

**Master File
On
Polder 02
Blue Gold Program
Khulna**

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Table of content

Topics	Page No
1. Background:	4-6
1.1 Introduction	4
1.2 Project Brief:	4
1.3 About Master file:	5
1.4. Methodology	6
2. About Polder	7-8
2.1 What is Polder?	7
2.2 Type of Polder;	7
2.3 Purpose of Polder formation:	8
3. Geographical Description of Polder:	9-13
3.1 Physical features and Topography:	9-10
3.2 Geographical location of Polder	11
3.3 Weather & Climate	11
3.4 Map of Bangladesh costal Polders	12-13
4. Present situation of Polder:	14- 40
4.1 General Information of Polder-2:	14
4.2 Population density	15
4.3 Land use	15
4.4. Main income sources and livelihoods:	16-23
4.5 Socio economic status:	23-25
4.6 Daily wage rate:	25-26
4.7 Drainage facilities:	26
4.8 Water supply, sanitation and health facilities:	27
4.9 Transportation facilities:	28
4.10 Government office:	28
4.11 Non Government office (NGOs):	28-29
4.12 Market infrastructure:	29
4.12. a. Permanent Market:	30
4.12.b. Temporary Market:	31
4.13 Environmental Hazards:	31
4.13 a Water logging:	31-34
4.13. b. Soil salinity;	35
4.13.c. Siltation:	36
4.13.d. River erosion:	37
4.13.e. Cyclone and tidal surge:	37
4.13.f. Arsenic contamination	38
4.14. Crisis Period In the area:	39-40
5. Economic sector:	41-84
5.1. Agriculture:	41-54
5.1.1. General Description	41
5.1.2. Land Ownership	42
5.1.3. Land use	43-45
5.1.4. Land type and classification	45-47
5.1.5. Major Agricultural crops:	47-49
5.1.6. Cropping patterns and Intensity:	49-50

5.1.7 Crop Calendar	51
5.1.8 Agricultural Mechanization:	52
5.1.9 Input market in Agricultural sector	52
5.1.10. Output market in Agriculture sector:	53
5.1.11. Factors affecting the Agriculture Sector:	53-54
5.2. Livestock;	55-58
5.2.1. Market Demand and Growth Potential:	56
5.2.2. Output market	57
5.2.3. Input Market	58
5.2.4. : DLS delivered Animal health & extension services	58
5.3. Fisheries	59-65
5.3.1. Involve in Fish culture:	59-62
5.3.2. Demand and Supply analysis:	62
5.3.3. Input Market:	63-64
5.3.4. Major problem in Fish sector:	65
6. Potential Value chain in Polder-29	66-81
6.1. Potential VC list in Polder	66
6.2. Value Chain Identification	67
6.3. VC selection scoring information	68-71
6.4. Overview of Identify the Value Chain	71-72
6.5. Potential Value chain Analysis (Mustard, Milk, Poultry)	73-81

1. Background:

1.1 Introduction: The Blue Gold program has a clear focus is to improve the livelihood condition of the communities that are living in the polders. The entry point is improved water resources management by enhancing social development, after that increase agriculture productivity and ensure the marketing facilities through developing the sub sector/value chain in the program area. The program covers many aspects of polder development which concentrate around five component; Community Mobilization and Institutional Strengthening, Integrated Water Resources Management, Food Security and Agricultural Development, Business Development and Private Sector Involvement, Cross Cutting Issues that is Gender, Governance, Innovation, Climate Change and DRR.

1.2 Project Brief:

Program objective: The overall objective of the Blue Gold Program is *“to reduce poverty for 150,000 households living on 160,000 ha of selected coastal polders by creating a healthy living environment and a sustainable socio-economic development”*.

The specific objectives of Blue Gold are:

- i. To protect the communities and their land located in polders against floods from river and sea (climate change adaptation) and to optimize the use of water resources for their productive sectors.
- ii. To organize the communities in water management organizations and/or cooperatives which will be the driving force for the natural resources based development (agriculture, fisheries and livestock), whereby environment, gender and good governance are effectively addressed.
- iii. To increase the household income derived from the productive sectors.
- iv. To strengthen the institutional framework for sustained water resources development and related development services in the SW/SC coastal zones.

Program Components:

- Community Mobilization and Institutional Strengthening:
- Integrated Water Resources Management:
- Food Security and Agricultural Development:
- Business Development and Private Sector Involvement:

(Sources; Inception Report)

1.3. About Master file:

Master file is an official document of Blue Gold program, which contain the sources of information about inside and outside of the polder 29. Everyone can use it for makes a common understanding about the Polder 29 as well as overall concept of Blue Gold program of commanding area.

The master file provide the sound understanding about the geographical location, physical infrastructure, institutional structure, different economic activities, livelihoods, socio-economic statue of population, culture, and communication system in the polder area.

The master file also provide the information on Agricultural activities in relation to Agriculture products & production, land productivity, cropping system, cropping intensity, different opportunities & existing practice, adoptable technique & technology, fish culture, livestock developmentand any other off-farm activities in the polder area.

This master file can help to business development component by providing necessary information on input-output market, different actor and their function, private sectors, local marketing system, sources of services, constraint & opportunities in market so that they can design the polder development plan (PDP) and value chain development activities.

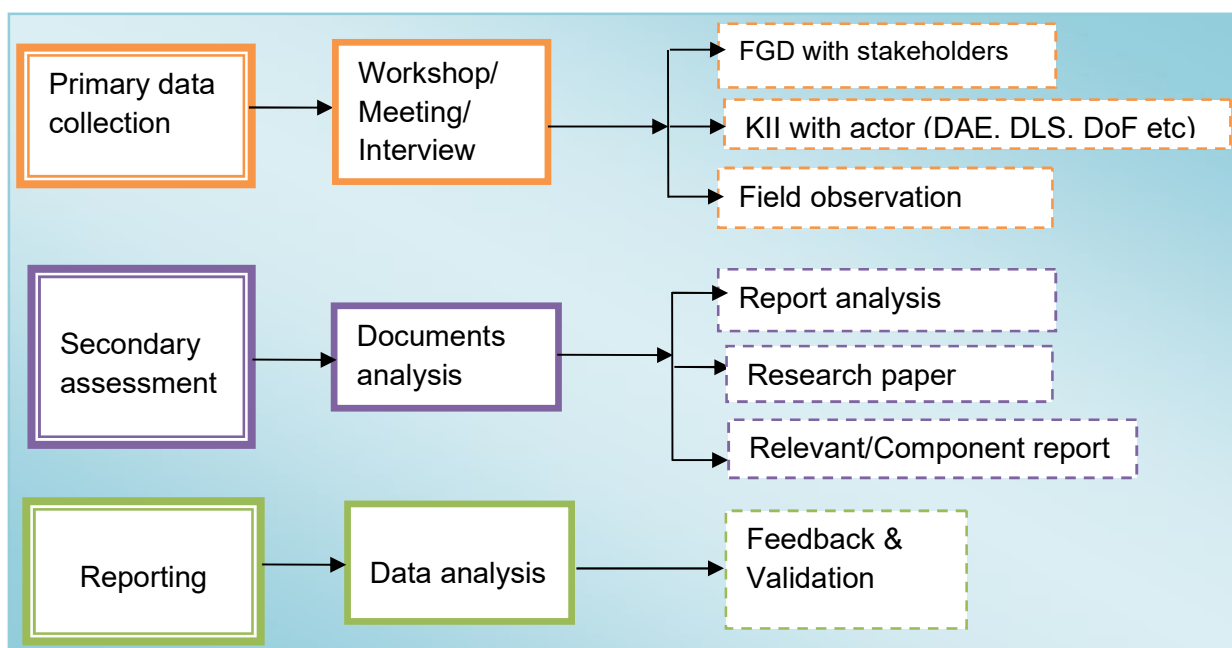
Therefore, this master file also helps to other component of Blue Gold program for use as a effective tools to know theoverall situation of livelihoods status, Agril production, marketing and local context in polder area.

Objective of Master file:

- To use master file as a source of information
- To makes a common understanding about component -4 of their overall objective, intervention as well as activities.
- To improve the knowledge and skill of staff so that they can manage the program by independently.
- To use it as a base line data which help to monitor and measure the program activities accordingly.

1.4 Methodology:

The master file has prepared by use different methodology, firstly primary data collection by conducting meeting, workshop, face to face discussion, interview with key informant, focus group discussion with different level of stakeholder, and overall field observation. Secondly report and documents analysis in order to cross check and validation of all collected information. And lastly master file has developed by accumulating all type of analytical data, put point specific explanation against field information and observation, and submitted to all concern staff for giving the valuable feedback and suggestion. Different tools and methods use for accomplished the task those are given bellow;



Primary data collection; This step is very important and essential to write up any documents. By this step, we effectively apply the different PRA tools/methodologies like; FGD, KII, face to face discussion, and transect walk or field visit for knowing the common observation about the polder 02. All implemented methods carried the different information especially on basic data, local context, livelihood status, agriculture production, and market situation and for capturing the information we used the different type of data collection format. These processes also ensure to gather new concept, learning, challenge, limitation and idea which help to develop the master file.

Secondary assessment; Different type of project documents like; project inception report, planning study report, project documents, Polder development plan, annual plan of operation and project progress report were kept and analysis in order to gathered the inside knowledge and idea about the polder area. It has also used as a primary data sources for prepared the master file report.

2. About Polder

2.1 What is Polder?

In briefly **Polder** is 'An area of low land that has been reclaimed from sea and river and it is protected by dikes'. A **Polder** is a low laying tract of land enclosed by embankments (barriers) known as dikes that forms an artificial hydrological entity, meaning it has no connection with outside water other than through manually operated devices.

An area of low-lying land, that has been reclaimed from a body of water and is protected by dikes. Water enters the low-lying polder through water pressure of groundwater, or rainfall, or transport of water by rivers and canals. This usually means that the polder has an excess of water, which is pumped out or drained by opening sluices at low tide.

In generally, Tract of lowland reclaimed from a body of water, often the sea, by the construction of dikes roughly parallel to the shoreline, followed by drainage of the area between the dikes and the natural coastline. Where the land surface is above low-tide level, the water may be drained off through tide gates, which discharge water into the sea at low tide and automatically close to prevent re-entry of seawater at high tide. To reclaim lands that are below low-tide level, the water must be pumped over the dikes. If a sediment-laden stream can be diverted into the polder area, the sediment may serve to build up the polder bottom to a higher level, thus facilitating drainage.

(Source: <http://en.wikipedia.org/wiki/Polder>)

2.2 Type of Polder;

The polder is a Dutch term. The Netherland is frequently associated with polders. This is illustrated by the English saying; "God created the world but the Dutch created Holland". The Dutch have a long history of reclamation of marshes and fenland, resulting in some 3000 polder in nationwide. About half of the total surface area of polders in north-west Europe is in the Netherlands. The first embankments in Europe were constructed in Roman times. The polders were constructed in the 11th century.

(Sources; http://en.wikipedia.org/wiki/Polder#Polders_and_the_Netherlands

There are three type polders;

1. **Land reclaimed**; from a body of water, such as a lake or the sea bed.
2. **Flood plains**; separated from the sea or river by dike.
3. **Marshes**; separated from the surrounding water by dike and subsequently drained.

Bangladesh has 123 polders, of which 49 are sea-facing. (Source; <http://en.wikipedia.org/w/index.php?title=Polder&action=edit§ion=3>) These were constructed by Bangladesh Water Development Board (BWDB) in the 1960s in the 14 coastal districts of Bangladesh (Khulna, Satkhira, Bagerhat, Jessore, Pirojpur, Barguna, Patuakhali, Barisal, Bhola, Noakhali, Laxmipur, Feni, Chittagong & Cox's Bazar) to protect the coastline from tidal flooding and reduce salinity. It was implemented the Coastal Embankment Project (1961-1978) and its subsequent extensions into newly accreted areas. There are about 6,000 km of embankments that protect 1.2 million ha of agricultural lands in the country. Unlike flooding and tidal surge, recent cyclones including the most recent *Sidr* in 2007 and *Aila* in 2009 brought substantial damage to these embankments. In response, BWDB re-focused its strategy on protecting against cyclones and developing early warning systems. [source: Social management and resettlement policy framework (SMRPF), coastal embankment improvement project, phase-I (CEIP-I), April 11, 2013]

2.3 Purpose of Polder formation:

Bangladesh is also ranked as being at “high-risk” of multiple devastating hazards. Bangladesh will be among the most affected countries in South Asia, with rising sea levels and more extreme heat and more intense cyclones threatening food production, livelihoods and infrastructure. Instrumental in the region’s agriculture development, they have also played a key role in mitigating the loss of life and damage during tidal surges.

In fact, in many areas, siltation has raised the river or other water channel bed to such levels that the polder region itself effectively lies below the water level. As a result, when sluice gates are opened, instead of water running from the polder lands, outside water rushes in, resulting in long-lasting water logging and flooding.

Many of the polders were created to increase the safety of the people living in the or near the sea and rivers. People build dikes around the sea or river to protect themselves.

“Polders play a crucial role in avoiding water logging from tidal surges. The recent Cyclone Mahasen was low in intensity, but the damage could have been significant from the resultant tidal surges and flooding. But the polder networks allowed the water to run off, avoiding long-term flooding,” said Delwar Hossain, executive engineer of the Bangladesh Water and Development Board which maintains an extensive database of coastal polders, including their length, location, construction year and cost.

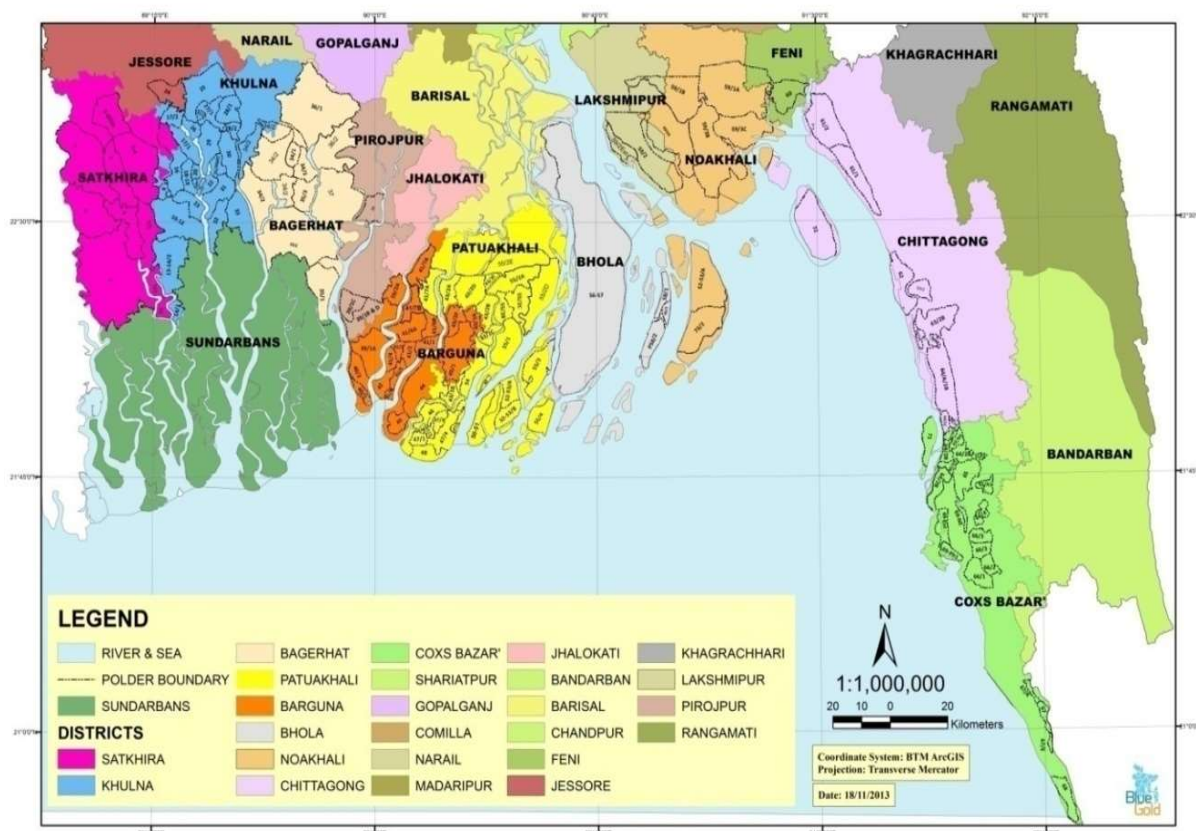
3 Geographical Description of Polder:

3.1 Physical features and Topography of district:

Satkhira located in south-western part of Bangladesh. Associated with the annual monsoon season, comes a series of floods that inundates the human life livestock, agriculture and all communication facilities, so that every year need to emphasis for attention of repeated humanitarian and emergency program for the vulnerable people.

