Area & Para		CHAR				Jala Sarker & Hosain Member (1)			
	Selling Amount (Kg/Year)	Selling Price (Tk/Year)	Unit Price	Others	1. No. of Pond 1	2. Area (ha) 1.0	3. Water Depth (m) 3.0	4. Owner: Private		
Natural Fishing										
(1) Lui (L)	-	-		1. Place of Fishery: N/A						
(2) Lui (S)	-	-		1) Dry Season N/A						
(3) Milka	-	-		2) Wet Season N/A						
(4) Katura	-	-		3) All the Year N/A						
(5) Irisi	400 kg/year	16,000 Tk/year	40 Tk/kg	2. Fishing License: N/A						
(6) Putty Carp	-	-		3. Type of Caught: N/A						
(7) Shrimp	-	-		4. Marketing: River Bank						
(8) Club	-	-								
(9) Others	-	-								
Fish Culture										
5. Name of Fish	Amount of Finger lings	Price of Finger lings	Feed Sources	Amount of Feed	Price of Feed	Production	Selling Price	Harvest C		
(1) Lui (L)	27 kg/ha	217 Tk/kg	Oil cake & Husk	263 kg/year	2,104 Tk/year	800 kg	40,000 Tk/year	12 month		
(2) Lui (S)										
(3) Milka	26 kg/ha	183 Tk/kg	Husk	870 kg/year	2,610 Tk/year	608 kg	18,240 Tk/year	12 month		
(4) Katura	13 kg/ha	163 Tk/kg	Husk • floor, oil cake	N/A	N/A	605 kg	21,175 Tk/year	12 month		
(5) Irisi										
(6) Putty Carp	13 kg/ha	263 Tk/kg	Husk	460 kg/year	1,380 T/year	279 kg	10,462 Tk/year	12 month		
(7) Shrimp										
(8) Club										
(9) Silver Cup	24 kg/ha	200 Tk/kg	Shawla	750 kg/year	938 Tk/year	550 kg	15,125 Tk/year			
Note	Survival Rate; 65~75%									

Table (A.2)
Fisheries Production

Area & Para		CHAR Mokbul Bapari (2)						
Items	Selling Amount (Kg/Year)	Selling Price (Tk/Year)	Unit Price	Others	1. Place of Fishary: 1) Dry Season 2) Wet Season 3) All the Year 2. Fishing License: 3. Type of Caught: 4. Marketing:			
Natural Fishing								
(1) Lui (L)	N-A							
(2) Lui (S)								
(3) Milka								
(4) Katura								
(5) Irisi								
(6) Putty Carp								
(7) Shrimp								
(8) Club								
(9) Others								
Fish Culture	1. No. of Pond	2. Area (ha)	3. Water Depth (m)	4. Owner:				
5. Name of Fish	Amount of Fingerlings	Price of (F)	Feed Sources	Amount of Feed	Price of Feed	Production	Selling Price	Harvest C
(1) Lui (L)	N-A							
(2) Lui (S)								
(3) Milka								
(4) Katura								
(5) Irisi								
(6) Putty Carp								
(7) Shrimp								
(8) Club								
(9) Silver Cup								
Note	(F); Fingerlings						C; Cycle	

Table (A.3) Fisheries Production

Area & Para		CHAR							
		Razzag Chairman (3)							
Items		Selling Amount (Kg/Year)	Selling Price (Tk/Year)	Unit Price	Others	1. Place of Fishary:	2. Fishing License:	3. Type of Caught:	4. Marketing:
Natural Fishing						1) Dry Season			
(1) Lui (L)	N-A	N-A	N-A	N/A		2) Wet Season			
(2) Lui (S)									
(3) Milka									
(4) Katura									
(5) Irisi									
(6) Putty Carp									
(7) Shrimp									
(8) Club									
(9) Others									
Fish Culture						4. Owner: Private			
5. Name of Fish		1. No. of Pond I	2. Area (ha) 0.8	3. Water Depth (m) 0.36	4. Owner: Private				
(1) Lui (L)	Amount of Fingerlings	Price of (F)	Feed Sources	Amount of Feed	Price of Feed	Production	Selling Price	Harvest C	
(2) Lui (S)									
(3) Milka	20 kg/ha	300 Tk/kg	Cow dung	1,500 kg/y	N/A	500 kg/y	15,000 Tk/y	10 month	
(4) Katura									
(5) Irisi									
(6) Putty Carp	25 kg/ha	300 Tk/kg	Cow dung	1,500 kg/y	N/A	350 kg/y	14,000 Tk/y	10 month	
(7) Shrimp									
(8) Club									
(9) Silver Cup									
Note		(F); Fingerlings	Survival Rate: 60~65%						C; Cycle

Table (A.4)

Fisheries Production

Area & Para		CHAR						
Items		Eklas Member and Samad Fakir (4)						
Natural Fishing		Selling Amount (Kg/Year)	Selling Price (Tk/Year)	Unit Price	Others			
(1) Lui (L)	} N-A	} N-A	} N-A		1. Place of Fishary: 1) Dry Season 2) Wet Season 3) All the Year 2. Fishing License: 3. Type of Caught: 4. Marketing:			
(2) Lui (S)								
(3) Milka								
(4) Katura								
(5) Irisi								
(6) Putty Carp								
(7) Shrimp								
(8) Club								
(9) Others								
Fish Culture		1. No. of Pond 2	2. Area (ha) 0.25	3. Water Depth (m) 2.0	4. Owner: Private			
5. Name of Fish	Amount of Fingerlings	Price of (F)	Feed Sources	Amount of Feed	Price of Feed	Production	Selling Price	Harvest C
(1) Lui (L)	20 kg/ha	200 Tk/kg	Oil Cake Husk	200 kg/y	1,600 Tk/y	1,200 kg/y	15,000 Tk/y	12 month
(2) Lui (S)								
(3) Milka	10 kg/ha	150 Tk/kg	Husk	150 kg/y	500 Tk/y	400 kg/y	3,000 Tk/y	12 month
(4) Katura	10 kg/ha	200 Tk/kg	Husk Floor	80.5 kg/y	750 Tk/y	500 kg/y	4,500 Tk/y	12 month
(5) Irisi								
(6) Putty Carp	7.5 kg/ha	200 Tk/kg	Husk	60 kg/y	200 Tk/y	200 kg/y	2,000 Tk/y	12 month
(7) Shrimp								
(8) Club								
(9) Silver Cup	20 kg/ha	200 Tk/kg	Shawla	300 kg/y	400 Tk/y	500 kg/y	3,500 Tk/y	12 month
Note	(F); Fingerlings		Survival Rate: 60~65%		C; Cycle			

Table (A.5)

Fisheries Production

Area & Para		CHAR					
		Jaynal Member and Hagan Khalifa (5)					
Items	Selling Amount (Kg/Year)	Selling Price (Tk/Year)	Unit Price	Others			
Natural Fishing					1. Place of Fishary: 1) Dry Season 2) Wet Season 3) All the Year		
(1) Lui (L)	} N-A	} N-A			2. Fishing License: 3. Type of Caught: 4. Marketing:		
(2) Lui (S)							
(3) Milka							
(4) Katura							
(5) Irisi							
(6) Putty Carp							
(7) Shrimp							
(8) Club							
(9) Others							
Fish Culture	1. No. of Pond 8	2. Area (ha) 1.4	3. Water Depth (m)	4. Owner: Joint Owner			
5. Name of Fish	Amount of Fingerlings	Price of (F)	Feed Sources	Amount of Feed	Price of Feed	Production	
(1) Lui (L)	50 kg/ha	250 Tk/kg	Cow dung	30 kg/y	-	200 kg/y	
(2) Lui (S)							
(3) Milka	55 kg/ha	N/A	Cow dung	-	-	-	
(4) Katura	20 kg/ha	40 Tk/kg	-	-	-	100 kg/y	
(5) Irisi							
(6) Putty Carp	-	250 Tk/kg	-	20 kg/y	-	-	
(7) Shrimp							
(8) Club	-	-	-	-	-	250 kg/y	
(9) Silver Cup							
Note	(F); Fingerlings		Survival Rate: 50~60%			C; Cycle	