Satkhira district as well as Polder 2 lies between Latitude 21° 36' to 21° 54' North and Longitude 88° 54' to 89° 29' south. Considering the surface of sea level, this district is situated approximately 16 fit high from the sea level. The location of this district is; East side surrounded by Khulna district, west side is west Bengal of India, north side surrounded by Jossehor district, and south side surrounded by Bay of Bengal as well as Mangrove forest (Sundarban). The shape of this district is roughly longitude from north to south. Total area of this district is 3858.33 skm among this one third is forest. Soil of this area is salty and clay. Always saline water comes from sea due to establish the direct river connection. North side of this district is high compare to the south side.

Map-01: Map of Bangladesh costal Polders



Map-02: Satkhira District Map

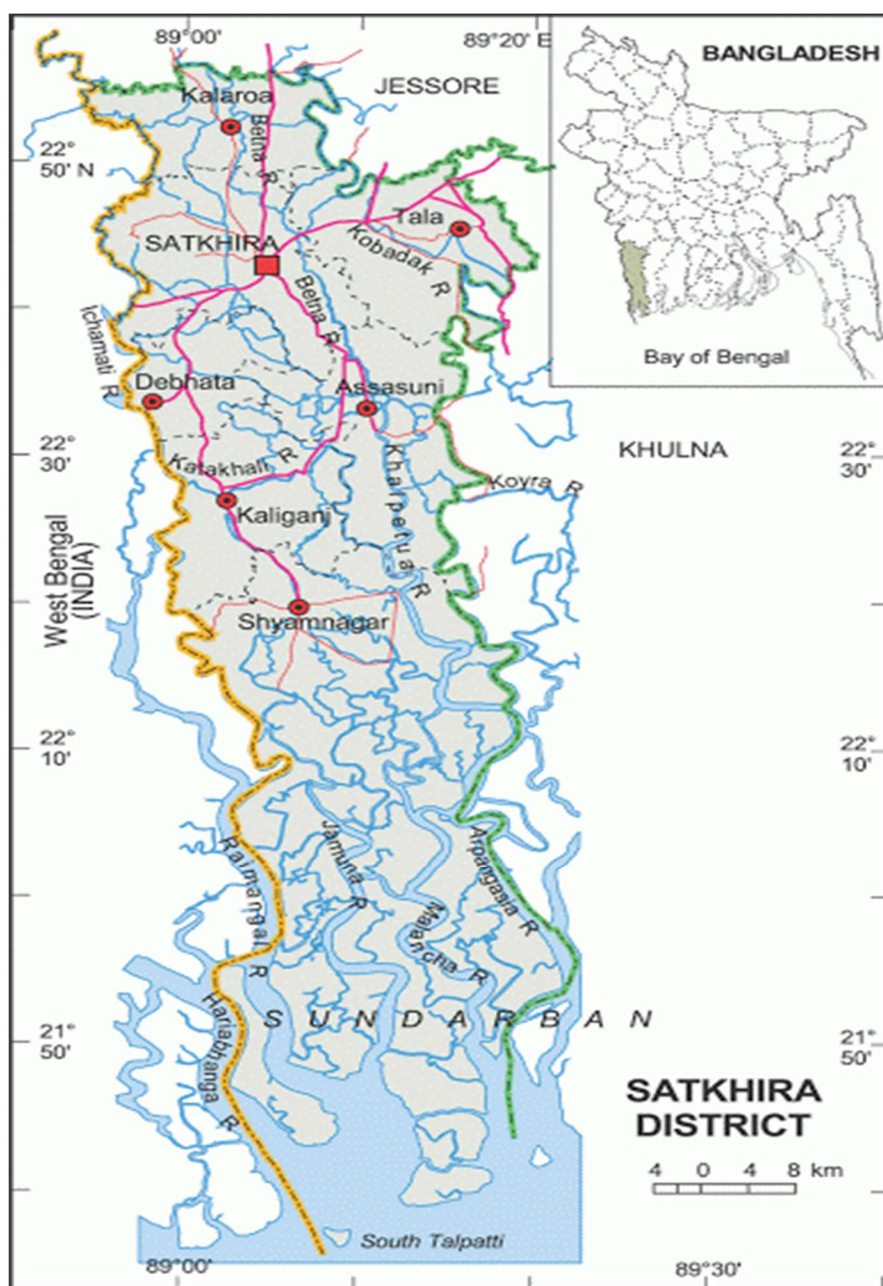


Table-01: General Statistics of Satkhira District

# Upazila	# Union	Area (skm)	Population	HHs	Education rate	River	Khal	Land area (ha)
7	78	3858	2079884	362589	53.32%	27	429	374984

3.2. Geographical location of Polder

The polder 2 is situated and forms part of the greater Ganges Flood Plains, an extremely complex and sensitive hydraulic system. This hydraulic system relies on a delicate balance between flows of water from two direction; downward flow from the source of river Ganges-Padma, and its drainage tributaries, as well as upward flows of sediment from the Bay of Bengal.

By the constructed of Bangladesh Water Development Board (BWDB), total of 14 polder in Satkhira among them Blue Gold program have a plan to working with three polder (Polder # 2, 4, 6/8 Ext).. Starting point of Polder 2 is very adjacent from District head quarter and it is also included the Paoroshava. The location of Polder 2 is North part surrounded by polder 6/8 Extension, Northeast part surrounded by polder 6/8, southeast part surrounded by Polder 7/2 (part), south part surrounded by polder 4, and west part surrounded by polder 1.

Geographical distribution of Polder 2 is consists of 57 mouzas with 9 Unions under the upazila of Satkhira sadar, Assasuni, and Tala (part) of Satkhira district. In terms of covering village as we as population; only 3 union covered 100% area and other 6 union covered by partially (details in point 4.1). So it is difficult to find out and distinguish the actual population as well number of village from the administrative distribution of union. We followed two methods as a basis of calculation for find out the population in our polder area; 1st one is we make the average population of each village and multiply into covering village (6 union, 36 village, & population 60161) which union covered by partially and 2nd way to calculation is we consider 100% population (91971) from 3 union (table-3). By this way total population of polder area is 1,52,132 and total covered area is 11296 ha.

Table-02: General statistics of the Polder:

# Upazila	# Union	# Mouza	Village	population	Number of HH	Area (ha)	Regulator/ WCS	River	Khal (km)	Embankment (km)	Inlet-outlet	Bridge/ culvert
3	9	57	97	152132	40034	11296	22	4	66.22	62.96	62	55

3.3. Weather & Climate

Polder 2 is humid during summer and pleasant in winter. Polder 2 annual averages maximum temperature reaches 35.5 °C (95.9 °F); and minimum temperature is 12.5 °C (54.5 °F). The annual rainfall is 1710 mm (67 in).

Map-03: Location map of Polder 2:

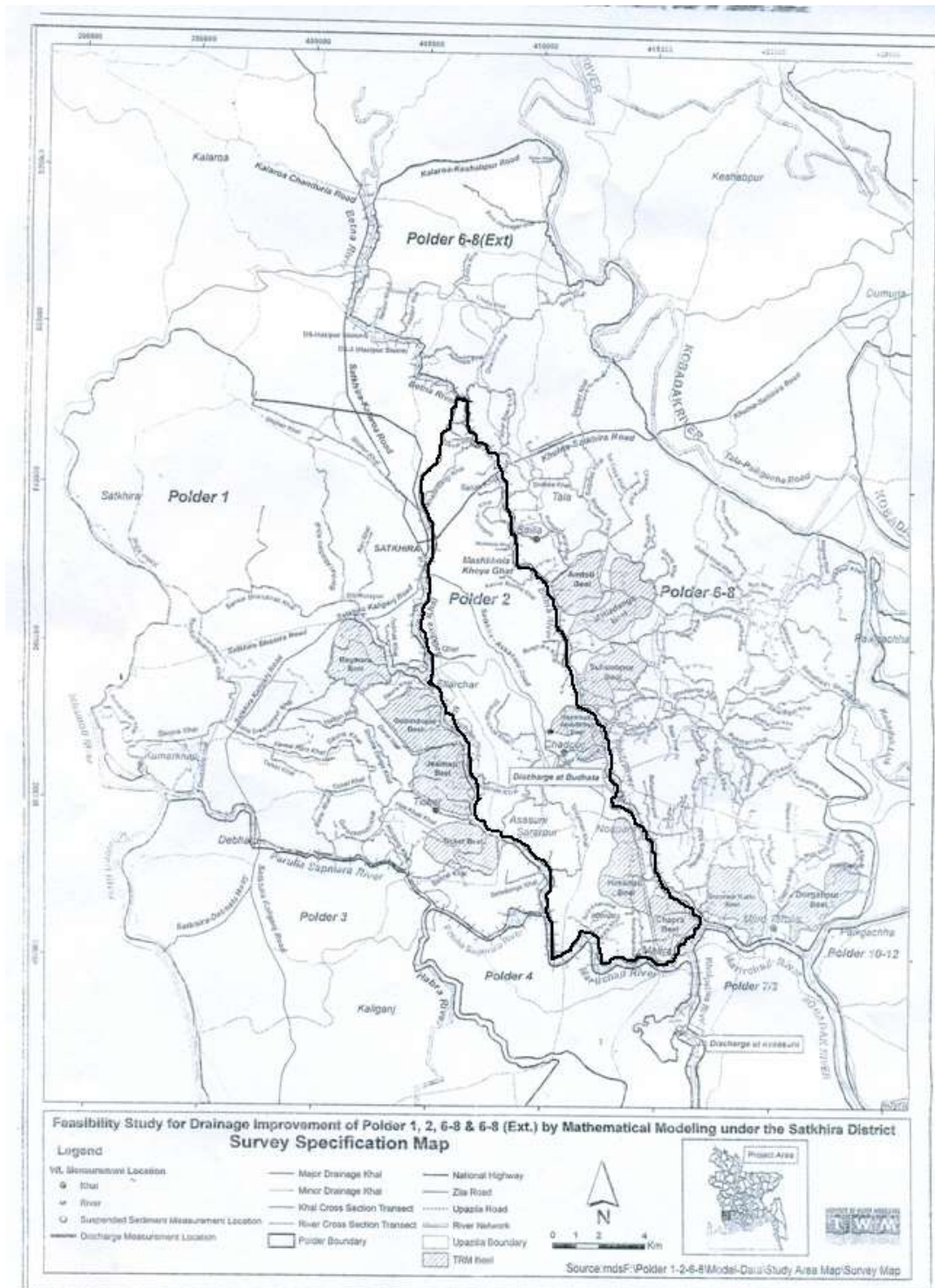
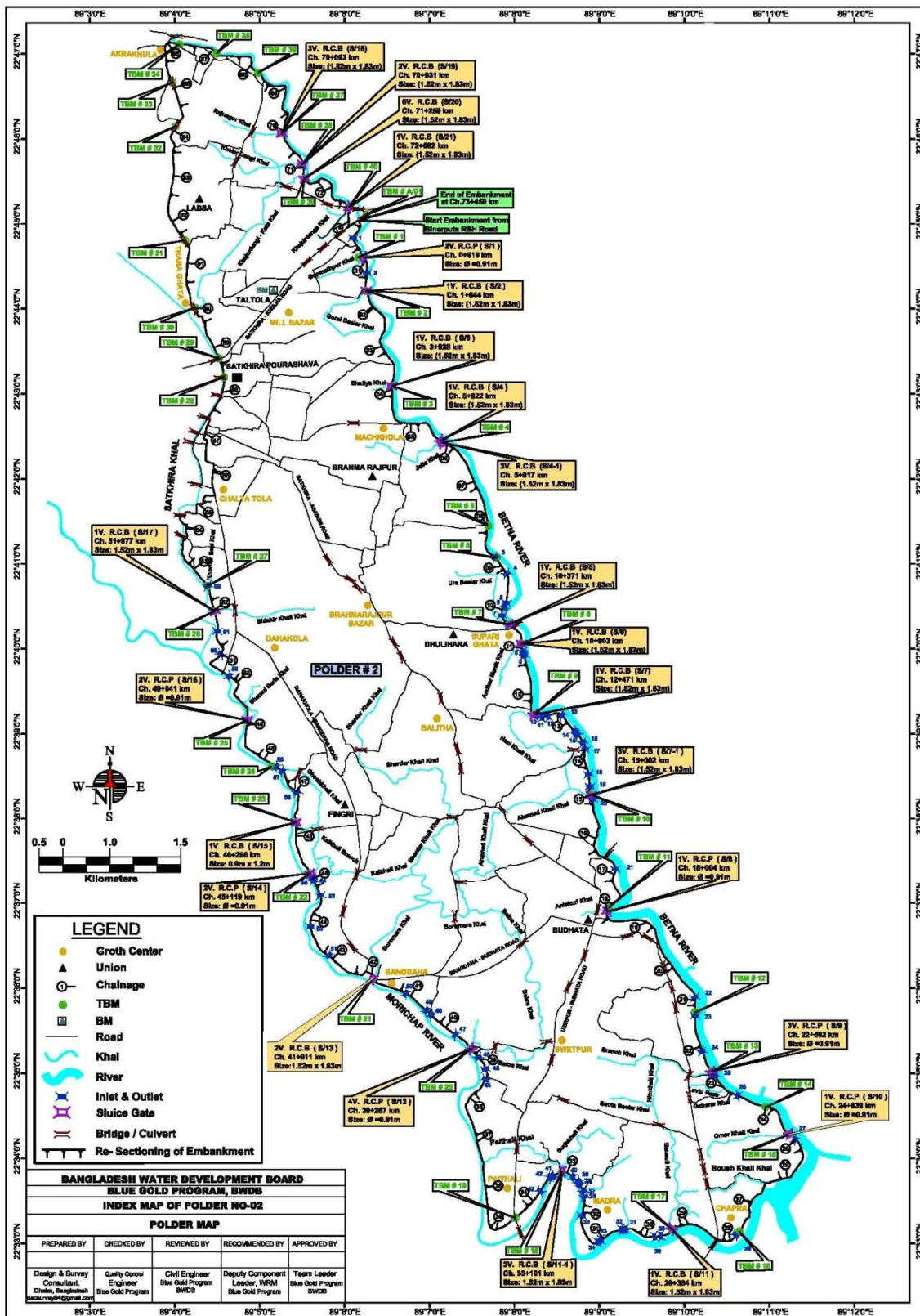


Figure 3.2 Survey Specification Map

Map-04: Map of Polder 2



4. Present Situation of Polder:

4.1. General Information of Polder-2:

Polder 2 is consists of 57 mouzas with 9 Unions under the 3-Upazila of Satkhira sadar, Assasuni, and Tala (part) of Satkhira district. Polder 2 touches the 3 upazila and 9 union but not covered 100% areas. The Polder covered the major percentage area of the union of Fingri (16 village), Budhata (24 village) and Bramahrajpu (21 village). Partially covered the union of Dhulihar (18 out of 27 village), Labsa (13 out of 16 village) and very limited area covered of union of Jhaodanga (2 out of 21 village), and only one village covered of Balli, Kulla, Nagarghat union. Starting point of Polder 2 is very adjacent from District head quarter and it is also included the Paoroshava. The total area of Polder is 11296 ha.