Table (A.6)

Fishery Production

Area & Para		CHAR Abdul Jalil Dewali (6)							
Items	Selling Amount (Kg/Year)	Selling Price (Tk/Year)	Unit Price	Others					
Natural Fishing	-	-			1. Place of Fishary:				
(1) Lui (L)	-	-			1) Dry Season -do-				
(2) Lui (S)	-	-			2) Wet Season -				
(3) Milka	-	-			3) All the Year -				
(4) Katura	-	-			2. Fishing License: -				
(5) Irisi	300 kg/year	13,000 Tk/y	43 Tk/kg		3. Type of Caught: -				
(6) Putty Carp	-	-			4. Marketing: Bank of River				
(7) Shrimp	-	-							
(8) Club	-	-							
(9) Others	-	-							
Fish Culture	1. No. of Pond	2. Area (ha) 1	3. Water Depth (m)	4. Owner:					
5. Name of Fish	Amount of Fingerlings	Price of (F)	Feed Sources	Amount of Feed	Price of Feed	Production	Selling Price	Harvest C	
(1) Lui (L)	}		}						
(2) Lui (S)									
(3) Milka									
(4) Katura	}		}						
(5) Irisi									
(6) Putty Carp									
(7) Shrimp	}		}						
(8) Club									
(9) Silver Cup									
Note	(F); Fingerlings								C; Cycle

Table (A.7)
Fisheries Production

Area & Para		CHAR									
Items		Mehar Mumshi (7)									
Natural Fishing		Selling Amount (Kg/Year)	Selling Price (Tk/Year)	Unit Price	Others						
(1) Lui (L)	} N.A				1. Place of Fishary: 1) Dry Season 2) Wet Season 3) All the Year 2. Fishing License: 3. Type of Caught: 4. Marketing:						
(2) Lui (S)											
(3) Milka											
(4) Katura											
(5) Irisi											
(6) Putty Carp											
(7) Shrimp											
(8) Club											
(9) Others											
Fish Culture		1. No. of Pond	2. Area (ha)	3. Water Depth (m)	4. Owner:						
5. Name of Fish	Amount of Fingerlings	Price of (F)	Feed Sources	Amount of Feed	Price of Feed	Production	Selling Price	Harvest C			
(1) Lui (L)	} N.A										
(2) Lui (S)											
(3) Milka											
(4) Katura											
(5) Irisi											
(6) Putty Carp											
(7) Shrimp											
(8) Club											
(9) Silver Cup											
Note	(F); Fingerlings							C; Cycle			

Table (A.8)

Fisheries Production

Area & Para		HAOR Chila (1)					
Items		Selling Amount (Kg/Year)	Selling Price (Tk/Year)	Unit Price	Others		
Natural Fishing							
(1) Lui (L)		-			1. Place of Fishary: Haor		
(2) Lui (S)		-			1) Dry Season		
(3) Milka		-			2) Wet Season		
(4) Katura		-			3) All the Year		
(5) Irisi		-			2. Fishing License:		
(6) Putty Carp		80 kg/y	1,600 Tk/y	20 Tk/kg	3. Type of Caught:		
(7) Shrimp		70 kg/y	10,500 Tk/y	150 Tk/kg	4. Marketing:		
(8) Club		100 kg/y	12,000 Tk/y	120 Tk/kg		Hiluchia	
(9) Others		Baila 60 kg/y	2,400 Tk/y	40 Tk/kg		L=2.5km	
Fish Culture		1. No. of Pond	2. Area (ha)	3. Water Depth (m)	4. Owner:		
5. Name of Fish		Amount of Fingerlings	Price of (F)	Amount of Feed	Price of Feed	Production	Selling Price
(1) Lui (L)	}						
(2) Lui (S)							
(3) Milka							
(4) Katura							
(5) Irisi		N.A					
(6) Putty Carp							
(7) Shrimp							
(8) Club							
(9) Silver Cup							
Note	(F): Fingerlings, C; Cycle						

Table (A.9)
Fisheries Production

Area & Para		HAOR Bania (2)							
Items		Selling Amount (Kg/Year)	Selling Price (Tk/Year)	Unit Price	Others				
Natural Fishing									
(1) Lui (L)		-			1. Place of Fishary: Haor				
(2) Lui (S)		-			1) Dry Season -				
(3) Milka		-			2) Wet Season -do-				
(4) Katura		-			3) All the Year -				
(5) Irsi		-			2. Fishing License: -				
(6) Putty Carp		100 kg/y	2,500 Tk/y	25 Tk/kg	3. Type of Caught: Net, Hook				
(7) Shrimp		200 kg/y	36,000 Tk/y	180 Tk/kg	4. Marketing: Hituchia				
(8) Club		150 kg/y	18,000 Tk/y	120 Tk/kg	L=2.25km				
(9) Others		Baila 70 kg/y	4,900 Tk/y	70 Tk/kg					
Fish Culture					4. Owner:				
5. Name of Fish		1. No. of Pond	2. Area (ha)	3. Water Depth (m)	Amount of Feed	Price of Feed	Production	Selling Price	Harvest C
(1) Lui (L)	} N.A	Amount of Fingerlings	Price of (F)	Feed Sources	Amount of Feed	Price of Feed	Production	Selling Price	Harvest C
(2) Lui (S)									
(3) Milka									
(4) Katura									
(5) Irsi									
(6) Putty Carp									
(7) Shrimp									
(8) Club									
(9) Silver Cup									
Note	(F); Fingerlings, C; Cycle								

Table (A.10)
Fisheries Production

Area & Para		HAOR Atka (3)						
Items		Selling Amount (Kg/Year)	Selling Price (Tk/Year)	Unit Price	Others	1. Place of Fishary:	Others	
Natural Fishing						1) Dry Season	Haor	
(1) Lui (L)						2) Wet Season	-	
(2) Lui (S)						3) All the Year	Haor	
(3) Milka						2. Fishing License:	-	
(4) Katura						3. Type of Caught:	Net, Hook	
(5) Irisi						4. Marketing:	Hiluchia	
(6) Putty Carp		150 kg/y	3,000 Tk/y	20 Tk/kg			L=2.5 km	
(7) Shrimp		60 kg/y	10,800 Tk/y	180 Tk/kg				
(8) Club		120 kg/y	14,400 Tk/y	120 Tk/kg				
(9) Others		150 kg/y	10,500 Tk/y	70 Tk/kg				
Fish Culture		1. No. of Pond	2. Area (ha)	3. Water Depth (m)	4. Owner:			
5. Name of Fish	Amount of Fingerlings	Price of (F)	Feed Sources	Amount of Feed	Price of Feed	Production	Selling Price	
(1) Lui (L)	}						Harvest C	
(2) Lui (S)								
(3) Milka								
(4) Katura		N.A						
(5) Irisi								
(6) Putty Carp								
(7) Shrimp								
(8) Club								
(9) Silver Cup								
Note	(F); Fingerlings							
	C; Cycle							

Table (A.11) Fisheries Production

Area & Para		HAOR Utiar (4)						
Items	Selling Amount (Kg/Year)	Selling Price (Tk/Year)	Unit Price	Others				
Natural Fishing								
(1) Lui (L)				1. Place of Fishery:	Haor			
(2) Lui (S)				1) Dry Season	-			
(3) Milka				2) Wet Season	-do-			
(4) Katura				3) All the Year	-			
(5) Irisi				2. Fishing License:	-			
(6) Putty Carp	300 kg/y	6,000 Tk/y	20 Tk/kg	3. Type of Caught:	Net			
(7) Shrimp	80 kg/y	14,400 Tk/y	180 Tk/kg	4. Marketing:	Hiluchia L=1.5 km			
(8) Club								
(8) Baila	200 kg/y	12,000 Tk/y	60 Tk/kg					
(9) Balm	180 kg/y	9,000 Tk/y	50 Tk/kg					
Fish Culture								
	1. No. of Pond 1.0	2. Area (ha) 0.21	3. Water Depth (m) 2.13	4. Owner:	Private			
5. Name of Fish	Amount of Fingerlings	Price of (F)	Feed Sources	Amount of Feed	Price of Feed	Production	Selling Price	Harvest C
(1) Lui (L)	3.0 kg/ha	600 Tk/kg	Oil Cake Pabby Husk	180 kg/y	(8 Tk/kg) 1,440 Tk/y	95 kg/y	5,700 Tk/y	6.0 month
(2) Lui (S)	-	400 Tk/kg	-	-	-	-	-	-
(3) Milka	2.0 kg/ha	500 Tk/kg	Oil Cake Pabby Husk	180 kg/y	1,440 Tk/y	74 kg/y	3,700 Tk/y	6.0 month
(4) Katura	2.0 kg/ha	400 Tk/kg	-ditto-	180 kg/y	1,440 Tk/y	95 kg/y	5,225 Tk/y	6.0 month
(5) Irisi	-	-	-	-	-	-	-	-
(6) Putty Carp	3.0 kg/ha	400 Tk/kg	-ditto-	180 kg/y	1,440 Tk/y	74 kg/y	2,960 Tk/y	6.0 month
(7) Shrimp	-	-	-	-	-	-	-	-
(8) Club	-	-	-	-	-	-	-	-
(9) Silver Cup	3.0 kg/ha	400 Tk/kg	-ditto-	180 kg/y	1,440 Tk/y	84 kg/y	3,360 Tk/y	6.0 month
Note	(F); Fingerlings		Survival Rate: 70~79%		C; Cycle			

Table (A.12)

Fisheries Production

Area & Para		HAOR Fakir (5)						
Items		Selling Amount (Kg/Year)	Selling Price (Tk/Year)	Unit Price	Others			
(1) Lui (L)					1. Place of Fishary: Haor			
(2) Lui (S)					1) Dry Season -			
(3) Milka					2) Wet Season -do-			
(4) Katura					3) All the Year -			
(5) Irisi					2. Fishing License: -			
(6) Putty Carp		100 kg/y	2,000 Tk/y	20 Tk/kg	3. Type of Caught: Net, hook			
(7) Shrimp		35 kg/y	6,300 Tk/y	180 Tk/kg	4. Marketing: Hituchia			
(8) Club		Baila 80 kg/y	4,800 Tk/y	60 Tk/kg	L=1.5km			
(9) Others		Balm 60 kg/y	3,000 Tk/y	50 Tk/kg				
Fish Culture		1. No. of Pond 1	2. Area (ha)	3. Water Depth	4. Owner:			
5. Name of Fish	Amount of Fingerlings	Price of (F)	Feed Sources	Amount of Feed	Price of Feed	Production	Selling Price	Harvest C
(1) Lui (L)	}							
(2) Lui (S)								
(3) Milka								
(4) Katura		N.A						
(5) Irisi	}							
(6) Putty Carp								
(7) Shrimp								
(8) Club								
(9) Silver Cup								
Note	(F); Fingerlings, C; Cycle							

Table (A.13) Fisheries Production

Area & Para		HAOR Jala (6)					
Items	Selling Amount (Kg/Year)	Selling Price (Tk/Year)	Unit Price	Others	1. Place of Fishary:	Harvest C	
(1) Lui (L)	-				1) Dry Season	Haor	
(2) Lui (S)	-				2) Wet Season	-	
(3) Milka	-				3) All the Year	-do-	
(4) Katura	-				2. Fishing License:	-	
(5) Irisi	-				3. Type of Caught:	Net, hook	
(6) Putty Carp	600 kg/year	1,800 Tk/y	30 Tk/kg		4. Marketing:	Hiluxhi	
(7) Shrimp	500 kg/year	65,000 Tk/y	130 Tk/kg			L=1.5km	
(8) Club	-						
(9) Others	(Baila) 600 kg/year	24,000 Tk/y	40 Tk/kg				
Fish Culture	1. No. of Pond 5.0	2. Area (ha) 1.15	3. Water Depth (m) 1.5	4. Owner: Joint Owner			
5. Name of Fish	Amount of Fingerlings	Price of (F)	Feed Sources	Amount of Feed	Price of Feed	Production	
(1) Lui (L)	3 kg/ha	600 Tk/kg	Oil cake Paddy husk	500 kg/y	4,000 Tk/y	656 kg/y	
(2) Lui (S)	-	-	-	-	-	-	
(3) Milka	2.5 kg/ha	450 Tk/kg	Oil cake Paddy husk	500 kg/y	4,000 Tk/y	345 kg/y	
(4) Katura	3.0 kg/ha	500 Tk/kg	Oil cake Paddy husk	500 kg/y	4,000 Tk/y	575 kg/y	
(5) Irisi	-	-	-	-	-	-	
(6) Putty Carp	-	-	-	-	-	-	
(7) Shrimp	-	-	-	-	-	-	
(8) Club	-	-	-	-	-	-	
(9) Silver Cup	4.0 kg/ha	400 Tk/kg	Oil cake Paddy husk	500 kg/y	4,000 Tk/y	460 kg/y	
Note	(F); Fingerlinge Survival rate: 80~90%						C; Cycle

Table (A.14)

Fisheries Production

Area & Para		CHAR Mehar Mumshi (7)							
Items	Selling Amount (Kg/Year)	Selling Price (Tk/Year)	Unit Price	Others					
Natural Fishing									
(1) Lui (L)	-			1. Place of Fishary: Haor					
(2) Lui (S)	-			1) Dry Season -					
(3) Milka	-			2) Wet Season -do-					
(4) Katura	-			3) All the Year -					
(5) Irisi	-			2. Fishing License: -					
(6) Putty Carp	150 kg/y	3,750 Tk/y	25 Tk/kg	3. Type of Caught: Net					
(7) Shrimp	60 kg/y	10,800 Tk/y	180 Tk/kg	4. Marketing: Hiluchia					
(8) Club	120 kg/y	7,200 Tk/y	60 Tk/kg	L=2.0 km					
(9) Others	Baila 130 kg/y Boul 150 kg/y	9,100 Tk/y 10,500 Tk/y	70 Tk/kg 70 Tk/kg						
Fish Culture									
	1. No. of Pond	2. Area (ha)	3. Water Depth (m)	4. Owner:					
5. Name of Fish	Amount of Fingerlings	Price of (F)	Feed Sources	Amount of Feed	Price of Feed	Production	Selling Price	Harvest C	
(1) Lui (L)									
(2) Lui (S)									
(3) Milka									
(4) Katura	N.A								
(5) Irisi									
(6) Putty Carp									
(7) Shrimp									
(8) Club									
(9) Silver Cup									
Note	(F); Fingerlings								C; Cycle