Table03: Union wise basic data

	Fingri	Bramahrajpur	Dhulihar	Labsa	Jhaodanga	Balli	Budhata	Kulla	Nagarghata
Area (sqkm)	33.21	9	16	18	18	17	33.53	20.58	26.42
Population	38033	23278	39912	31580	39341	18376	30660	44263	22169
Village	16	21	27	16	21	17	24	21	23
Mouza	19	5	6	6	24	7			6
Hat/bazer	5	2	3	2	3	1	5		2
Education rate	49%	19%	72	41%	49%	65%	85%		45
Primary school	16	12	13	10	17	8	15	15	14
High school	3	4	3	3	2	3	4	4	3
Madrassa	5	3	2	3	6	1	7	7	1
College	1		1	2	2	0	2	2	0
Mosque	50	35	49	36		30	46	38	31
Mundeer	20	16	1			7	13	13	
Bank		1	1			0			
Road (km)		48	170				155		90
Hand tub well		410	544						500
Deep tube well			62						12
Shelter centre		2	3			1			
Community health centre	1	1		1		1			1
Community clinic	4	2	3			2			
NGOs	2	7	1			6			
Bridge/culvert	10	B-1	b-2 c-72						

(Sources; Upazila website & KII with UP)

4.2. Population density:

The natural, physical, human, social and financial assets are totally disrupted when the population density of an area become tremendously high. The causes behind of high population density is where have opportunity to find out different livelihoods option, natural resources are available, and people can easily access all essential requirement etc. But on the other hand it was found that poverty intensity was high in the area where natural asset like lands, fishing ponds are not properly managed. The high population density makes the social suffering in the area and always increases the pressure on land uses and its proper management. In the Polder area, the population density is high in Bramahrajpur union and lowest in Budhata union. Bramahrajpur union is very much adjacent in district headquarter and this union is also focused as business centre including most of the civic amenities are available in this union so the population density is high compare to other union in Polder area. Beside Nagarghata of Tala Upazila and Budhata union of Assasuni upazila is very low population density area compare to others union. Budhata is saline prone area and here only 14% area (land) are used for settlement purpose and other 86% land used for Agriculture (30%) aquaculture (27%) agriculture+ aquaculture (20%) and open water body, for that population density is very low.

Table 04: Union wise population density

Union	Total population	Total area (sq.km)	Population density/sqkm
Fingri	38033	33.21	1145.22
Bramahrajpur	23278	9	2586.44
Dhulihar	39912	16	2494.5
Labsa	31580	18	1754.44
Jhaodanga	39341	18	2185.61
Balli	18376	17	1080.97
Budhata	30660	33.53	914.40
Kulla	44263	20.58	2150.77
Nagarghata	22169	26.42	839.09

(Sources; Union website)

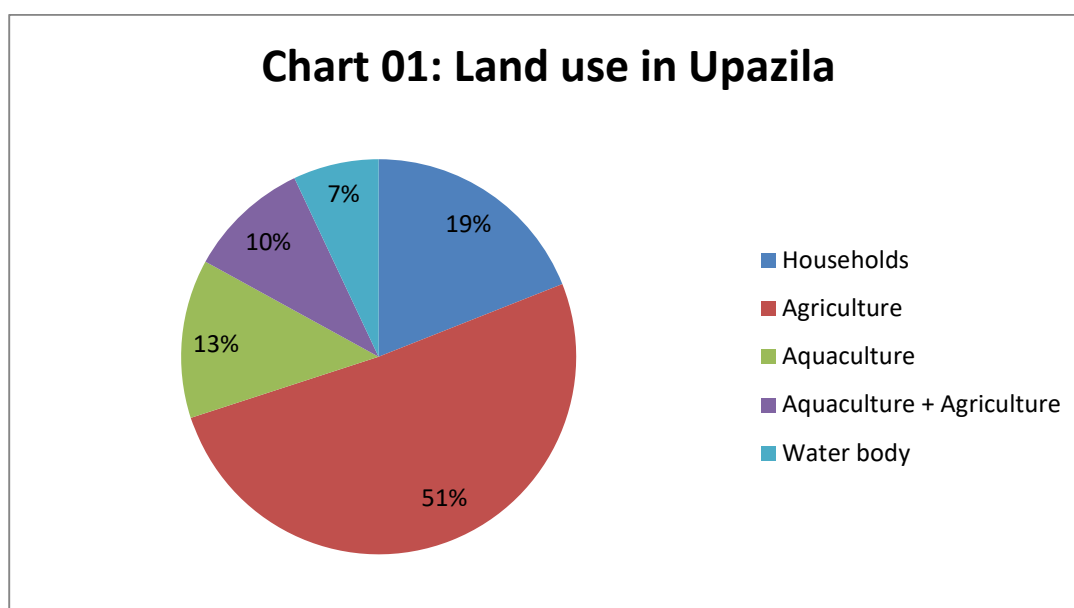
4.3. Land use:

Land use in Bangladesh has evolved through natural forces as well as human needs it is also the same causes in our polder areas. Settlements, agricultural land, aquaculture, forestland homesteads are the major land use types in Bangladesh. With the growing population, and their increasing needs in various sectors, land use patterns are undergoing a qualitative change in which the areas under the net cropped land, and forest land is gradually shrinking. In the polder area a large part of the agricultural land shifting to illegal occupation for homestead and shrimp culture etc.

Table 05: Land use in different purpose

Upazilla	Area (ha)	HHs		Agriculture		Aquaculture		Aquaculture+ Agriculture		Water body	
		ha	%	ha	%	ha	%	ha	%	ha	%
Satkhira Sadar	40808	9196	23	27004	66	3129	7	246	1	1233	3
Assasuni	34270	4615	14	10328	30	9024	27	6832	20	3071	9
Tala	36915	7909	21	21393	58	2148	6	2962	8	2533	7
Total	111993	21720	19	58725	51	14301	13	10040	10	6837	6

(Sources; DAE)



4.4. Main income sources and livelihoods:

Satkhira has a three relatively distinct area or livelihoods zone; 1st one is south part that is livelihoods of Sundarban mangrove national part area mainly depends on marine fish capture, second is an area in central Satkhira (included of upazila Tala, Satkhira sadar and Assasuni) where cultivation of shrimp, prawn and fish are the predominant means of livelihoods. Thirdly, the northern part of Satkhira where the normal agricultural production is predominant and this area are affected by waterlogged. These areas also the same livelihoods zone, a mixed agricultural zone of food and cash crops and livestock with the fish cultivation.

Agricultural production of food and cash crops is the main livelihoods option of this Polder. Rice is the main crop for both food and cash purposes with two main season of production. Boro covered the major percentage area but T-Aman is cultivated that area where land are free from water logging or that place where water rapidly go away. In the Boro season highest yield per area up to 4.2 MT/ha and the greatest coverage of cultivation and irrigation, fertilizer and high yielding variety seed are typically used this season. In Aman season the

average yield is 3.1 MT/ha and irrigation not required this season. Aus rice is not commonly cultivated in this zone.

During data collection time we discussed with WMG and in some cases interview with Union Parishad representative, we found that in the polder area most of the household depend on more than one sources of income for maintaining their livelihoods. Considering in our polder area, Agriculture is the main income source for the majority people; while 33.88% of households are depends agriculture as their major sources of income, 16.33% households selling labour in agriculture, 17.44% households depends as their major sources of income in fish culture (both shrimp, prawn and white fish) and capture from wetlands. 4.88% households selling labour in fish culture activities. 14.44% households are in non agricultural sector. 8.66% of households specifically involved in business sector as their major sources of income (here business means a whole range of business from the 'petty trading' of poor people to large scale business of rich people, buying and selling fish, running shops; grocery/sweetmeat/poultry feed/cloth, renting machineries; tractor/power tiller, running tea stall, poultry farming, mobile phone recharge etc. And lastly 5.33% households are in service in non-government, government and others company.

A large number of female-headed households are depending on selling households labour. The female labourers usually get engaged in wage labouring mostly in harvest and post harvest activities. They also get involve in earth work (road/gher construction and maintenance of rural infrastructure). They receive a lower wage rate than the males even if they perform the same work.

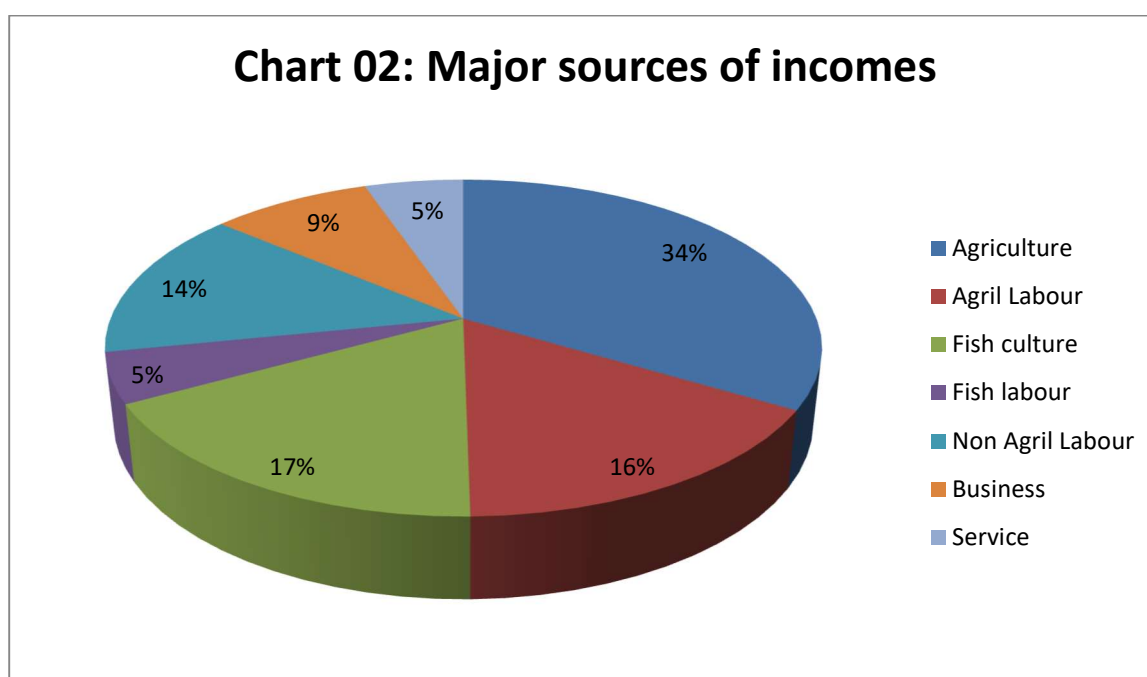
The bellows data collected by discussion with WMG members, LF, and Union parishad and just they provide information as percentage not actual data collect from house to house visit. The collected data refer to overall status of the communities which multiply to union after that we get a sense about main income sources of Polder areas. The data are given bellows;

Table -06: Major income sources of People

Name of Union	% HHs	Distribution of HHs according to their major income sources						
		Agriculture	Agril Labour	Fish culture/ capture	Fish labour	Non Agril Labour	Business /trading	Service
Fingri	100	35	14	22	6	13	7	3
Bramahrajpur	100	36	17	16	3	15	7	6
Dhulihar	100	28	15	25	6	13	6	7

Labsa	100	34	19	9	3	18	9	8
Jhaodanga	100	35	22	7	2	18	11	5
Balli	100	37	16	10	6	15	10	6
Budhata	100	28	12	32	8	11	6	3
Kulla	100	30	15	27	5	8	10	5
Nagarghata	100	33	17	9	5	19	12	5
		33.88%	16.33%	17.44%	4.88%	14.44%	8.66%	5.33%

(Sources; FGD with WMG, KII with UP)



4.4.a. Income and Expenditure:

Water logging is the major problem in Satkhira and it is also similar in Polder areas. UKAID funded Food Security Cluster (FSC) have done the study report on '**Measuring the Impact of Water logging on Households Economies**'. They try to find out the major deviation of annual cash income and yearly expenditure both in waterlogged affected area and non affected areas. This data use only to makes common understanding about the polder but not possible to gives the actual information of that area. We can get idea about general income and expenditure status which directly handle the livelihoods of the areas.

Annual cash income: About annual cash income the given data are accumulated by analyzing graphic presentation of that report.

Table 07: Annual cash income in affected and non-affected area

Income sources	Yearly cash Income							
	Landless labours		Marginal		Small		Rich	
	Affected	Non Affected	Affected	Non Affected	Affected	Non Affected	Affected	Non Affected
Crop sales		5000		50000	5000	95000	50000	230000
Milk sales				5000	3000	5000	5000	3000
Livestock sales		5000	20000	25000	35000	40000	30000	40000
Daily labour	65000	65000	30000	30000	7000			
Seasonal migration			20000					
Small business			10000		70000	20000	50000	110000
Fish cultivation					10000	5000	140000	5000
Loan	10000	5000	10000	10000	10000	15000	60000	65000
Total	75000	80000	90000	120000	140000	180000	335000	453000

(Sources; Measuring the Impact of Water logging on Households Economies' by FSC UKAID)

Landless labour: In the affected area, yearly income of landless labour is Tk.75000 on the others side non affected area yearly income is Tk.80000. Major deviation between the areas is; Non affected areas landless labours are able to earning from four sources like crops sales. Livestock sales, labour sales and access to take limited loan but in affected areas landless labour only involved in labour selling activities other than they are taking loan from outside.

Marginal farmers:

In the affected area, Mostly people cannot start the agricultural activities in timely and in some cases they start seasonal small business for short time and some are take a decision to migrate others place for searching the works for their financial improvement. On the other hand, non affected area's people get scope to cultivate their own land as their main earning sources, including involve in households based economic activities such as poultry rearing, milking cow rearing, homestead gardening etc and ultimately no need to migrate to others places.

Small Farmers:

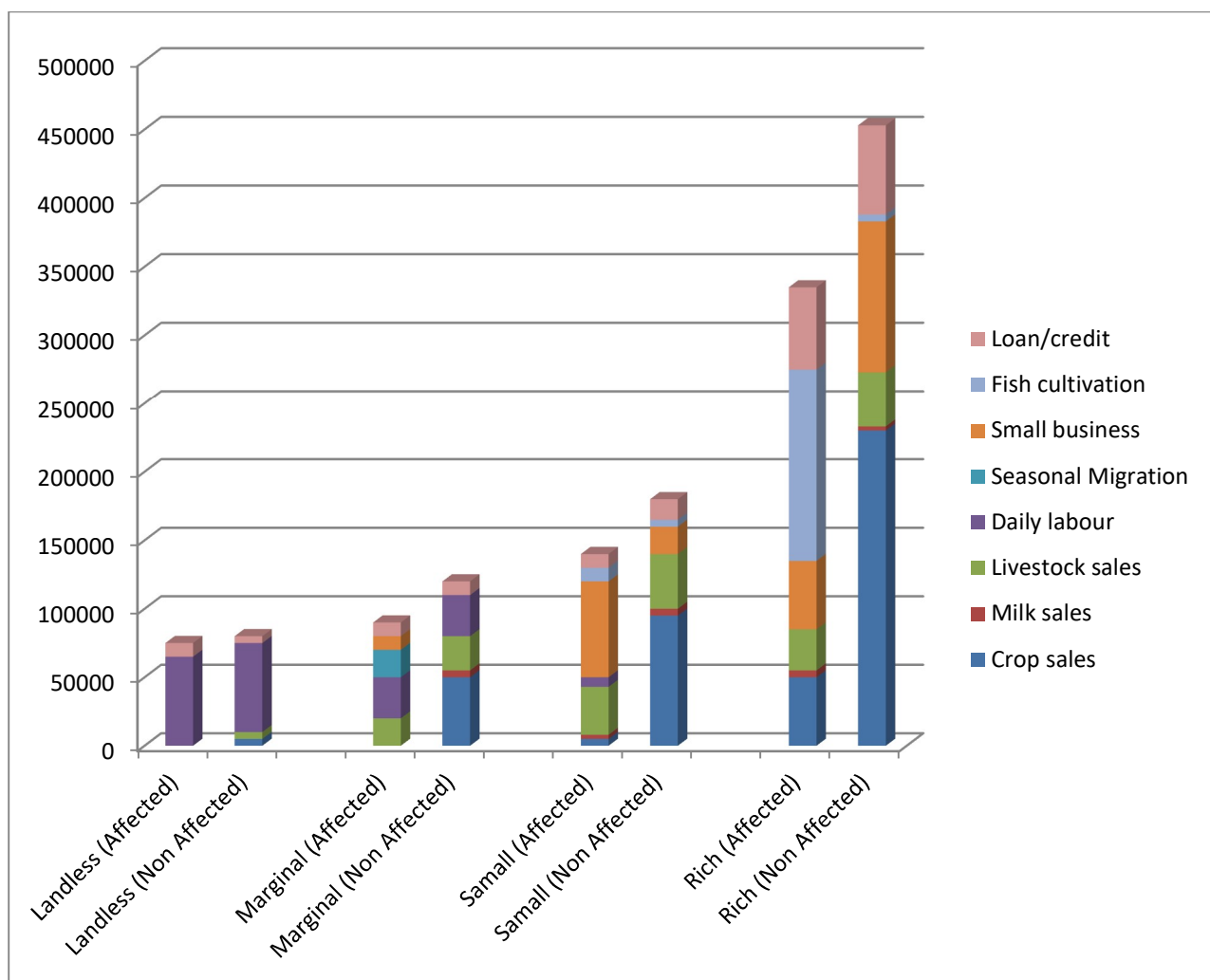
It is very great problem for small farmers in affected areas that agriculture production is very minimum where as non affected areas agricultural production high. In very critical time, affected areas people sold some valuable asset and involve in seasonal small business for

minimize and recovery from the shocked. Non affected areas farmer’s successfully continue the agricultural activities and earn the more profit compare the affected areas farmers and this sector makes the main difference between the both areas.

Rich farmers:

Rich farmers of the affected and non affected areas are not directly loss the economic situation, they recovery their stress by changing the earning sources like; affected areas farmers change their income sources from agriculture to fish culture, other hand non-affected areas farmers continue the agricultural activities instead for fish culture. Including both are continue the small business or year round business as a regular earning sources.

Chart-03: Annual Cash Income Disaggregated by socio economic status



4.4.b. Yearly Expenditure:

In that report they (FSC) also try to find out the yearly expenditure of the affected and non affected area by applying as same procedure. The given data are accumulated by analyzing graphic presentation of that report;

Table 08: Yearly expenditure in affected and non affected area

Expenditure pattern Income sources	Yearly Expenditure							
	Landless labours		Marginal		Small		Rich	
	Affected	Non Affected	Affected	Non Affected	Affected	Non Affected	Affected	Non Affected
Main foods	25000	20000	20000	18000	18000	10000	12000	10000
Others foods	20000	20000	18000	22000	27000	35000	50000	75000
Household s items	10000	10000	10000	10000	15000	20000	20000	35000
Production inputs	6000	8000	15000	35000	35000	70000	125000	150000
Schooling/ health	3000	4000	5000	6000	8000	15000	15000	35000
Festival/ clothing	3000	4000	5000	6000	12000	15000	25000	40000
Credit repayment	12000		15000	20000	15000	20000	75000	80000
Miscellaneous	3000	2000	5000	5000	15000	12000	20000	30000
Total	70000	68000	94000	122000	145000	197000	342000	455000

(Sources; Measuring the Impact of Water logging on Households Economies' by FSC UKAID)

Main food: The first category (Main foods) of expenditure indicated on the table as “rice, wheat, pulses, potato” includes all types of rice and pulses purchased (various qualities and prices), with the wheat being in the form of wheat flour “*atta*”.

Other foods: This covers all other foods including meat, fish, milk, eggs, oil, sugar, vegetables and fruit.

Other household items: This item includes cooking ingredients such as chili, turmeric, salt, etc as well as tea, soap and essential hygiene and sanitation products, kerosene for lighting and cooking, electricity, milling costs for paddy, purchase of firewood and dung sticks, as well as cooking utensils, pots, and furniture.

Production inputs: This categories covers irrigation, land rental, equipment hire and purchase, seeds, fertilizers, pesticides, herbicides, livestock purchase and vaccines, fodder,

labor costs, fingerlings and other inputs for fish rearing, rickshaw repair, small business investment as well as expenditure on housing and yard repair.

Schooling and health: This categories includes costs for fees, books, uniforms, pocket money, tutoring, doctor fees and traditional and modern medicines.

Festivals/clothing: This includes purchase of gifts for others during festival times, clothing and shoes for the household, *zakat* and other religious obligations, formal and informal taxes, cash gifts to others and other similar expenditures.

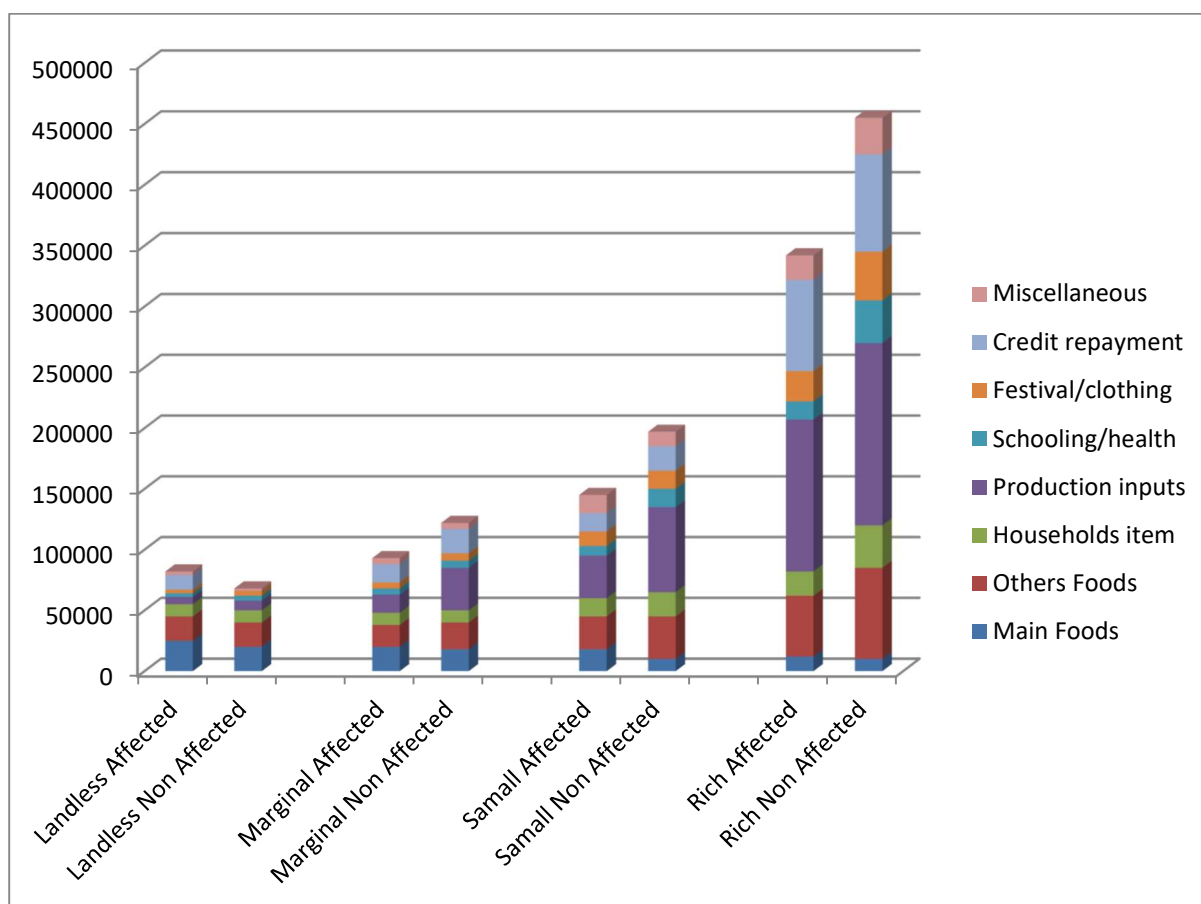
Credit repayment: This includes repayment of capital as well as interest.

Miscellaneous: This includes expenditure on transport, phone credit, betel nut and tobacco products, luxury hygiene and cosmetic products such as skin creams, razors, and shampoo, as well as other non-essentials and “luxury” items.

Data Analysis:

Non affected areas expenditure is more compare to the affected areas expenditure except in landless farmers. The causes behind is farmers used more production inputs which meaning that they are involved in different productive activities.

There are some expected patterns observables in the data, following wealth group status. Expenditure on the staple food rice, as well as the other basic foods of the area, potatoes and pulses, decreased with wealth group. Expenditure on this category was higher for every wealth group comparing affected areas with non-affected areas. Conversely, expenditure on tastier, more nutritiously diverse foods increased significantly with wealth group, but also followed the same “reduction” pattern when comparing affected areas with non-affected areas. Expenditure on schooling and health increased as expected with wealth group, but was also significantly lower for all household types in the affected area.

Graph 04: Yearly Expenditure Disaggregated by socio economic status

4.5. Socio economic status:

Without house to house survey, it was difficult to measure the actual socio economic status of every household. During this reporting period our project has not done the household survey to know the socio economic status of the polder areas. Food Security Cluster (FSC) has classified and used the socio economic status in their report by give the reference of DAE. We can also use this data for makes a common realization about the polder areas economic situation but not take it as a actual livelihoods status of the areas.

Table-09: Socio economic status in Polder area

Category	Main criteria	% of population
Landless	Less than 0.02 Ha land	21%
Marginal farmers	0.02-0.2 Ha land	28%
Small Farmers	0.2-1 Ha land	30%
Medium Farmers	1-3 Ha land	18%
Large farmers	3+ Ha land	3%

(Sources; Measuring the Impact of Water logging on Households Economies' by FSC UKAID)

During our data collection period in order to develop the master file, we conducted so many FGD and discussion event with different level of stakeholder (WMG, individual interview with community's peoples, KII with Union Parishad representative, and sometime over discussion with our field staff of LFs and Cos) and try to find out the common voice about the social status of the village as well as union which reflecting to the polder areas. The data was collect as hypothetically by percentage. This socio economic status classified by considering the all livelihoods option, it means doesn't emphasis only the Agril family.

Before categories the socio economic status, we classified four categories by discussion with different level of participants and set up more specific criteria which help for distinguish the status (Table 10). The data are given bellows;

Table-10: Well being categories of households

Category	%	Selecting criteria
Extreme poor (Ati Garib)	32%	<ul style="list-style-type: none"> • These people who living by hand to mouth. • They do not take 3 meals in a day with cannot take nutritional valued any food. • Some time these people take 1 or 2 meals in a day. • Cannot buy sufficient clothes. • Children & women always faced the nutritional deficiency. • Children deprive from education facilities and involve to selling the child labor. • Early marriage rate is high in households. • Women from such families have to work as day labor. • Some of them are living by begging. • Always these people are in behinds in health care facilities or do not get the treatment support in timely and sufficiently. • Numbers of family members always more to the numbers of earning members that is dependence member always high. • They are landless ad have not any fixed asset and always they living on government land or land owner donated land
Poor (Garib)	40%	<ul style="list-style-type: none"> • These people sell physical labor throughout the year both in agricultural and non-agricultural field. • They do not have any cultivable land only have an own homestead. • Some time they involved in agricultural production as contract farming system. • Their expenditure always appears to be more than their income. • They take 2-3 meals in a day but questionable in nutritional valued of food. • They have not ability to cope with any crisis situation without external help. • They always living on unkind loan repayment bad cycle by receiving money for overcome the crisis. • They pulling cycle-van, rickshaw and any other men driven vehicle. • Some of them are engaged in petty trade. • They make their living from catching fish and crabs.

		<ul style="list-style-type: none"> Some of them go outside the area for selling labor and to do some odd jobs.
Medium rich (motamuti sachchal)	27%	<ul style="list-style-type: none"> They earn enough to lead a moderate life-style though they have to work hard for it. They do not suffer from want of food and clothes; they can also afford some luxury items. They can afford to educate their children. They do not face problems in the treatment of minor ailments of family members. They have some cultivable land; they cultivate their land themselves and sharecropping some more land. From their own agril production they are able to supply food for their own consumption up to 8-10 months in a year. They have <i>ghers</i> (shrimp-fields) and ponds. They have medium-category businesses. Some family-members have salaried jobs (in educational institutions, NGO offices, police department, armed forces). They sometimes own power-tillers and shallow tube-wells.
Rich (Sachchal)	9%	<ul style="list-style-type: none"> They have own lot of land. The harvested food grains are sufficient for their households and even they sell the surplus. A certain percentage owns land and pond give the lease to other person for continuing agricultural production. Always hired the agricultural labor through the year. They have big business enterprises; some of them have more than one. They have <i>ownghers</i> (shrimp fields). They have nice houses with orchards, some of them have buildings. Household members have good jobs (GO/NGO). They have own power-tillers and shallow tube-wells. They have no difficulties to educate their children or to obtain good treatment for ailing members of their families. They can easily cope with crises with no serious difficulties. They can afford luxury items for their household members.

4.6 Daily wage rate:

The most intensive demand for labour is earth work and rice transplanting and harvesting. Shrimp culture also provides a lot of work opportunities in the polder area. Most work is done by men, however women from poorer households are also engaged in agricultural work. There is no specific peak of work as such, rather there are short phases of peak work availability (only rice harvesting time) throughout the year, depending on the crop type and phase. But in specific areas where water logging is the major problem there have a specific “lean season” In the Satkhira as well as our polder areas, the provision of labor contracting system is differs compare to other parts of country such as; in polder area labour working for half day (8:00 AM to 1:00 Pm) and give the payment accordingly. So rest of half day workforce is not use efficiently. If both parties agree to work in whole day the wage rate

calculate as double but never female are work in full day. Wage rate are not the same for both of male and female in different type of work, causes behind for that female are physically less capable of work than the male. It is the normal phenomenon in our country context that wage rate always fluctuated by considering the season and shortage of labour during the required time. The given data collect discussion with WMG and day labours.

Table 11: Male-Female wage rate

Type of work	Wage rate			
	Male		Female	
	Half day	Full day	Half day	Full day
Earth work in road construction	200	400	150	Female Not work in full day
Earth work in <i>gher</i> construction	150	300	150	
Paddy Harvesting & threshing	200	400	180	
Bed/land preparation of vegetables field	150	300	150	
Intercultural operation in vegetable field	150	300	150	
Shrimp and Prawn culture labour	150	300	120	
Labour (others)	200	400		

(Sources: KII with WMG)

4.7 Drainage facilities:

Drainage facilities are fully hampered due to siltation of surrounding river. Most of the inlet-outlets are not effectively works because outlet facilities are fully closed due to raised the river bed. On the other side maximum khal are controlled by some people of many purpose (fishing, rice producing, housing). Two big river of Betna and Morichap and Saykhira khal has go away surrounding the Polder 2. Total of 62 Inlet-outlet, 22 Water Control System-WCS (Sluice gate/regulator), 55 bridge/culvert, and almost 23 khal by the covered of 66 km and 4 rivers in the Polder 2 is available. After having those infrastructure, polder are not effectively worked on drainage system and resulting is many areas go through under water and some of area permanently water logged year to year. Bangladesh water Development Board (BWDB) has constructed polders and associated water management infrastructure for safe guarding huge tract of land from inundation of saline water during high tide as well as from upstream flood water and thereby promoting agricultural production. Water management groups (WMG) try to continue the proper maintenance by their own management so that the all infrastructures performing very well. But it is true that still now they do not get any drainage facilities from those infrastructures. The People are thinks that the re-excavation of khal inside the polder will not help much more to improve the drainage facilities it should require the re-excavation of river, because the all river beds has been raised through siltation and salinity of river water has been increased and resulting is local rain water as well as upstream flood water during rainy season cannot drain out efficiently.

4.8 Water supply, sanitation and health facilities:

4.8.a. Drinking Water Availability:

The coastal area of Bangladesh is endowed with both fresh and salty water resources. The country as well as coastal area receive enormous amount of fresh water during monsoon while during winter there is a scarcity of fresh water. As same as Polder 2 where is the scarcity of good drinking water round the year but during winter season it is create a great problem and in monsoon it is less but not 100% remove from problem. Many number of tube-well are installed in the area but all are not used for drinking purpose. Based on area specific reason some areas are affected in arsenic contamination (Fingri, Dulihar, Brahma rajpur), some areas are salinity problem and some areas are faced both problem. So the people are cannot easily avoid this type circumstances. Some tube-well especially, semi-deep or deed tube-well supplied the quality drinking water which installed by DPHE, Oxfum, Union Parishad, rich man or any other agencies but it is very low numbers and it is not easily accessible for all due to the distance. But most of poor and medium poor people installed hand tube-well only use for household purpose but they are not tested as is it arsenic contaminated or not? Extreme poor people and un-conciseness people some time use for drinking purpose. For fulfil the drinking water requirement, some people collect water from ponds which are well protected from river tidal flow, some people collect water from distance place and it is very pains for women to bring water, some people also harvest rain-water for drinking purpose, but it requires a certain capability which poor people are not able, some of people who are very much awarded about their health, those are collect drinking water from Satkhira or supplier who supplied the mineral drinking water. But in some place, where there is no arsenic problem just faced salinity problem in dry season those area's installed tube-well can delivered the fresh water during the monsoon. However the safe drinking water still remains big problem in the area.