Table (A.15)

Area & Para Items	HAOR Mosjid (8)							
	Selling Amount (Kg/Year)	Selling Price (Tk/Year)	Unit Price	Others	1. No. of Pond: 2.0	2. Area (ha) 0.69	3. Water Depth (m) 2.73	4. Owner: Private
Natural Fishing								
(1) Lui (L)	-							1. Place of Fishery: Haor
(2) Lui (S)	-							1) Dry Season -
(3) Milka	-							2) Wet Season -do-
(4) Katura	-							3) All the Year -
(5) Irisi	-							2. Fishing License: -
(6) Putty Carp	400 kg/y	10,000 Tk/y	25 Tk/kg					3. Type of Caught: Net
(7) Shrimp	400 kg/y	48,000 Tk/y	120 Tk/kg					4. Marketing: Hiluchia
(8) Club								L=2.0 km
(9) Others	Tangra 100 kg/y Baila Taki 100 kg/y	4,000 Tk/y 2,500 Tk/y	40 Tk/kg 25 Tk/kg					
Fish Culture								
5. Name of Fish	Amount of Fingerlings	Price of (F)	Feed Sources	Amount of Feed	Price of Feed	Production	Selling Price	Harvest Cycle
(1) Lui (L)	2 kg/ha	600 Tk/kg	Oil cake Paddy husk	250 kg/y	2,000 Tk/y	311 kg/y	18,660 Tk/y	6.0 month
(2) Lui (S)	-	-	-	-	-	-	-	-
(3) Milka	2 kg/ha	400 Tk/kg	Oil cake Paddy husk	250 kg/y	2,000 Tk/y	248 kg/y	12,400 Tk/y	6.0 month
(4) Katura	2 kg/ha	500 Tk/kg	Oil cake Paddy husk	250 kg/y	2,000 Tk/y	221 kg/y	11,050 Tk/y	6.0 month
(5) Irisi	-	-	-	-	-	-	-	-
(6) Putty Carp	-	-	-	-	-	-	-	-
(7) Shrimp	-	-	-	-	-	-	-	-
(8) Club	-	-	-	-	-	-	-	-
(9) Silver Cup	3 kg/ha	400 Tk/kg	Oil cake Paddy husk	250 kg/y	2,000 Tk/y	345 kg/y	13,800 Tk/y	6.0 month
Note	(F); Fingerlings Survival Rate; 85~90% C; Cycle							

Table (A.16)
Fisheries Production

Area & Para		HAOR						
Items		Nomosudra (9)						
Natural Fishing		Selling Amount (Kg/Year)	Selling Price (Tk/Year)	Unit Price	Others			
(1) Lui (L)					1. Place of Fishary: Haor			
(2) Lui (S)					1) Dry Season -			
(3) Milka					2) Wet Season -do-			
(4) Katura					3) All the Year -			
(5) Irisi					2. Fishing License: -			
(6) Putty Carp		120 kg/y	2,400 Tk/y	20 Tk/kg	3. Type of Caught: Net, hook, Boat			
(7) Shrimp		50 kg/y	8,500 Tk/y	170 Tk/kg	4. Marketing: Hiluchia			
(8) Club		Tamgra; 100 kg/y	5,000 Tk/y	50 Tk/kg	L=1.5 km			
(9) Others		Baila 130 kg/y	7,800 Tk/y	60 Tk/kg				
		Boul; 150 kg/y	9,750Tk/y	65 Tk/kg				
Fish Culture		1. No. of Pond	2. Area (ha)	3. Water Depth (m)	4. Owner:			
5. Name of Fish		Amount of Fingerlings	Price of (F)	Amount of Feed	Price of Feed	Production	Selling Price	Harvest C
(1) Lui (L)		}						
(2) Lui (S)								
(3) Milka								
(4) Katura			N.A					
(5) Irisi								
(6) Putty Carp								
(7) Shrimp								
(8) Club								
(9) Silver Cup								
Note		(F); Fingerlings						C; Cycle

Fisheries Production

Table (A.17)

Area & Para		HAOR Dakshin (10)			
Items	Selling Amount (Kg/Year)	Selling Price (Tk/Year)	Unit Price	Others	
Natural Fishing					
(1) Lui (L)	-			1. Place of Fishary: Haor	
(2) Lui (S)	-			1) Dry Season -	
(3) Milka	-			2) Wet Season -do-	
(4) Katura	-			3) All the Year -	
(5) Irisi	-			2. Fishing License: -	
(6) Putty Carp	300 kg/y	4,500 Tk/y	15 Tk/kg	3. Type of Caught: Net, hook	
(7) Shrimp	50 kg/y	7,500 Tk/y	150 Tk/kg	4. Marketing: Hiluchia	
(8) Club	Tamgra, 150 kg/y	9,000 Tk/y	60 Tk/kg	L=1.0 km	
(9) Others	Baila 170 kg/y Boul; 150 kg/y	8,500 Tk/y 10,500Tk/y	50 Tk/kg 70 Tk/kg		
Fish Culture	1. No. of Pond	2. Area (ha)	3. Water Depth (m)	4. Owner:	
5. Name of Fish	Amount of Fingerlings	Price of (F)	Amount of Feed	Price of Feed	Production
(1) Lui (L)	}				Selling Price
(2) Lui (S)					
(3) Milka					
(4) Katura		N.A			
(5) Irisi					
(6) Putty Carp	}				
(7) Shrimp					
(8) Club					
(9) Silver Cup					
Note	(F); Fingerlings				C; Cycle

Table (A.18) Fisheries Production

Area & Para		HAOR Purba (11)						
Items		Selling Amount (Kg/Year)	Selling Price (Tk/Year)	Unit Price	Others	1. Place of Fishary:	Others	
Natural Fishing						1) Dry Season	Haor	
(1) Lui (L)		-				2) Wet Season	-	
(2) Lui (S)		-				3) All the Year	-do-	
(3) Milka		-				2. Fishing License:	-	
(4) Katura		-				3. Type of Caught:	Net, hook	
(5) Irisi		-				4. Marketing:	Hiluchia	
(6) Putty Carp		120 kg/y	2,400 Tk/y	20 Tk/kg			L=2.0 km	
(7) Shrimp		60 kg/y	10,800 Tk/y	180 Tk/kg				
(8) Club		Baila 12 kg/y	720 Tk/y	60 Tk/kg				
(9) Others		Baila 140 kg/y	9,800 Tk/y	70 Tk/kg				
		Boul 150 kg/y	9,000Tk/y	60 Tk/kg				
Fish Culture						4. Owner:		
		1. No. of Pond	2. Area (ha)	3. Water Depth (m)				
5. Name of Fish	Amount of Fingerlings	Price of (F)	Feed Sources	Amount of Feed	Price of Feed	Production	Selling Price	
(1) Lui (L)	}						Harvest C	
(2) Lui (S)								
(3) Milka								
(4) Katura		N.A						
(5) Irisi								
(6) Putty Carp	}							
(7) Shrimp								
(8) Club								
(9) Silver Cup								
Note	(F); Fingerlings							C; Cycle