4.8.b. Sanitation:

There is no any valid data about the sanitation condition of the polder areas. During data collection period when discussed with WMG we found that, in rural area a good numbers of peoples are used healthy & hygienic sanitary latrine (water-seal), But the poor people did not set up the sanitary slabs (not water-seal), just they digging the soil and constructed a bamboo made house in surrounding the excavate soil due to their lack of awareness and it is also questionable as healthy point of view.

In relation to health service, Polder areas people easily avail the quality health service from the district level Government hospital because Polder are very much adjacent from the

district. Beside in Polder level 09 community clinic and more than 00 community health centres (inside & outside of polder) have been providing the health service for the people.

4.9. Transportation facilities:

Geographically Satkhira is situated on the southwest corner part of Bangladesh. It also called as Border district. No high way road passing through this district just connecting with Khulna and Jasseor district as well as connected with others part of country wide. Polder 2 is touching the very small part of Pawroshava on the other hand Assasuni and Samnagar Upazila connecting road cross in the middle of the Polder. Including all union connecting roads are more developed and constructed. Local bus, Mahindra and in some cases Honda and Auto Bick are available and continued their transport services on the Upazila to Upazila connecting road (Satkhira to Assasuni and Samnagar). Union level different connecting road have connected with district as well as Upazila crossing road. Above all connecting road are covering and constructed by bituminous or in some cases covering by bricks. And village to village connecting roads is earth making and some are brick making. The main transport facilities of polder area are rickshaw, motor cycle, Van, Auto Bick, Mahindra, Nosimon, Tempo and local bus. Most of the village roads are narrow and insufficient drainage facility and during monsoon it has create the difficulties, especially in waterlogged area's people cannot easily move to everywhere. There is no any railway coverage in the polder area but river Morichap, Betna and Khalpetua passed outside of the polder and inside many canal connected with the river and in monsoon boat are available for providing transport facilities. But it was observed that during monsoon the river cannot keep the sufficient water due to siltation, as a result flooded cropland with touching canal which look like as big water body where easily use the boat.

4.10 Government office:

The Polder 2 is connecting the 3 Upazila with 9 union so all kind of government office as well as services are available in the polder areas. Government managed different specialized office like; DAE, DLS, DoF, land office, social welfare, cooperative department, Health & family planning, BWDB, LGED, Education office, Youth development, DPHE etc and all type of education institution like primary school, high school and Madrasa have been delivered the education service to the polder areas.

4.11 Non Government office (NGOs):

A number of local, national and international development and credit orientated Non Government Organization (NGOs) are have been working in the area. Different micro credit organization like; BRAC, ASA, Grameen Bank, Nijera Kori, PKSF, HEED Bangladesh,

Ashroy Foundation, Shusilon, Rupantor, Jagaroni Chakra Foundation are effectively work in the polder area for providing financial support as credit including provide service on education, awareness, and in some cases volunteer support where necessary. Some of them are also active to implement the development program by the technical and financial support of government, donor and national organization. On the other hand development project like; CNFA, World Vision, and World Fish center, UNDP, UNICEF Bangladesh, have been working for implementing their designed activities. It is quite striking to see that more than 70% of households have their members linked with NGOs or some local organizations in most cases, extreme poor & poor people (Garib) and medium rich (Maddhyam) categories of households are members of these organizations. Despite a high concentration of NGO activities in the area and equally high enrolment in NGO program, non-members do not always hold a high opinion of NGOs and their activities, some of the complaints regarding NGOs and their activities are; they are doing business in the guise of social work, they have set up a money-lending business, they are working with foreign funds and their activities are taking people away from religious.

4.12 Market infrastructure:

According to ministry officials, Satkhira as a whole is a net exporter of rice and fish (Shrimp, prawn and white fish). Rice is sold to other parts of Khulna Division and further to other parts of Bangladesh and fish directly exports to foreign country. Jute mills in other parts of Khulna Division and Bangladesh are the main destination of jute. Mangoes are also exported outside the zone. Pulses and potatoes are imported into the zone, while much of the vegetable production serves local demand within the zone. Most meat including chicken, goat and beef, as well as fish, are produced within the zone. Livestock are purchased by mobile middle-men who sell in regional and district livestock markets. Luxury commodities such as oil and sugar, as well as condiments for cooking come from other areas. The zone is well connected with other parts of the district, division and even well connected with India. Road conditions are consistent with other parts of the country. The rains can sometimes lead to disruptions in access, in particular in the waterlogged areas, however this is not for extended periods of time. There are an abundance of local ward- and union-level market centres in the zone, rarely more than a couple of kilometers away from any particular village. It is from these that most households do their daily and weekly purchasing. There are special *haat* days for trading, at least two per week. Upazila and district level trade is seven days a week. Village shops tend not to sell much rice and essential foods, instead focusing on condiments and luxury commodities as well as hygiene products. Most trading is done by men.

4.12. a Permanent Market/Haat: In Polder area more than 35 markets place/haat are situated. In the market, some of shops are fully secured by separated small cottage and it this type shop leased to the grocery shop owner and they continue the business start from early in the morning and end up to midnight. Other space in markets are open and there are no any boundary in terms of security circumstance but place separated specifically for leased owner and this place are mostly use for vegetable and cereal crop marketing. Some of fish Arot are also constructed and separated. This type of constructed market have been continuing the business activities every day but particular day in a week here sited the specialized market by the name of local hat where all level of customer and different piker come from distance place.

Table 12: Different market in the Polder area:

	Union	Market name	Sited date	Time	Specification
1	Dhulihar	Dhulihar bazer	Every day	Morning & after noon	All products
2		Valuka-chadpur bazer	Every day		All products
3		Gobindapur bazer			All products
4	Bramahrajpur	Machkhola bazer	Saturday & Tuesday	After noon	All products
5		Dahakula			All products
6	Jhawdanga	Jhawdanga bazer	Monday & Friday	Morning & after noon	Fish & All products
7		Madhobkati bazer	Sunday & Wednesday	After noon	All products
8		Akhrakhola bazer	Sunday Thursday	After noon	Fish & All products
9	Balli	Balli new market			All products
10		Raipura bazer			All products
11	Labsa	Kadamtala bazer	Every day	Morning & after noon	All products
12		Benerpota bazer	Every day	Morning & after noon	All products
13		Rajnaragar bazer	Friday, Monday, Wednesday	After noon	All products
14	Fingri	Bangdaha bazer	Saturday, Tuesday	After noon	Fish & All products
15		Fingri bazer	Friday, Sunday, Monday, Wednesday	After noon	Fish & All products
16		Shimulbaria bazer	Saturday Wednesday	After noon	All products
17		Gobardari bazer	Everyday	Morning	All products
18		Balitha bazer	Everyday	Morning & after noon	All products
19		Faizullahpur bazer	Saturday	After noon	All products

			Thursday		
20		Ellarchar bazer	Friday Monday	After noon	Fish & All products
21	Pawroshava	Sultanpur bara bazer	Everyday	Morning & after noon	All products
22		Etagacha bazer	Everyday	After noon	All products
23		Hatkhola bazer	Everyday		All products
24		Kadamtala bazer	Everyday	Morning & after noon	All products
25	Budhata	Budhata bazer	Friday, Monday	Morning & after noon	Mustard & All products
26		Paikhali bazer & arot	Sunday, Wednesday	Morning & after noon	Fish Arot
27		Kazir haat	Thursday, Saturday	After noon	All products
28		Maddham chapra	Thursday	A	Fish & All products
29		Mahesswar kathi arot	Everyday	Morning	Fish Arot

4.12.b: Temporary Market: Approximately temporary basis 80 market (Bazer) have been running in the Polder area, generally this unrecognized market is situated in the centre of the village or roadside. Among these markets some of seasonal which are mostly focused by specific product based and sited one or two days in a week. On the other hand some of markets are sited very short time in a day specially focused for selling and buying specific products like; fresh vegetable, fish, milk, egg and poultry etc where nearest villager come in the market for exchange the products. Usually poor producer have got the opportunity to sale their surplus product (vegetable, fish, milk, egg, and poultry), approximately 15-18 different type of retailer (depends on market size) have running the business by collecting the products from outside area an all level of consumers come in the places and buying the essential commodities

4.13. Environmental Hazards:

4.13.a. Water logging:

Water-logging is the most serious problem of mainly in the northern part of the polder-2 mainly affected of Fingri, Dhulihar and Brahma Rajpur Unions; Siltation is one of the main causes of water logging and resulting river bed is higher than canal bed. All the year most of the outlets of the water canals that are supposed to drain out the water have been raised much higher than low land or beels, floodplains etc. Some of area are faced the severe problem from year to year if any year happened the heavy rainfall it has create a very extreme problem. Some of area are faced the moderate level of water logging problem it

also depending the rainfall situation in the year and up & down streaming flood. But in last year, water logging situation in the polder was low to moderate levels of inundation as compared with previous years. June to December is the water logging time but some of areas are waterlogged round the year. But farmers faced the severe problem in the period of mid July to August causes behind it is the time of seedling and land preparation of T-Aman rice cultivation. On the other hand some of area also faced the severe problem in the period of Mid September to October, especially for Mustard cultivated farmers, because if they cannot timely sowing the mustard seed they also cannot start the Boro rice in timely. The strategy of mustard cultivation in the polder areas is they can take the additional advantage to cultivate the mustard as interim crop on between T-Aman and Boro Rice. So it is called, mustard cultivation is very much affected on water logging situation in the polder area.

During flood period, water logging does not happen only the geographical position rather human intervention like different construction is also the major constrain for water logging. Water logging create the various problem like damage the agricultural crop, drainage blockage, affect transportation system, polluted the surface water which is the responsible for water born disease and create other health hazards also disrupted the education facilities. The many households need to make repairs during water logging and after water logging situation. This time also people have no any ability to maintain a minimum level of hygiene. And this time happen the seasonal migration to seeking the work or earning sources. The total communication systems in the submerged area are completely damage during water logging period and boat is the only way to overcoming the transportation problem in the locality.

Other indirect impacts on livelihoods are the impact on education and marketing. Many schools in the affected areas are inundated (as seen on the cover on the report), and during peak flood periods roads and trading areas are covered. Many households need to make repairs to their homes after mud foundations have been inundated with water for months on end. People seeking work need to travel further to find opportunities. There is an overall trend of increasing migration out of the area. Poorer households tend to migrate to neighboring districts and divisions to find seasonal work. Better off households tend to send someone abroad to countries such as Malaysia from where they are able to remit money home. These trends are noticeable at a broad level although they do vary from village to village. It is likely that people's ability to maintain a minimum level of hygiene and dignity related to bathing and defecating is much more challenging during waterlogging given they are surrounded by water. On the other hand, there are positive opportunities that can be exploited with the new geographic realities. These mostly relate to aquaculture. Unfortunately for poorer households, the investment costs to engage in fish cultivation are

prohibitive meaning that they are not currently able to utilize these opportunities to any great degree. Needless to say, people with financial capital, and political influence, are making the most of the opportunity.

Table 13: Waterlogged area in the Polder

Name of Beel	Area (Ha)	Waterlogged area in percentage	
		Year round	5-6 month
Bashgada beel		40%	80%
Kainerkura beel		30%	70%
Uraban beel		65%	100%
Zialarpur beel		20%	75%
Buramarir beel		60%	100%
Bendaha jordia beel		40%	70%
Bangdaha		50%	85%
Boalmari beel	13.40	60%	80%
Kachur beel	13.40	45%	90%
Gabindakatir beel	66.80	55%	75%
Chelar beel		40%	85%
Faijullpur beel		35%	80%
Wariar beel	66	50%	90%
Debnagar beel	66	60%	85%
Behula paschim	70	70%	90%
Kurermath beel	45	60%	85%
Naoapara beel	55	50%	75%
Setpurer beel	50	60%	85%
Pakrer beel	65	60%	100%
Kundaria beel	60	65%	100%
Paikhali beel	40	60%	100%

(FGD and with WMG and villagers)

Impact and key finding of Water logging:

Socio economic statuses directly affect the overall livelihoods condition. UKAID have done the research on '**Measuring the Impact of Water logging on Households Economies**' and according to report they focused on quantifying and analysing the impact on households economies of annually occurring water logging and inundation. They got data from affected and non-affected areas, allowing a comparative analysis of total impact on livelihoods and

food security. Long term inundation prevents the cultivation of most of the crops normally cultivated in the area resulting in very significant economics loss to households and village in the waterlogged area. The effects are wide ranging and complex but they include;

- Reduced income
- Reduced dietary diversity
- Lower consumption of nutritionally diverse food such as meat, eggs vegetable and fruits
- Reduced expenditure on long term productive investments such as schooling and health.
- Increased amount of days of labour worked
- Seasonal migration

In response, some households in particular those at the better-of end of the wealth spectrum, have been able to switch focus from agricultural to aquaculture. Other households, mostly those at the lower end of the wealth spectrum, lack the human, financial and political capital to be to support these poorer households through improvements in technical knowledge partnered with access to zero or low interest credit. Advocacy aimed at engaging government and non-government actors for the development of a long term solution to the waterlogging problem is critical (Sources; Measuring the Impact of Waterlogging on Households Economies' by FSC)

Observation and Possible solution to reduce Water-logging:

- The people of the polder areas think that re-excavation of khals inside the polder will not help much more in reducing water-logging in the polder area. The local people strongly suggest for re-excavation of those rivers and to make link with Ichamoti River (West Bengal). (Sources; FTR #35, Blue Gold Program)
- In some areas, river bank and channel (khal) connecting point is closed due to build the permanent house on the embankment. The people thinks, if we can open this type of connecting point for free the water flow it helps to easily reduce the water logging problem in the polder (sources; FGD with WMG).
- In some cases, channel are illegally occupied and controlled by some musclemen and it disrupted the water flow system extremely. The people think, if we can release or free channel from their controlling and after that suggest for re-excavation of those channel (sources; FGD with WMG).

4.13. b. Soil salinity;

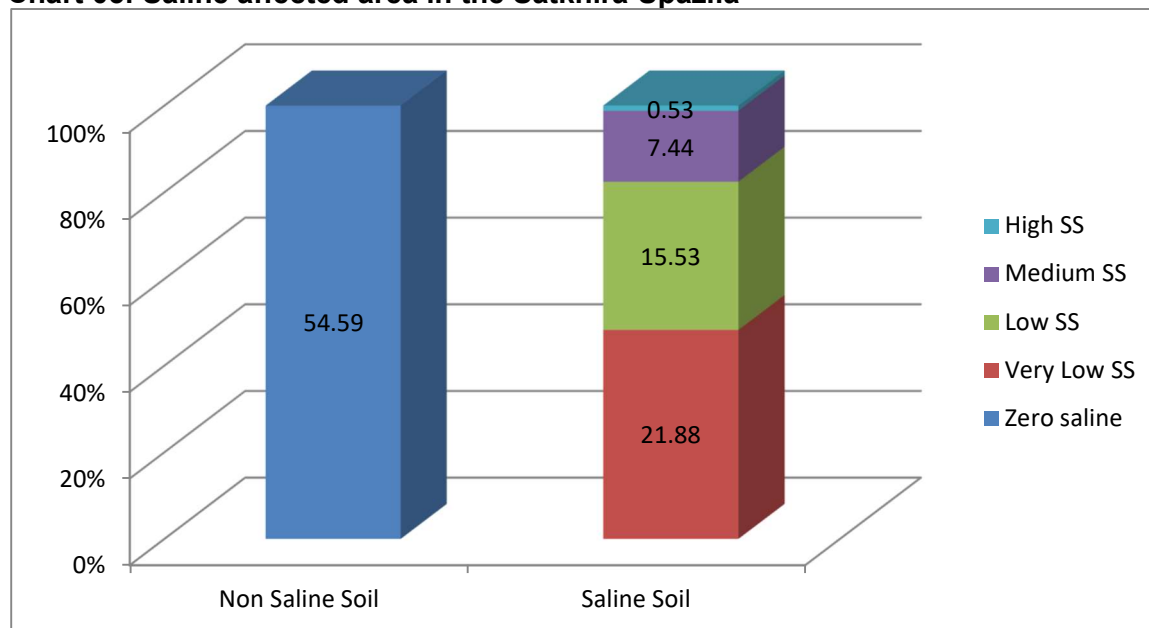
The coastal area of Bangladesh is contributed both the fresh and saline water. The country receives huge amount of fresh water during monsoon while during winter there is a scarcity of fresh water especially in coastal area. It is true that saline water is one of the major natural resource in Bangladesh which from helps to produced the salt and marine fish (shrimp culture) and it is contribute to earn the foreign money. We are known that saline water improved the marine fish culture activities but other hand day by day decrease the soil fertility and ultimately field crop productivity going to zero where saline water flooded the crop land, soil is the major concern in terms agriculture production. But it is possible to flushed water salinity during monsoon in particularly drinking purpose and used it in agriculture sector for irrigation purpose but it is difficult to remove the soil salinity if at least one time affected by saline water. Crop cultivation is fully interrupted when saline water come off from Bay of Bengal and saline water flooded the crop field spontaneously. As a result, all type of cereals crop like; rice, wheat, maize and vegetable like; sweet gourd, pumpkin, bean, radish, arum and different homestead fruit like; papaya, banana, guava, pomegranate, lemon etc have lost their yielding capacity due to the soil nutrients cannot work efficiently. However the impact of soil salinity still remains countable in this area but in our polder area it is measurable and remains up to controlled but medium and high saline area are not suitable for agricultural crops.

Considering the soil salinity 54.59% area are non saline and the rest 45.41% areas have a saline problem. Among the total area 7.98% areas (high 7.44 medium 0.53) faced the high salinity (8.1 to 15+ Ds/m) where agricultural crops are not suitable only shrimp culture is applicable. But south part of the Polder like, Fingri, Brahma Rajpur, Budhata and Kulla is more affected in salinity problem. (table 15)

Table 14: Saline affected area in the Satkhira Upazila

Total land (Ha)	Non Saline soil (NSS)		Saline soil (SS)									
			Total SS		Very low SS Ds/m (2-4)		Low SS Ds/m(4-8)		Medium SS Ds/m(8-15)		High SS Ds/m(15+)	
area	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%
40808	22278	54.59	18530	45.41	8930	21.88	6340	15.53	3040	7.44	220	0.53

(Sources;DAE)

Chart 05: Saline affected area in the Satkhira Upazila**Table 15: Union wise soil salinity rate**

Upazila	Union	Soil salinity (ds/m)
Satkhira Sadar	Fingri	2-8
	Brahma Rajpur	0-8
	Dhulihar	0-4
	Labsa	0-4
	Jhaudanga	0-4
	Balli	0-6
Assasuni	Budhata	4-12
	Kulla	4-12
Tala	Nagarghata	0-4

4.13.c. Siltation:

Siltation is also one of the major problems which directly affected the waterlogged situation in the Polder areas and resulting; river bed is higher than canal bed (khal) or low land. When up & down streaming flood are happens that time enormous amount of sand are storage on the river bed and resulting is river silted up and connection of the river mouth are raised rapidly and disrupted the connectivity between river and low land areas. There have been significant changes in the physical feature and the ecology of the beels, khal, floodplains and rivers due to siltation, which caused adverse impact on the resource base and the livelihoods of the people. The different type of construction like road, culvert, regulator and many others developments activities have not functioning properly. Some of area are faced the severe problem from year to year if any year happened the heavy rainfall it has create a very extreme problem. Some of area are faced the moderate level of water logging problem it also depending the rainfall situation in the year and up & down streaming flood.

4.13.d. River erosion:

River erosion is also one of the big issues of Polder 2. Betna, Morichap and Echamati River are flow outside of the Polder. The shape of this Polder is roughly longitude from north to south, Betna river flow by touching the east side and Morichap river flow by touching the west side of the Polder. Echamati river not directly touching the polder side but connected with canals. In general the river erosion is observed along the eastern and western side of the polder. Mainly part of the union of Dhulihar, Brahmarajpur Fingri, Budhata are very much affected by the river erosion. The main river Betna flows beside the eastern part of the Polder that has happen the river erosion all over the Polder. The upstream discharge carries a lot of sediment that is deposit the river bed and reducing the water holding capacity. As a result during monsoon, excessive water flow make the crisis and change the direction of water flow that ultimately turns to erosion in many areas. By this time, people become homeless, loss their property and flooded the low land due to the river erosion. Everyone is suffering but poor people become vulnerable and they need to take temporary shelter along the embankment or roadside and some of them migrate to other place for search food and shelter.

4.13.e. Cyclone and tidal surge:

Everyone known that the coastal belt of Satkhira several time affected by natural disaster like cyclone and tidal surge forming in the Bay of Bengal. Due to geographical location Polder 2 is more vulnerable of cyclone and tidal surge. In the coastal area cyclone and tidal surge happen by the uncertainty but it is the normal phenomenon in this areas. People become helpless, fisherman are lost or died due to lack of or absence or ignore the weather forecasting or not having the life saving appliance. Apart from the loss of lives, there is a high economic loss like properties, settlement, infrastructures, forest, field crops, livestock etc.

There is evidence that the devastating cyclone Aila on 25th May 2009 caused damage to the life and properties of this area. There are no any specific data in the polder area but have a data in the Satkhira district which are little bit applicable in our polder area. Among the affected districts, Satkhira receives the highest amount of impacts in its infrastructures including educational institutions, religious institutions, roads, bridges, embankments etc. The study reveals that 734 institutions were damaged fully or partially. The adverse impacts of Aila were observed in 7 Upazilas and 48 unions of Satkhira District. However, Shyamnagar and Ashasuni and part of Sadar upazial are the most affected Upazila as reported by the local source and available data. The study reveals that more than fifty

thousand people have been adversely affected by Aila flooding. On the other hand, total damaged cropland is about 1250 ha. Moreover, 59 people died and 1509 injured during Aila. Aila's impact on infrastructure also presents devastating scenario. 734 educational institutions including the religious institutions, 329.25 km roads, 41 bridges or culverts, 292.42 km embankment and 26028 ha shrimp farm (gher) were fully or partially damaged. Besides these, more than thirty thousand people positioned themselves on the embankment at Gabura and Padmopukur, as they did not get any safe place for their immediate shelter during the disaster.

(Sources; http://www.unnayan.org/documents/Climatechange/ailareport_humansuffering.pdf)

4.13.f. Arsenic contamination

The coastal area of Bangladesh is endowed with both fresh and salty water resources. The country as well as coastal area receive enormous amount of fresh water during monsoon while during winter there is a scarcity of fresh water. As same as Polder 2 where is the scarcity of good drinking water round the year but during winter season it is create a great problem and in monsoon it is less but not 100% remove from problem. Many number of tube-well are installed in the area but all are not used for drinking purpose. Based on area specific reason some areas are affected in arsenic contamination (Fingri, Dulihar, Brahma rajpur), so the people are cannot easily avoid this type circumstances. Some tube-well especially, semi-deep or deed tube-well supplied the quality drinking water which installed by DPHE, Oxfum, Union Parishad, rich man or any other agencies but it is very low numbers and it is not easily accessible for all due to the distance. But most of poor and medium poor people installed hand tube-well only use for household purpose but they are not tested as is it arsenic contaminated or not? Extreme poor people and un-conciseness people some time use for drinking purpose.

High level of arsenic in ground water used for drinking and cooking water cause serious human health problems. The effects are not removed by boiling the water. After few years of continued low level of arsenic exposure, many skin disease appear. The first symptom of arsenocosis is melanosis, where the limbs of the body have brackish/dusky appearance and then rest of the body is affected. Gradually black and white spot appear on the body known as spotted melanosis. This is not painful or itchy in the beginning stage but at the later may start rotting and develop into gangrenous ulcers as a pre cancerous stage. As a whole the impact of arsenic includes skin ailments, damage to internal organs, skin and hung cancer and eventual death.

During summer, poor availability of surface water, rain water, contamination of surface water and lack of awareness of the community people makes a complex situation in the rural drinking water supply sector. The provision of arsenic safe water is essential to safe guard the health of rural population. DPHE and NGOs have been continuing the motivational or awareness activities including deep tube-well installation program, installation of pond-sand filters in large protected tanks, rain water harvesting, and technical support accordingly for ensure and supplying arsenic safe water for all rural people. However, now the polder areas are not fully protected from arsenic contamination and safe drinking water still remains big problem in the area.

4.14. Crisis Period In the area:

It is true that 'no work may even mean no food' for some of them. So a period is regarded as 'good time' when income opportunities are available for people. Agriculture sector is the major income sources for the most of the people. 'Good time' means when agricultural activities are at the peak season while the agricultural lean months are regarded as crisis periods. Mainly waterlogged affected areas are very much faced the crisis period; specially the landless labourers and marginal farmers are affected and feel the vulnerable themselves. Waterlogged area's people do not get scope to start the agricultural activities and ultimately agricultural labours becoming workless in the affected areas. There have no any earning sources in the areas except fishing. So people can take a decision to migrate others place for searching the works for their financial improvement. It is true that most of them are living hand to mouth by doing hard work and always searching the new income sources because they have not saving the "surplus food" through year.

Basically waterlogged condition creates the major crisis in the area. Non-affected areas landless labours are able to earning from four sources like crops sales. Livestock sales, labour sales and access to take limited loan but waterlogged affected areas landless labour only take a decision to migrate other places for searching work other than they are taking loan from outside.

Non-affected areas area's small & marginal farmers get scope to cultivate their own land as their main earning sources, including involve in households based economic activities such as poultry rearing, milking cow rearing, homestead gardening etc and ultimately no need to migrate to others places. But in affected areas those farmers did not get scope for utilize their land and farmers try to minimize the crisis to involve in small business but many time they are fail.

In the Polder area there are very limited agricultural activities during the months of July to mid October), besides, very little income opportunities are there in other sectors. Poor people adopt different strategies to cope with crisis. Some of them go out of the area in search of work, some go for pulling rickshaw/van; some take up petty businesses, many take loans from money-lenders and NGOs, or buy goods from shops on credit; many take advances from potential employers, and almost all of them cut down the number of meals per day and amount of food per meal. And very few number of medium rich people (maddhyam) category sell their assets (trees, domestic animals, ornaments, land), they borrow money from relatives, bank or money lenders, sometimes by mortgaging land and ornaments, they use less inputs in paddy fields, they buy commodities from shopkeeper credit.

Table 16: Cope the situation during crisis period

Well being category	To cope with the situation
Extreme poor & poor	<ul style="list-style-type: none"> • Migrate to other area to search of work. • Change the occupation to pulling <i>rickshaw/van</i>, petty businesses. • Take loans from money-lenders and NGOs. • Buy goods from shops on credit. • Take advances from employers. • Most of them cut down the number of meals per day and amount of food per meal.
Medium rich	<ul style="list-style-type: none"> • Sell their assets (trees, domestic animals, ornaments, land), • Take borrow money from relatives, bank or money lenders. • Mortgaging land and ornaments. • Less inputs in paddy fields and reduce investment in business. • Buy commodities from shops on credit. • Minimize the amount of meals in a day. • Some of savings the surplus food specific for crisis period.
Rich	<ul style="list-style-type: none"> • Rich man always savings the surplus money and food for provide to other for coping the situation.

5. Economic sector:

The rural economy of Satkhira is predominantly agricultural. Out of total 436,178 holdings 252,036 were farm holdings and they produce varieties of crops, namely, local and HYV rice, vegetables, mustard seed, spices, pulse and others. Fruits available in the district are banana, jack-fruits, papaya, guava, olive etc. Besides crops, fishery and forestry are other sources of household income. Shrimp and Prawn is one of the main export items of Bangladesh, which is abundantly available in the district. Prawn farming in the coastal area is the most important economic activities of the households. The district is very rich in forest resources. The Sundarban is another source of income of the people of Satkhira district.

The non-farm economic activities are also important of this district.

But in our Polder area total economy are same as like district , in particularly 67% land use for agricultural production where 34% people are directly involve in the agricultural production, processing and marketing activities and 16% are labour selling. And 33% are wetland where 17% are directly involve in fishing activities and 5% are labour selling in fish sector. On the other hands 33% people are involve in non agricultural sector, small business and services.

5.1 Agriculture

5.1.1 General Description:

Physiographical and Agro ecologically maps indicate that this zone is an the crossover area of the Ganges Flood plan and Ganges Tidal fold plains. The area is part of and has been formed by an active delta system. The soil are relatively fertile and allowing for medium to high level intensified agriculture-multiple crop types, cultivated throughout the year in three seasons.

Agricultural production of food and cash crops is the main livelihoods option of this Polder. Rice is the main crop for both food and cash purposes with two main season of production. Boro covered the major percentage area but T-Aman is cultivated that area where land are free from water logging or that place where water rapidly go away.

Several number of minor crops are presently cultivate in the area such as pulses, wheat, potatoes, mustard however these are grown in very small amount of area.

Many types of vegetable and several fruits are produced in this polder. These include cauliflower, cabbage, beans, radish, various gourd, carrots, okra, egg plant, onion, pumpkin. Mango is the main fruit and expansion the new area very rapidly as commercial fruit

cultivation but banana, jackfruit and guava are also common fruit. And two important cash crops Mustard & Jute are cultivated but its production area and productivity depends on water logging situation in the respective year.

The crop requires irrigation and is typically cultivated using purchased high yielding variety seeds as well as fertilizer and pesticides. But in Kharif-2 (Aman monsoon) not required irrigation also fertilizer and pesticide are not typically used with these crops as the surplus rain water leads to uncontrollable input losses. Aus rice is not commonly cultivated in the polder area.

Land preparation is mostly using small machines, but also used ploughs. The most intensive demand for labour is during transplanting and harvesting of rice. Vegetable cultivation also provides a lot of work opportunities and major percentage work done by men, however women from poor and poorest households are also engaged in agricultural works.

In the polder area average intensity of land use is 67% where cultivated the different agricultural crop and cropping intensity is 224% (table:00) on the other hand and 33% land are not cultivable only for fish culture (shrimp, prawn, white fish, and open water fisheries). As salinity point of view total of 54.59 areas are free from salinity problem and rest 45.41% areas are salinity affected where 7.98% areas are high salinity (8.1 to 15+ Ds/m) where agricultural crops are not suitable only shrimp culture is applicable (Table 00).

5.1.2. Land ownership:

Land is measured in bigha which is equivalent to 0.33 of an acre (0.135 Hectare). A bigha is further divided into 33 decimals (1 decimal is equal to roughly 40m²). Share cropping is common, however it is more typical to pay for land rental in cash.

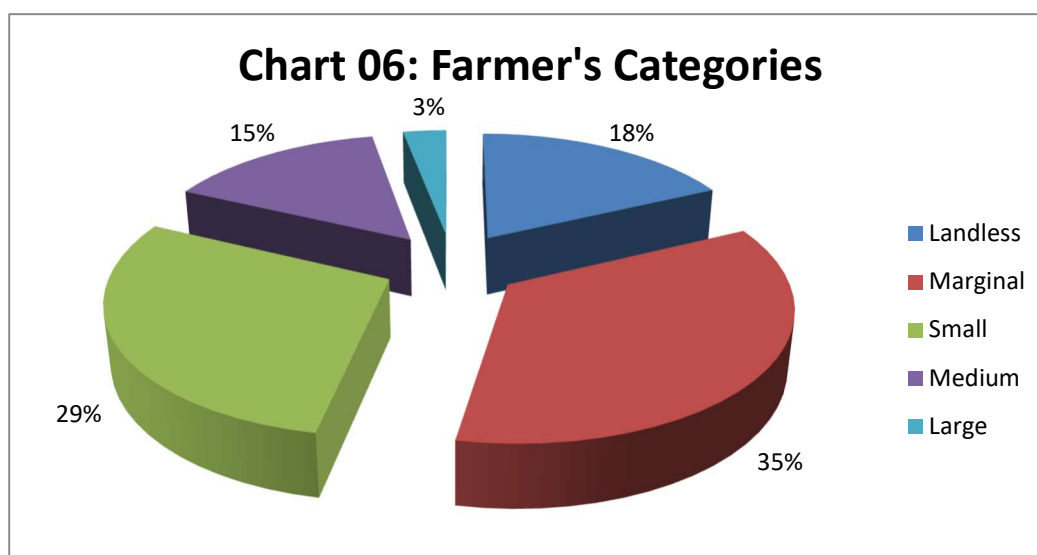
Land is one of the most important assets in rural society. In a village context, not only use it have financial importance, it also carries some social value. Though other assets like education and business are getting prominence, land still adds to the social position of a household in rural area. Department of Agricultural Extension (DAE) classified the household's wealth categories in the village areas. **Landless farmers**; it refer to those farmers who are at the bottom of the wealth line which are primarily composed of landless labour as well as van/rickshaw pullers etc and they have no any productive and non productive asset just have a mobile or some have bicycle/van. **Marginal farmers**; those households who have some productive land (Up to 0.2 ha land) that they cultivate for need to supplement own consumption and some have non productive asset with income from labour and other sources. **Small and Medium farmers**; they have a productive land amount

of up to 1 ha and 3 ha respectively, this households are fully depends on income sources of agricultural sector (rice, vegetable, fish etc), some of them are involve in agribusiness, they have all kind of non productive assets, some of them have Agri machineries . **Large farmers**; it refer to those farmer who recognized as a land lord in the areas. They are not only cultivate the rice and vegetable also they take a challenge with have ability cultivate the all kind of minor crop like, mustard, jute, sugarcane etc. They also give their surplus land to others farmers as lease and share cropping system. They have cattle ownership and rearing is the most lucrative livestock. They have all kind of productive and non productive asset.