Table (A.19) Fisheries Production

Area & Para		HAOR Ghosh (12)										
Items		Selling Amount (Kg/Year)	Selling Price (Tk/Year)	Unit Price	Others	1. Place of Fishary:	Production	Selling Price	Harvest Cycle	2. Area (ha) 0.61	3. Water Depth (m) 3.0	4. Owner: Private
Natural Fishing												
(1) Lui (L)		-	-	-		Haor						
(2) Lui (S)		-	-	-		1) Dry Season						
(3) Milka		-	-	-		2) Wet Season						
(4) Katura		-	-	-		3) All the Year						
(5) Irisi		-	-	-		2. Fishing License:						
(6) Putty Carp		450 kg/y	18,000 Tk/y	40 Tk/kg		3. Type of Caught:						Net, hook
(7) Shrimp		500 kg/y	75,000 Tk/y	150 Tk/kg		4. Marketing:						Hiluchia
(8) Club		-	-	-								L=2.0 km
(9) Others		Baila, Tangra 500 kg/y	25,000 Tk/y	50 Tk/kg								
Fish Culture		1. No. of Pond: 2.0	2. Area (ha) 0.61	3. Water Depth (m) 3.0	4. Owner: Private							
5. Name of Fish		Amount of Fingerlings	Price of (F)	Feed Sources	Amount of Feed	Price of Feed	Production	Selling Price	Harvest Cycle			
(1) Lui (L)		2.0 kg/ha	600 Tk/kg	Oil cake Paddy Husk	650 kg/y	5,200 Tk/y	366 kg/y	21,960 Tk/y	6.0 month			
(2) Lui (S)		1.5 kg/ha	500 Tk/kg	Oil cake Paddy Husk	650 kg/y	5,200 Tk/y	183 kg/y	9,150 Tk/y	6.0 month			
(3) Milka		2.0 kg/ha	400 Tk/kg	Oil cake Paddy Husk	650 kg/y	5,200 Tk/y	244 kg/y	12,200 Tk/y	6.0 month			
(4) Katura		2.0 kg/ha	500 Tk/kg	Oil cake Paddy Husk	650 kg/y	5,200 Tk/y	305 kg/y	16,775 Tk/y	6.0 month			
(5) Irisi		-	-	-	-	-	-	-				
(6) Putty Carp		-	-	-	-	-	-	-				
(7) Shrimp		-	-	-	-	-	-	-				
(8) Club		-	-	-	-	-	-	-				
(9) Silver Cup		3.0 kg/ha	400 Tk/kg	Oil cake Paddy Husk	650 kg/y	5,200 Tk/y	244 kg/y	13,420 Tk/y	6.0 month			
Note		(F); Fingerlings Survival Rate; 75~85% C; Cycle										

Table (A.20)
Fisheries Production

Area & Para		HAOR Paschim (13)							
Items	Selling Amount (Kg/Year)	Selling Price (Tk/Year)	Unit Price	Others	1. Place of Fishary:	Production	Selling Price	Harvest Cycle	
Natural Fishing									
(1) Lui (L)	-	-	-		1) Dry Season	1,172 kg/y	670,320 Tk/y	6.0 month	
(2) Lui (S)	-	-	-		2) Wet Season	828 kg/y	41,400 Tk/y	6.0 month	
(3) Milka	-	-	-		3) All the Year	707 kg/y	35,350 Tk/y	6.0 month	
(4) Katura	-	-	-		2. Fishing License:	566 kg/y	31,130 Tk/y	6.0 month	
(5) Irisi	-	-	-		3. Type of Caught:	-	-	-	
(6) Putty Carp	100 kg/y	2,000 Tk/y	20 Tk/kg		4. Marketing:	-	-	-	
(7) Shrimp	100 kg/y	18,000 Tk/y	180 Tk/kg			444 kg/y	22,200 Tk/y	6.0 month	
(8) Club	-	-	-			-	-	-	
(9) Others	Baila, 150 kg/y Boul 430 kg/y	9,000 Tk/y 21,500 Tk/y	60 Tk/kg 50 Tk/kg			-	-	-	
Fish Culture									
	1. No. of Pond: 5.0	2. Area (ha) 2.02	3. Water Depth (m) 2.40	4. Owner: Private					
5. Name of Fish	Amount of Fingerlings	Price of (F)	Feed Sources	Amount of Feed	Price of Feed	Production	Selling Price	Harvest Cycle	
(1) Lui (L)	3.0 kg/ha	600 Tk/kg	Oil cake Paddy Husk	900 kg/y	9Tk/kg 8,100 Tk/y	1,172 kg/y	670,320 Tk/y	6.0 month	
(2) Lui (S)	2.0 kg/ha	550 Tk/kg	Oil cake Paddy Husk	900 kg/y	8,100 Tk/y	828 kg/y	41,400 Tk/y	6.0 month	
(3) Milka	2.0 kg/ha	400 Tk/kg	Oil cake Paddy Husk	900 kg/y	8,100 Tk/y	707 kg/y	35,350 Tk/y	6.0 month	
(4) Katura	2.0 kg/ha	500 Tk/kg	Oil cake Paddy Husk	900 kg/y	8,100 Tk/y	566 kg/y	31,130 Tk/y	6.0 month	
(5) Irisi	-	-	-	-	-	-	-	-	
(6) Putty Carp	4.0 kg/ha	400 Tk/kg	Oil cake Paddy Husk	900 kg/y	8,100 Tk/y	444 kg/y	22,200 Tk/y	6.0 month	
(7) Shrimp	-	-	-	-	-	-	-	-	
(8) Club	-	-	-	-	-	-	-	-	
(9) Silver Cup	3.0 kg/ha	400 Tk/kg	Oil cake Paddy Husk	900 kg/y	8,100 Tk/y	1,212 kg/y	48,480 Tk/y	6.0 month	
Note	(F); Fingerlings Survival Rate; 66~82%							C; Cycle	

Table (A.21) Fisheries Production

Area & Para		HAOR Shibin (14)									
Items		Selling Amount (Kg/Year)	Selling Price (Tk/Year)	Unit Price	Others	1. Place of Fishary:	2. Fishing License:	3. Type of Caught:	4. Marketing:	Harvest Cycle	
(1) Lui (L)	-	-	-	-	-	1) Dry Season	-	-	-	Haor	
(2) Lui (S)	-	-	-	-	-	2) Wet Season	-	-	-	-	
(3) Milka	-	-	-	-	-	3) All the Year	-	-	-	-do-	
(4) Katura	-	-	-	-	-		-	-	-	-	
(5) Irisi	-	-	-	-	-		-	-	-	-	
(6) Putty Carp	700 kg/y	21,000 Tk/y	30 Tk/kg								
(7) Shrimp	400 kg/y	48,000 Tk/y	120 Tk/kg								
(8) Club	-	-	-	-	-						
(9) Others	Baila, Tangra 1,000 kg/y	45,000 Tk/y	45 Tk/kg							Hiluchia L=1.5 km	
Fish Culture	1. No. of Pond: 5.0	2. Area (ha) 1.82	3. Water Depth (m) 2.0	4. Owner: Private							
5. Name of Fish	Amount of Fingerlings	Price of (F)	Feed Sources	Amount of Feed	Price of Feed	Production	Selling Price	Harvest Cycle			
(1) Lui (L)	3.0 kg/ha	600 Tk/kg	Oil cake Paddy Husk	600 kg/y	5,400 Tk/y	1,092 kg/y	65,520 Tk/y	6 month			
(2) Lui (S)	-	-	-	-	-	-	-	-			
(3) Milka	2.0 kg/ha	450 Tk/kg	Oil cake Paddy Husk	600 kg/y	5,400 Tk/y	728 kg/y	36,400 Tk/y	6 month			
(4) Katura	2.0 kg/ha	550 Tk/kg	Oil cake Paddy Husk	600 kg/y	5,400 Tk/y	910 kg/y	54,600 Tk/y	6 month			
(5) Irisi	-	-	-	-	-	-	-	-			
(6) Putty Carp	-	-	-	-	-	-	-	-			
(7) Shrimp	-	-	-	-	-	-	-	-			
(8) Club	-	-	-	-	-	-	-	-			
(9) Silver Cup	3.0 kg/ha	400 Tk/kg	Minar Cup	600 kg/y	5,400 Tk/y	728 kg/y	29,120 Tk/y	6 month			
Note	(F); Fingerlings Survival Rate; 80~90% C; Cycle										