Table 17: Ownership of Agricultural land

Total HHs	Land less Farmer (0-0.02ha)	Marginal Farmer (0.02-0.2ha)	Small farmer (0.2-1ha)	Medium Farmer (1-3 ha)	Large Farmer (<3ha)
	18%	35%	29%	15%	3%

(Sources: DAE& KII with SAAO)



5.1.3. Land use:

Land is measured here in Bigha which is equivalent to 33 decimal or 0.33 acre or 0.135 hectare. Major percentage area of Polder-2 is covered by Satkhira sadar Upazila (6 union) and partly covered by Tala ((1union) and Assasuni (2 union) upazila. So agricultural practiced leaded by Sadar upazila and we can easily multiply the Sadar upazila data's as the overall polder data as on average. In the polder area, average intensity of land use is 67% where cultivated the different agricultural crop and cropping intensity is 224% (table:00). Sadar upazila's as well as Polder areas cropping intensity is higher than the Assasuni and Tala upazilla, the main causes is the single cropped area of sadar upazila is 5% on the other hand 61% & 21% is Assasuni and Tala respectively. Beside double & triple cropped areas of sadar upazila is 67% & 27% which contribute to increase the cropping intensity in the areas.

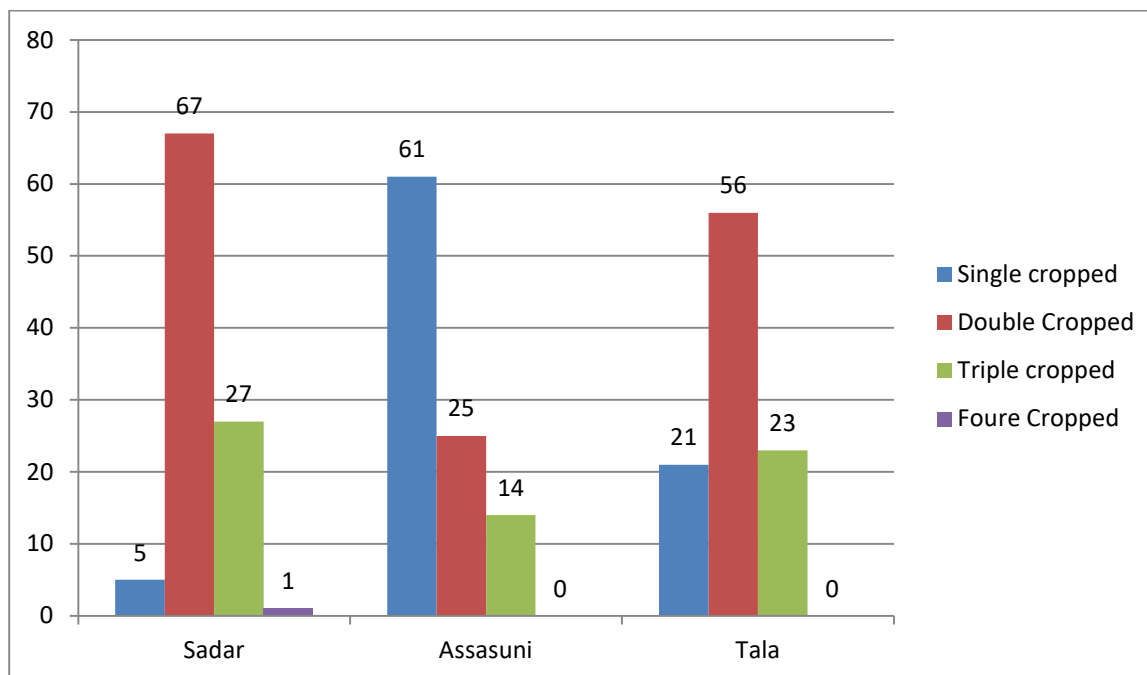
On the other side Assasuni and Tala Upazila's double and triple cropped area is 25%, 14% and 56% 23% (Chart: 00). In case of Assasuni Upazila, 54% areas are wetland and only used for fish culture activities mainly shrimp & prawn culture.

Table-18: Land distribution as per culture (cultivable and wetland)

	Area (ha)	Cultivable land		Wetland		Distribution of wetland(ha)			
		Area	%	Area	%	Fish culture	Prawn	Shrimp	Open water
Fingri	3343	2482	74	916	26	77	90	500	216
Bramahrajpur	2732	1726	63	543	37	28	94	308	92
Dhulihar	3783	2721	72	1731	28	41	134	1310	219
Labsa	2252	1358	60	486	40	46	180	172	89
Jhaodanga	2643	1876	71	180	29	36	109		34
Balli	1686	1116	66	269	34	32	159	120	28
Budhata									
Kulla									
Nagarghata									
Average in Polder			67%		33%				

Table-19: Upazila wise Land use

Description	Satkhira		Assasuni		Tala	
	Area	%	Area	%	Area	%
Total area	40808		37660		33555	
Single Cropped Area	1260	5	10548	61	5025	21
Double Cropped Area	18345	67	4225	25	13600	56
Triple cropped area	7470	27	2387	14	5730	23
Four Cropped area	175	1	0	0	0	
Net cropped area (NCA)	27250	100	17160	100	24355	100
Total cropped area	61060		26184		49415	
Cropping Intensity	224%		153%		202%	
Intensity of Land use	67%		46%		73%	

Chart-07: Upazila wise Land use

5.1.4. Land type and classification

Polder-2 is located in south-western part of Bangladesh. The Polder is very much adjacent with sea and we found that the Polder is situated approximately 16 fit high from the sea level. The shape of this Polder is roughly longitude from north to south. Land type of the Polder is moderately low compare to others part of Bangladesh. But comparing the Polder situation north side is high compare to the south side. Soil of this area is salty and clay. Always saline water comes from sea due to establish the direct river connection.

By considering and analyzing the overall district Land type, we can multiply the land type of Polder area is High land 25%, medium high land 58%, medium low land is 16% and low land is 1%. High to medium high land used for vegetable and rice (both T-Aman and Boro) cultivation, medium low land used for fish culture (Shrimp and Prawn) and some area cultivated Boro rice where logged water run way rapidly and low land area only used for shrimp & prawn culture activities. The farmers as well as DAE are practiced and cultivated the agricultural crop considering the land type of the areas. The area is almost level and broken up by numerous tidal creeks along which there are narrow strips. Most of the areas are seasonally flooded in the rainy season and the depth of flooding rises to a maximum of 1 meter and in some areas flooding up to 1.5 meter and more. Considering the soil salinity, 45.41% areas have a faced the saline problem and 7.98% areas are high salinity (8.1 to 15+ Ds/m) where agricultural crops are not suitable only shrimp culture is applicable (Table 00).

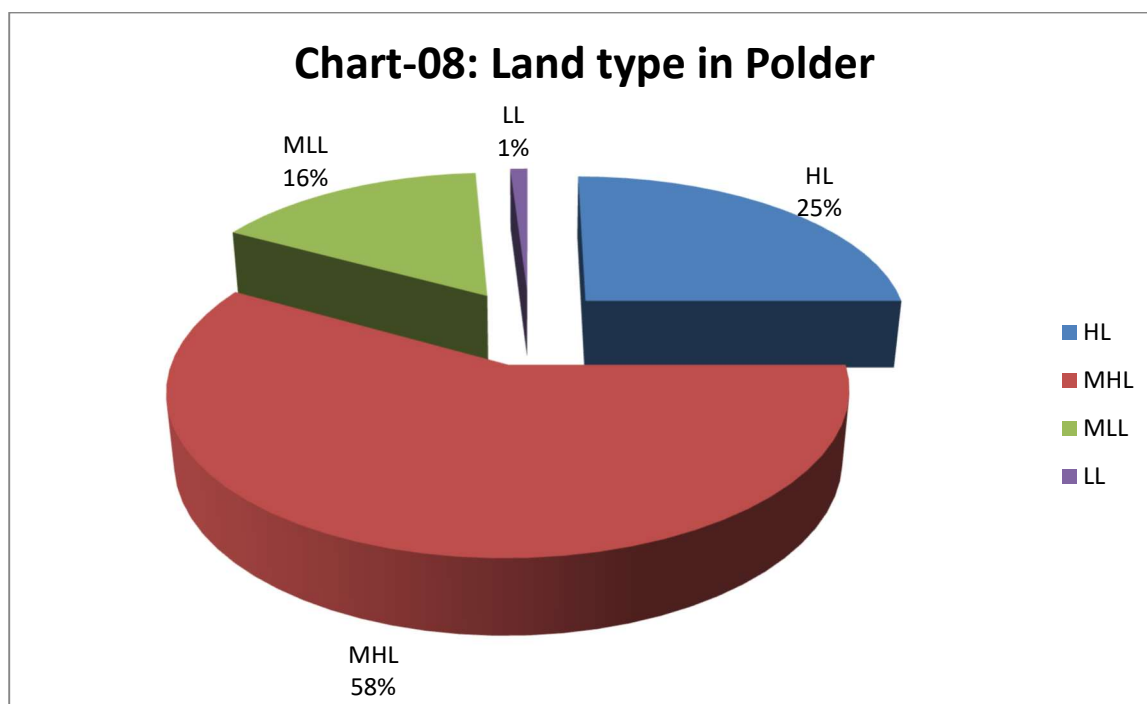
South part of the Polder like, Fingri, Brahma Rajpur, Budhata and Kulla is more affected in salinity problem. (Table 00)

Table-20: Land type in Upazila

Upazila	Area	HL		MHL		MLL		LL	
		Area	%	Area	%	Area	%	Area	%
Satkhira	40808	11557	28	23915	59	5060	12	272	1
Assasuni	34270	6148	18	18938	55	8865	26	319	1
Tala	36945	10717	29	22210	60	3791	10	227	1
Total	112023	28422	25	65063	58	18716	16	818	1

Sources; DAE

But in Polder areas we can easily multiply the average percentage of land type. That is in Polder-2 high land 25%, medium high land is 58%, medium low land is 16% and low land is 1%. Including other soil characteristics is same as Sadar upazila.

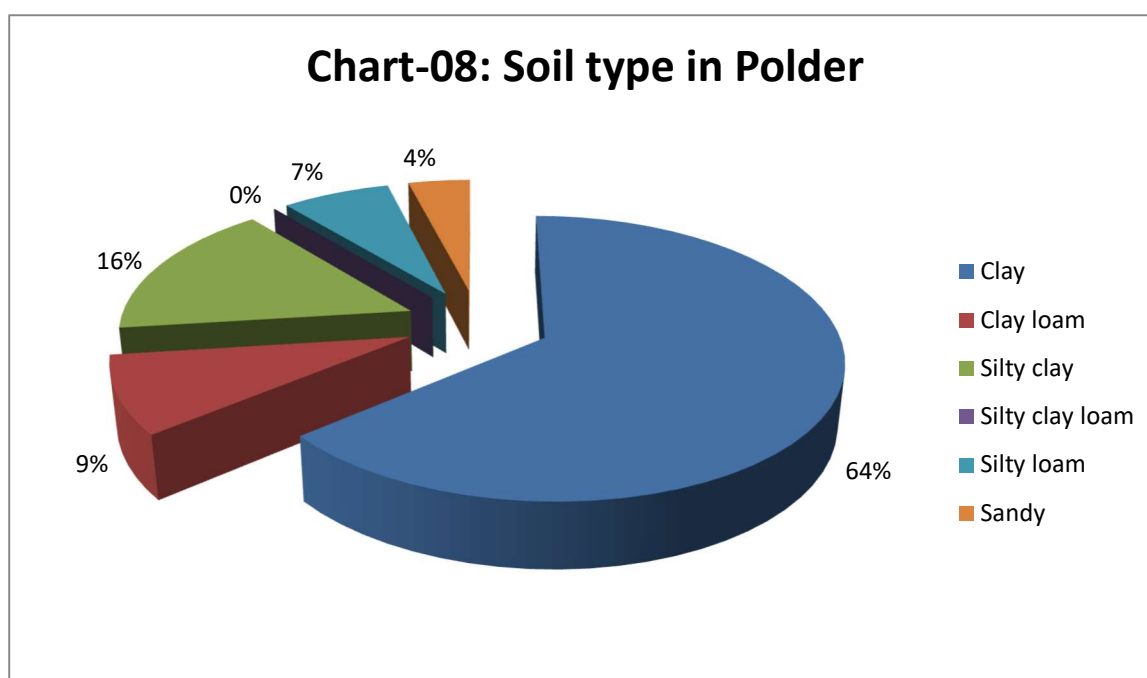


Soil Type:

Major soil type of the Polder is Clay to clay loam. Considering and analysing the upazila soil structure we observed that 65% areas soil is clay and some of areas is Silty clay. Clay and silty clay soil are suitable for rice production including vegetable and other minor crop are not grown as high productivity. The soil colour is grey to dark grey calcareous and some areas soil colour is darkish. Here we can also use the sadar upazila soil type as a Polder soil type. So that, in the polder area 64% soil structure is clay type and soil colour is gray to dark gray.

Table 21: soil type

Upazilla	Total	Soil Type											
		Clay		Clay loam		Silty clay		Silty clay loam		Silty loam		Sandy	
		area	%	area	%	area	%	area	%	area	%	area	%
Satkhira Sadar	40808	26011	64	3554	9	6679	16	0	0	2814	7	1750	4
Assasuni	37660	22981	61	14679	39	0	0	0	0	0	0	0	0
Tala	33555	5112	16	0	0	21403	64	2476	7	4264	13		



5.1.5. Major Agricultural crops production:

Rice is the main staple food in Bangladesh that's why country wide most of areas are covered by rice cultivation, there is no any alternative or change In Satkhira as well as Polder-2. Although, this area is recognized as a coastal area and here 33% (16060 ha land) area effective in fish culture activities and approximately 2% people are fully maintenance their livelihoods in this sector.