Table (A.22) Fisheries Production

Area & Para		HAOR Pal (15)						
Items	Selling Amount (Kg/Year)	Selling Price (Tk/Year)	Unit Price	Others	Production	Selling Price	Harvest Cycle	
Natural Fishing								
(1) Lui (L)	-	-	-	1. Place of Fishary: Haor				
(2) Lui (S)	-	-	-	1) Dry Season -				
(3) Milka	-	-	-	2) Wet Season -do-				
(4) Katura	-	-	-	3) All the Year -				
(5) Irisi	-	-	-	2. Fishing License: -				
(6) Putty Carp	600 kg/y	21,000 Tk/y	35 Tk/kg	3. Type of Caught: Net, hook				
(7) Shrimp	300 kg/y	39,000 Tk/y	130 Tk/kg	4. Marketing: Hiluchia				
(8) Club	-	-	-	L=1.6 km				
(9) Others	Baila, Tangra 400 kg/y	20,000 Tk/y	50 Tk/kg					
Fish Culture								
	1. No. of Pond: 7	2. Area (ha) 1.53	3. Water Depth (m) 2.0	4. Owner: Joint Ownership				
5. Name of Fish	Amount of Fingerlings	Price of Feed	Amount of Feed	Feed Sources	Price of Feed	Production	Harvest Cycle	
(1) Lui (L)	3.0 kg/ha	600 Tk/kg	650 kg/y	Oil cake Paddy Husk	5,200 Tk/y	689 kg/y	6 month	
(2) Lui (S)	-	-	-	-	-	-	-	
(3) Milka	2.0 kg/ha	400 Tk/kg	650 kg/y	Oil cake Paddy Husk	5,200 Tk/y	497 kg/y	6 month	
(4) Katura	-	500 Tk/kg	650 kg/y	Oil cake Paddy Husk	5,200 Tk/y	459 kg/y	6 month	
(5) Irisi	-	-	-	-	-	-	-	
(6) Putty Carp	-	-	-	-	-	-	-	
(7) Shrimp	-	-	-	-	-	-	-	
(8) Club	-	-	-	-	-	-	-	
(9) Silver Cup	3.0 kg/ha	400 Tk/kg	650 kg/y	Oil cake Paddy Husk	5,200 Tk/y	765 kg/y	6 month	
Note	(F); Fingerlings Survival Rate; 80~90% C; Cycle							

Table (A.23) Fisheries Production

Area & Para		HAOR Noagdon (16)					
Items	Selling Amount (Kg/Year)	Selling Price (Tk/Year)	Unit Price	Others	1. Place of Fishary:	Harvest Cycle	
Natural Fishing							
(1) Lui (L)	-	-	-		1) Dry Season	Haor	
(2) Lui (S)	-	-	-		2) Wet Season	-	
(3) Milka	-	-	-		3) All the Year	-do-	
(4) Katura	-	-	-		2. Fishing License:	-	
(5) Irisi	-	-	-		3. Type of Caught:	Net, hook	
(6) Putty Carp	1,000 kg/y	25,000 Tk/y	25 Tk/kg		4. Marketing:	Hiluchia	
(7) Shrimp	800 kg/y	120,000 Tk/y	150 Tk/kg			L=1.5 km	
(8) Club	-	-	-				
(9) Others	Baila, 120 kg/y	4,800 Tk/y	40 Tk/kg				
Fish Culture	1. No. of Pond: 1.0	2. Area (ha) 0.21	3. Water Depth (m) 2.13	4. Owner: Private			
5. Name of Fish	Amount of Fingerlings	Price of (F)	Feed Sources	Amount of Feed	Price of Feed	Production	Selling Price
(1) Lui (L)	3.0 kg/ha	600 Tk/kg	Oil cake Paddy Husk	600 kg/y	4,800 Tk/y	972 kg/y	58,320 Tk/y
(2) Lui (S)	-	-	-	-	-	-	-
(3) Milka	2.0 kg/ha	400 Tk/kg	Oil cake Paddy Husk	600 kg/y	4,800 Tk/y	486 kg/y	24,300 Tk/y
(4) Katura	2.0 kg/ha	500 Tk/kg	Oil cake Paddy Husk	600 kg/y	4,800 Tk/y	810 kg/y	40,500 Tk/y
(5) Irisi	-	-	-	-	-	-	-
(6) Putty Carp	-	-	-	-	-	-	-
(7) Shrimp	-	-	-	-	-	-	-
(8) Club	-	-	-	-	-	-	-
(9) Silver Cup	3.0 kg/ha	400 Tk/kg	Oil cake Paddy Husk	600 kg/y	4,800 Tk/y	648 kg/y	25,920 Tk/y
Note	(F); Fingerlings Survival Rate; 80~90%						C; Cycle

Table (A.24)
Fisheries Production

Area & Para		HAOR Maddha (17)						
Items		Selling Amount (Kg/Year)	Selling Price (Tk/Year)	Unit Price	Others	1. Place of Fishary:	Others	
Natural Fishing						1) Dry Season	Haor	
(1) Lui (L)						2) Wet Season	-	
(2) Lui (S)						3) All the Year	-do-	
(3) Milka						2. Fishing License:	-	
(4) Katura						3. Type of Caught:	Net hook	
(5) Irisi						4. Marketing:	Hiluchia	
(6) Putty Carp	200 kg/year		6,000 Tk/y	30 Tk/kg			L=2.0 km	
(7) Shrimp	150 kg/year		22,500 Tk/y	150 Tk/kg				
(8) Club	-		-	-				
(9) Others	Baila 200 kg/year		14,000 Tk/y	70 Tk/kg				
Fish Culture						4. Owner:		
		1. No. of Pond	2. Area (ha)	3. Water Depth (m)				
5. Name of Fish	Amount of Fingerlings	Price of (F)	Feed Sources	Amount of Feed	Price of Feed	Production	Selling Price	
(1) Lui (L)	}						Harvest C	
(2) Lui (S)								
(3) Milka								
(4) Katura		N.A						
(5) Irisi								
(6) Putty Carp								
(7) Shrimp								
(8) Club								
(9) Silver Cup								
Note	(F); Fingerlings							C; Cycle

Fig. (A.1)

1. Jalal Sarkar & Hossain Member (CHAR)

Name of Crops	(ha)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Aus (LV)													
Aus (HYV)													
Aman (LV)	20								●	—	—	—	●
Aman (HYV)													
Boro (LV)	20	●	—	—	●								
Boro (HYV)	20		●	—	—	●							
Wheat	20	●	—	—	●								
Jute	20				●	—	—	—	●				
Pulses (Lentils)	7								●	—	—	—	●
Potato													
Sweet Potato	20	●	—	—	●						●	—	—
Vegetables	1	●	—	●							●	—	—
Sugar Cane	3	●	—	—	—	—	—	—	—	—	—	—	●
Spices	1	●	—	—	●							●	—
G. Nut	9	●	—	—	●						●	—	—
Water Melon													
Oil seed	3	●	—	●							●	—	—
Others	5	●	—	—	●	—	—	●				●	—

Cropping calendar

2. Mokubul Bapari

(CHAR)

Name of Crops	(ha)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Aus (LV)													
Aus (HYV)													
Aman (LV)													
Aman (HYV)	30								●	—	—	—	●
Boro (LV)													
Boro (HYV)	28	●	—	—	●							●	—
Wheat	30	●	—	●								●	—
Jute	30				●	—	—	—	●				
Pulses (Lentils)													
Potato	1	●	—	●							●	—	—
Sweet Potato													
Vegetables													
Sugar Cane													
Spices	2	●	—	—	●							●	—
G. Nut	2	●	—	●							●	—	—
Water Melon													
Oil seed	28	●	—	●							●	—	—
Others	30	●	—	—	●	—	—	—	●				

Fig. (A.2)

Cropping calendar

3. Rezzak Chairman

(CHAR)

Name of Crops	(ha)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Aus (LV)													
Aus (HYV)													
Aman (LV)	4								●	—	—	—	●
Aman (HYV)													
Boro (LV)	4	●	—	—	—	—	●						
Boro (HYV)	4		●	—	—	—	—	●					
Wheat	5	—	—	●	—	—	—	—					
Jute	5				●	—	—	—	●				
Pulses (Lentils)	2.5	—	—	●								●	—
Potato	0.5	—	●									●	—
Sweet Potato	0.5	—	●									●	—
Vegetables	0.1	—	●									●	—
Sugar Cane	0.25	●	—	—	—	—	—	—	—	—	—	—	●
Spices	0.13	—	●									●	—
G. Nut	4	—	—	●								●	—
Water Melon													
Oil seed	0.1	—	—	●							●	—	—
Others (China)	10	—	—	●	—	—	—	●				●	—

Cropping calendar

4. Eklas Member & Samad Fakir

(CHAR)

Name of Crops	(ha)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Aus (LV)													
Aus (HYV)													
Aman (LV)													
Aman (HYV)	20							●	—	—	—	●	
Boro (LV)	23	—	—	●									●
Boro (HYV)	3	—	—	●									●
Wheat	20	—	—	●								●	—
Jute	20				●	—	—	—	●				
Pulses (Lentils)													
Potato													
Sweet Potato													
Vegetables													
Sugar Cane													
Spices	2	—	—	●								●	—
G. Nut	3	—	—	●							●	—	—
Water Melon													
Oil seed	20									●	—	—	●
Others	10	—	—	●	—	—	—	●				●	—

Fig. (A.3)

Cropping calendar 5. Jaynal Member & Hasan Khalifa (CHAR)

Name of Crops	(ha)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Aus (LV)													
Aus (HYV)													
Aman (LV)													
Aman (HYV)	4								●	—	—	—	●
Boro (LV)													
Boro (HYV)	80.9	●	—	—	—	—	—	●					
Wheat	4	—	—	●								●	—
Jute	9.6				●	—	—	—	●				
Pulses (Lentils)													
Potato													
Sweet Potato													
Vegetables													
Sugar Cane													
Spices	0.08	—	—	●								●	—
G. Nut													
Water Melon													
Oil seed	40.4	—	—	—	—	●						●	—
Others													

Cropping calendar 6. Abdul Jalil Dewali (CHAR)

Name of Crops	(ha)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Aus (LV)													
Aus (HYV)													
Aman (LV)	4							●	—	—	—	—	●
Aman (HYV)													
Boro (LV)													
Boro (HYV)													
Wheat	4	—	—	—	—	●						●	—
Jute	3				●	—	—	—	—	—			
Pulses (Lentils)	6								●	—	—	—	—
Potato													
Sweet Potato	0.5	—	—	—	—	●				●	—	—	—
Vegetables	0.5	—	—	●							●	—	—
Sugar Cane													
Spices	0.25	—	—	—	—	●						●	—
G. Nut	16	—	—	—	—	●					●	—	—
Water Melon													
Oil seed	0.5	—	—	—	—	●						●	—
Others	25			●	—	—	—	—				●	—

Fig. (A.4)

Cropping calendar

7. Mehar munshi

(CHAR)

Name of Crops	(ha)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Aus (LV)													
Aus (HYV)													
Aman (LV)	13								●	—————	●		
Aman (HYV)													
Boro (LV)													
Boro (HYV)													
Wheat	4	●	—————	●								●	—————
Jute													
Pulses (Lentils)													
Potato													
Sweet Potato													
Vegetables	0.5	●	—————	●								●	—————
Sugar Cane													
Spices													
G. Nut													
Water Melon													
Oil seed	3	●	—————	●								●	—————
Others	20	●	—————	●	—————	●						●	—————

Fig. (A.5)

Cropping calendar

1. Chila

(HAOR)

Name of Crops	(ha)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Aus (LV)													
Aus (HYV)													
Aman (LV)													
Aman (HYV)													
Boro (LV)													
Boro (HYV)	6.09	—————●											●
Wheat													
Jute													
Pulses (Lentils)													
Potato													
Sweet Potato	0.4	————●											●
Vegetables													
Sugar Cane													
Spices	0.6	————●											●
G. Nut													
Water Melon													
Oil seed	1	————●											●
Others													

Cropping calendar

2. Bania

(HAOR)

Name of Crops	(ha)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Aus (LV)													
Aus (HYV)													
Aman (LV)													
Aman (HYV)													
Boro (LV)													
Boro (HYV)	8.05	—————●											●
Wheat													
Jute													
Pulses (Lentils)	0.31	————●											●
Potato													
Sweet Potato													
Vegetables													
Sugar Cane													
Spices	0.69	————●										●	————
G. Nut													
Water Melon													
Oil seed	1.07	————●											●
Others													

Fig. (A.6)

Cropping calendar

3. Atka

(HAOR)

Name of Crops	(ha)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Aus (LV)													
Aus (HYV)													
Aman (LV)													
Aman (HYV)													
Boro (LV)	20.15	—————●											●—————
Boro (HYV)													
Wheat													
Jute													
Pulses (Lentils)													
Potato													
Sweet Potato													
Vegetables													
Sugar Cane													
Spices	2.05	—————●									●—————		
G. Nut													
Water Melon													
Oil seed	2.1	—————●										●—————	
Others													

Cropping calendar

4. Uttar

(HAOR)

Name of Crops	(ha)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Aus (LV)													
Aus (HYV)													
Aman (LV)													
Aman (HYV)													
Boro (LV)													
Boro (HYV)	120.26	—————●											●—————
Wheat													
Jute	12.15			●—————		●—————							
Pulses (Lentils)	1.21	—————●										●—————	
Potato	1.21	—————●										●—————	
Sweet Potato													
Vegetables	0.4	—————●										●—————	
Sugar Cane													
Spices													
G. Nut													
Water Melon													
Oil seed	12.15	—————●										●—————	
Others	1.62	—————●										●—————	

Fig. (A.7)

Cropping calendar

5. Fakir

(HAOR)

Name of Crops	(ha)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Aus (LV)													
Aus (HYV)													
Aman (LV)													
Aman (HYV)													
Boro (LV)	0.23	●	—	—	—	●							
Boro (HYV)	2.2	●	—	—	—	●							●
Wheat													
Jute												●	—
Pulses (Lentils)	1.28	●	—	●								●	—
Potato	0.5	●	—	●									
Sweet Potato												●	—
Vegetables	0.17	●	—	—	—	●							
Sugar Cane												●	—
Spices	0.02	●	—	—	—	●							
G. Nut													
Water Melon													
Oil seed													
Others	0.1	●	—	—	—	●							

Cropping calendar

6. Jala

(HAOR)

Name of Crops	(ha)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Aus (LV)													
Aus (HYV)													
Aman (LV)													
Aman (HYV)													
Boro (LV)													
Boro (HYV)	21.67	●	—	—	—	●							●
Wheat													
Jute	0.4				●	—	—	●					●
Pulses (Lentils)	0.3	●	—	●									
Potato													
Sweet Potato													
Vegetables	0.1	●	—	—	—	●							●
Sugar Cane													
Spices													
G. Nut													
Water Melon													
Oil seed	0.6	●	—	●									
Others													

Fig. (A.8)

Cropping calendar

7. Kona.

(HAOR)

Name of Crops	(ha)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Aus (LV)														
Aus (HYV)														
Aman (LV)														
Aman (HYV)														
Boro (LV)	10.17	—————●												●———
Boro (HYV)														
Wheat														
Jute														
Pulses (Lentils)														
Potato	0.61	—————●											●———	
Sweet Potato	0.16	—————●											●———	
Vegetables	0.65	—————●											●———	
Sugar Cane														
Spices	0.39	—————●											●———	
G. Nut	0.65	●———	—————●											
Water Melon														
Oil seed	2.35	—————●											●———	
Others														

Cropping calendar

8. Mosjid

(HAOR)

Name of Crops	(ha)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Aus (LV)														
Aus (HYV)														
Aman (LV)														
Aman (HYV)														
Boro (LV)														
Boro (HYV)	56.69	—————●												●———
Wheat														
Jute														
Pulses (Lentils)	2.02	—————●										●———	—————	
Potato	1.14	●———	—————●											
Sweet Potato														
Vegetables	0.5	—————●										●———	—————	
Sugar Cane														
Spices														
G. Nut														
Water Melon														
Oil seed	2.02	—————●										●———	—————	
Others (Chillie)	4.62	—————●										●———	—————	

Fig. (A.9)

Cropping calendar

9. Nomosudra

(HAOR)

Name of Crops	(ha)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Aus (LV)													
Aus (HYV)													
Aman (LV)													
Aman (HYV)													
Boro (LV)													
Boro (HYV)	2.83	—————●											●
Wheat													
Jute													
Pulses (Lentils)													
Potato	0.05	●	—————		●								
Sweet Potato													
Vegetables	0.05	—————				●							●
Sugar Cane													
Spices													
G. Nut													
Water Melon													
Oil seed													
Others (Chillie)	0.1	—————				●							●

Cropping calendar

10. Dakshin

(HAOR)

Name of Crops	(ha)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Aus (LV)													
Aus (HYV)													
Aman (LV)													
Aman (HYV)													
Boro (LV)													
Boro (HYV)	12.09	—————					●						●
Wheat													
Jute													
Pulses (Lentils)													
Potato													
Sweet Potato													
Vegetables													
Sugar Cane													
Spices	3	—————				●							●
G. Nut													
Water Melon													
Oil seed	1.1	—————		●									●
Others													

Fig. (A.10)

Cropping calendar

11. Purba

(HAOR)

Name of Crops	(ha)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Aus (LV)													
Aus (HYV)													
Aman (LV)													
Aman (HYV)													
Boro (LV)													
Boro (HYV)	80.04	—————●											●———
Wheat													
Jute													
Pulses (Lentils)													
Potato	2.5	————●											●———
Sweet Potato													
Vegetables	2.02	—————●											●———
Sugar Cane													
Spices	1	—————●											●———
G. Nut	1	●———			●———								
Water Melon													
Oil seed	2.5	————●											●———
Others													

Cropping calendar

12. Ghosh

(HAOR)

Name of Crops	(ha)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Aus (LV)													
Aus (HYV)													
Aman (LV)													
Aman (HYV)													
Boro (LV)													
Boro (HYV)	14.23	—————●											●———
Wheat													
Jute	0.6			●———			●———						
Pulses (Lentils)													
Potato													
Sweet Potato													
Vegetables	0.4	—————●											●———
Sugar Cane													
Spices													
G. Nut													
Water Melon													
Oil seed	1.36	————●											●———
Others													

Fig. (A.11)

Cropping calendar

13. Paschim

(HAOR)

Name of Crops	(ha)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Aus (LV)													
Aus (HYV)													
Aman (LV)													
Aman (HYV)													
Boro (LV)													
Boro (HYV)	36.44	—————●											●———
Wheat													
Jute													
Pulses (Lentils)	0.16	—————●										●———	———●
Potato	0.2	—————●										●———	———●
Sweet Potato													
Vegetables	0.15	—————●										●———	———●
Sugar Cane													
Spices													
G. Nut													
Water Melon													
Oil seed													
Others (Chillie)	0.3	—————●										●———	———●

Cropping calendar

14. Shibir

(HAOR)

Name of Crops	(ha)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Aus (LV)													
Aus (HYV)													
Aman (LV)													
Aman (HYV)													
Boro (LV)													
Boro (HYV)	29.8	—————●											●———
Wheat													
Jute													
Pulses (Lentils)	1.4	—————●											●———
Potato													
Sweet Potato													
Vegetables													
Sugar Cane													
Spices													
G. Nut													
Water Melon													
Oil seed	1.2	—————●											●———
Others													

Fig. (A.12)

Cropping calendar

15. Pal

(HAOR)

Name of Crops	(ha)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Aus (LV)													
Aus (HYV)													
Aman (LV)													
Aman (HYV)													
Boro (LV)													
Boro (HYV)	5.86	—————●										●—————	
Wheat													
Jute													
Pulses (Lentils)													
Potato													
Sweet Potato													
Vegetables	0.2	—————●										●—————	
Sugar Cane													
Spices	0.41	—————●										●—————	
G. Nut													
Water Melon													
Oil seed													
Others													

Cropping calendar

16. Noagaon

(HAOR)

Name of Crops	(ha)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Aus (LV)													
Aus (HYV)													
Aman (LV)													
Aman (HYV)													
Boro (LV)													
Boro (HYV)	12.15	—————●											●—————
Wheat													
Jute													
Pulses (Lentils)													
Potato	0.19	—————●										●—————	
Sweet Potato													
Vegetables	0.15	—————●										●—————	
Sugar Cane													
Spices / Chillie	0.17	—————●										●—————	
G. Nut													
Water Melon													
Oil seed	0.3	—————●										●—————	
Others													

Fig. (A.13)

Cropping calendar

17. Maddha

(HAOR)

Name of Crops	(ha)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Aus (LV)													
Aus (HYV)													
Aman (LV)													
Aman (HYV)													
Boro (LV)													
Boro (HYV)	4.05	—————●											●———
Wheat													
Jute													
Pulses (Lentils)													
Potato													
Sweet Potato													
Vegetables													
Sugar Cane													
Spices / Chillie	0.2	—————●										●———	
G. Nut													
Water Melon													
Oil seed													
Others / Garlic	0.2	—————●											●———