Major Field crop:

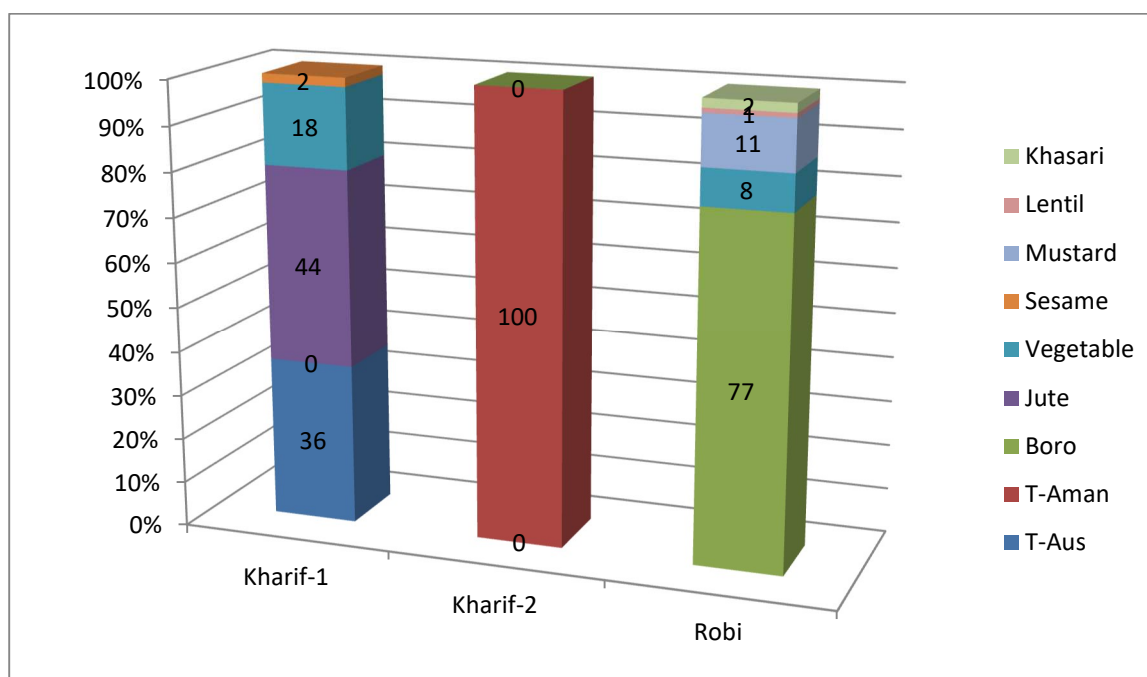
Kharif-1: Rice is the main field crop in this area. In Kharif-1 major percentage area covered by jute cultivation (4500ha) and second one is T-Aus in the medium land area where water not logging permanently and vegetable is third one crops of Kharif-1 season.

Kharif-2: Only rice is cultivated in this season. Total of 22655 ha land covered by T-Aman rice where as only 295 ha for local variety rice.

Robi: In this season total of 24700 ha land covered under Boro rice cultivation where as 20700 ha in HYV rice and 4000 are Hybrid rice. And mustard cultivation as second crop in this season area.

Table 22: Area and Production

Crop	Total area	Total production (ton)	Rain fed area			Irrigated area		
			Area	Yield	Production (Ton)	Area	Yield (ton/ha)	Production (Ton)
Kharif-1								
T-Aus(HYV)	3600	10872				3600	3.02	10872
Sesame	220	242				220	1.1	242
Jute	4500	18750	3000	10.5	31500	1500	12.5	18750
Vegetable	1800	25200				1800	14	25200
Kharif-2								
T-Aman (local)	295	472	295	1.6	472			
T-Aman (HYV)	22360	67950	17860	3	53550	4500	3.2	14400
Robi								
Boro (HYV)	20700	87768	20700	4.24	87768	20700	4.24	87768
Boro hybrid	4000	20000				4000	5	20000
Mustard	3500	4270				3500	1.2	4270
vegetable	2550	43815				2550	19.4	43815
Lentil	400	1.4	280	1.2	336	120	1.4	168
Khasari	700	1260	700	1.8	1260			

Chart 09: Area and Production**Table 23: Major cultivated vegetable variety;**

SI No	Crops	Variety
	Rice	Boro season: BRRI Dhan-28, 29, 45, 50, and BINA-6, T-Aman: BR-11, BRRI Dhan-30, 31, 32, 33, 34, 39, 40, 41, 44, 49, 51, 52 and BINA -4, 7, 8 and BAU Dhan-1. T-Aus: BR-26, BRRI Dhan-28, 29, 48 and Saline tolerant variety; BINA Dhan-8, BARI Dhan 47, 55
	Vegetable	Robi: Tomato, cauliflower, Cabbage, olcapi, Radish, Red amaranth, Brinjal, Country bean Kharif-1 & 2: Ladies finger, Bitter gourd, bottle gourd, snack gourd, sweet gourd, Long yard bean, Pointed gourd
1	Potato	HYV-Granula, Cardinal, Dimond, Petronis, Estarixs, Raza, Felsina, Local- Sheel Bilaty, Jhaow, Endurkani
2	Tomato	Manik, Raton, Lalima. Jhumka, Sindur, Apurba, BARI tomato-10, 11,12,13,14,15 and BARI Hybrid Tomato- 1,2,3,4,5,6
3	Brinjal	Nyontara, Kajla, Uttara, Islampury, Katabegun, BARI Begun-5,6,7,8,9,10
4	Bitter gourd	BARI karola 1,2 Taz, Teea,
5	Bottle gourd	BARI Lao-1, 2 and IPSA lao-1
6	Sweet gourd	Swety, BARI Mistykumra-1
7	Country bean	BARI sheem-1, 2 IPSA sheem-1,2
8	Long yard bean	BARI-1

5.1.6. Cropping patterns and Intensity:

The polder is dominated by Agricultural crop such as T-Aman, Boro and different kind of Robi crop like vegetable which are mainly cultivated under irrigated or non-irrigated condition. The major area of Polder 2 is dominating under Sadar upazila (6 union) so we

consider the sadar upazila cropping intensity is the same as Polder 2 cropping intensity. In the Polder 2 area it is the cropping intensity is 224% where followed the 7 cropping pattern which indicate that double cropped area covers maximum land.

Table 24: Agriculture based Major Cropping pattern

Major Cropping Pattern			Total area	% of NCA
Kharif-1	Kharif-2	Robi		
Fallow	T-Aman	Boro	15890	59.09
Fallow	T-Aman	Mustard+Boro	3000	11.16
Jute	T-Aman	Potato	1550	5.76
T-Aus	T-Aman	Boro	1500	5.58
Vegetable	Vegetable	Vegetable	2000	7.44
Jute	T-Aman	Wheat	1000	3.72
Fallow	Fallow	Boro	1775	6.60
Jute	T-Aman	Mustard+Boro	175	0.65
			26890	100%

Table 25: Major cropping pattern in Polder

ing pattern	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
	%	Kharip-1			Kharip-2			Robi				
Fallow-T aman-Boro	59.09	Fallow			T -Aman			Boro				
Fallow-T-Aman-Mustard/Boro	11.16	Fallow			T-Aman			Mustard/Boro				
Jute-T Aman-Potato	5.76	Jute			T-Aman			Potato				
T-Aus-T-Aman-Boro	5.58	T-Aus			T-Aman			Boro				
Vegetable	7.44	Vegetable			Vegetable			Vegetable				
Jute-T-Aman-Wheat	3.72	Jute			T-Aman			Wheat				
Fallow-Fallow-Boro	6.60	Fallow			Fallow			Boro				
Jute-T-Aman-Mustard/Boro	0.65	Jute			T-Aman			Mustard/Boro				

Table-26: Shrimp/Prawn Based Major Cropping Pattern

Major Cropping Pattern			Total area	% of NCA
Kharif-1	Kharif-2	Robi		
Prawn	T-Aman	Boro	1740	6.47
Shrimp	White fish	Boro	3253	12.09
Shrimp	White fish	Boro	1303	4.85

Crop Calendar

5.1.7. Crop calendar:

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Crop Season	Robi			Kharip-1			Kharip-2			Rabi		
1	T-Aus			[Seed bed]			[Production]			[Harvesting]		
2	T Aman (HYV)			[Seed bed]			[Production]			[Harvesting]		
	Boro Rice			[Seed bed]			[Production]			[Harvesting]		
3	Mustard seed			[Seed bed]			[Production]			[Harvesting]		
4	Potato			[Seed bed]			[Production]			[Harvesting]		
5	Bottle gourd			[Seed bed]			[Production]			[Harvesting]		
6	Bitter gourd			[Seed bed]			[Production]			[Harvesting]		
7	Brinjal			[Seed bed]			[Production]			[Harvesting]		
8	Cauliflower			[Seed bed]			[Production]			[Harvesting]		
9	Cabbage			[Seed bed]			[Production]			[Harvesting]		
10	Country been			[Seed bed]			[Production]			[Harvesting]		
11	Jute			[Seed bed]			[Production]			[Harvesting]		



5.1.8. Agricultural Mechanization:

It is true that agriculture now started and going through the mechanization practice. Here different development organization and agro-machineries Manufacture Company work efficiently in field level with the assistance of DAE. There is a trend for agricultural mechanization in this region and usually use agri-machineries for tillage, threshing, irrigation, weeding, processing, spray of pesticide etc. Now some of people take the agro mechanization service as a business and different service providers are in available within and outside the polder. There is no actual data about agricultural machineries in the Polder area. We can get scenario about the farm machineries status of Polder areas by analyzed the overall status of upazila.

Table-27: Upazila wise Farm Machineries

Name of Upazila	Power tiller	Tractor	Threshing machine
Satkhira Sadar	538	84	2741
Assasuni	92	25	491
Tala	270	21	1688
Total	900	130	4920

(sources: District statistics 2011, Satkhira)

Table-28: Irrigation machineries at Sadar Upazila

Irrigation pump	User system		
	Diesel	Electric	Total
Deep tube well	135	113	248
Semi deep tube well	14776	1597	16373
LLP	155	27	182

Sources; DAE

5.1.9. Input market in Agricultural sector

Seed, fertilizer, pesticide, farm machineries, irrigation facilities and technology & information is the main input of agriculture sector. Most of the input company and private sector have been working in this Polder area as well as upazilla and also they are established close connection with farmers through the dealership system. In the upazila, total of 225 fertilizer retailer, 22 fertilizer dealer, 60 seed & pesticide dealer, more than 180 seed retailer & 345 pesticide retailer including more than 70 company and private sector have been working in agriculture input sectors. Lal teer, Supreme Seed Ltd, Metal Agro Ltd, Buyer crop science, Syngenta, Alfa Agro Ltd, Modern seed Ltd, Petro Cam Ltd, Semco Ltd, Gatco Agro Ltd, BRAC seed, Partex Agro Ltd, Malik seed Ltd, ACI Ltd, Mc Donald BD Ltd, Mimpex Agro Chemical Ltd, Larsen chemical ind, Setu corporation, Popular agro ind Ltd, Map agro in Ltd, Arany internation is the common company in the area,

Table 29: Input supplier in Polder area

Type of input	No of Input supplier
Fertilizer dealer	22
Fertilizer retailer	255
Seed Dealer	60
Seed Retailer	180
Pesticide Dealer	60
Pesticide retailer	345
Company & private sector	70

(Sources DAE & KII with Input supplier)

5.1.10. Output market in Agriculture sector:

There are 35 markets in the polder area (Table 00) where the Agriculture producers easily can access to selling their products. In the polder area, farmers are get the opportunity to selling & buying their products every day, because polder area's markets place are sited every day by consecutively. Most of the markets have facilities for selling all agricultural products, some of market have specialist for specific products like; Budhata bazer focused on mustard and fish wholesaling market, Mahesswar kathi and Paikhali bazer focused on shrimp & prawn fish selling. (Table 12).

5.1.11. Factors affecting the Agriculture Sector:

All type of agricultural crop depends on the seasonality, different type of factor like; rain water logging, salinity, low & high temperature, and tidal surge are mostly affected the normal crop calendar in the year. In Satkhira as well as Polder area natural factor are directly affected the overall agricultural practice in the region. For example, Water logging is the major problem in this areas and this factor directly hampered both T-Aman and Boro rice cultivation time including vegetable production and lastly mustard seed production is depends on water logging condition in affected area. If water logging start from the month of June and remain up Mid October, have no scope to start T-Aman rice cultivation in that area and it continue up to November, mustard are not cultivated. In this circumstances if the farmers cultivate the mustard seed never they can start the Boro rice in that field but it is true Boro is the main crop in that area so ultimately famers avoid the mustard cultivation. Some time people could not start the production cycle untill end the duration of ongoing factors so the factors very much considerable for maintain the crop calendar. If any year happens this type of circumstances in any season ultimately they have behind to start the next crop timely and resulting is changing the cropping season as well as cropping pattern & cropping intensity gradually.

Table-30: Factors Affecting Crop Production through the year

Item	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall												
Water logging												
Tidal surge												
High Temperature												
Winter/cold stress												
Cyclone/tonedo												
Salinity												

Source: FGD & KII with SAAO

Table-31: Major factors and its Impacts on crop cultivation:

Major Problem	Impact
Water logging	<ul style="list-style-type: none"> • Change the cropping pattern • Reduce cropping intensity • Reduced income • Reduced dietary diversity • Reduced expenditure on long term productive investments. • Increased amount of days of labour worked • Seasonal migration
Salinity	<ul style="list-style-type: none"> • Reduce crops production up to zero • Decrease productivity • Change the biodiversity and ecology • Soil quality degraded • Decrease Soil Micro organism • Crop diversification decrease
Rainfall	<ul style="list-style-type: none"> • Increase the height of surface water level • Water staging everywhere • People became workless • Crop production becoming zero in the period of tillering and panicle stage • Crop damage

5.1. Livestock:

In the Polder area, poultry, duck, cattle, dairy, buffalo, goat, sheep, pigeon are rearing as a major livestock. Every village are rich in those farm animals. There is a possibility of improvement in rural income distribution with an increase in investment for indigenous livestock development. The landless and small farm's rearing the highest percentage of poultry and goat. While the medium and large farms possess significant percentage of cattle and the improved breeds of poultry. Thus, the investment in small ruminant and poultry species will greatly help to generate employment and income for the rural poor and thus improve livelihood. Local breed cattle are being low in body weight and low in milk production but little bit resistant to disease and the challenges posed by the climatic conditions.

This sector has also generated good employment, thus providing a means to solve the unemployment problem of the polder area. Jobless and unemployment youth firstly select the sector as a way of new earning sources and most of the cases it was make a turning point of life. On the other hand rural women firstly select this sector as their own income and they easily have established their rights in this earning source. These reasons and the potential for growth have made poultry an important sector. There have no any recent specific numerical data in relation to numbers of livestock population. During our data collection period we discussed with DLS representative also got information from milk producers, every sources are not provide the numerical data but both give us the percentage basis data, which from we can get the overall picture in our Polder area. The data are given bellows;

Table 32: Households involve in Livestock sector at Polder area.

	HHs Involve in Livestock sector					
	1-4	5-9	10-14	15-19	20+	
Backyard poultry	100%	40%	15%	8%	5%	
Milking cow	65%	10%	2%	0%	0%	
Bull fattening	12%	5%	0%	0%	0%	
Goat rearing	18%	7%	3%	0	0	
Duck rearing	80%	25%	12%	5%	2%	

(Sources; DLS and KII with milk producers)

Poultry: It was normally and traditionally reared by our women at the household's level. There are no any households in rural area where the poultry are not reared. Approximately 100% rural women involved to rearing at least 1-4 poultry (e.g. chickens, ducks) at the household level and it is makes an important role in income generation and poverty reduction for women. Still now the women have established the rights and ownership on this

asset. It is not only income generation activities also contribute the nutritional requirement of the family members, it is also proved that the major percentage animal protein are come from poultry egg and meat. But it is the true sense that the women are reared this valuable asset by traditionally and have no any improved technical knowledge on their hand especially the housing facilities, feeding, and treatment. Moreover, backyard poultry is mostly owned and managed, and sometime traded by women, and therefore has high potential to advance women's socioeconomic empowerment.

Milk production:

Satkhira also famous for producing milk made products like; sweet, yogurt etc. The total milk products are produced by use the local supply. In the Polder area 65% HHs are rearing at least 1-4 milking cows as traditional farming system. They take it as secondary income sources, someone is takes as main income sources but do not takes it as business. Very few numbers of HHs (12%) are take it as their main income sources by practice farming system. Approximately 80% cows are cross breed as per data of DLS and KII with WMG and milk producer, but still now it is questionable that all are not high productive milking cow. The average milk production of those cows is 3-4 litter, some of cows are give milk up to 7-8 litter but they area rearing as farming system. Milk marketing of this zone are not develop, although national level milk processing company have been continuing milk collection by set up the chilling centre in the zone. PRAN chilling point is situated at the middle part of the Polder (Dhulihar bazer) and Milk vita, BRAC Arong situated outside of the Polder but not far distance, the Polder areas milk producers are sale the milk in that chilling point through mobile milk collector.

5.2.1. Market Demand and Growth Potential

High market demand and good profit margin has made this sector attractive for investors and new entrepreneurs. The high demand exists due to increased urban population consumers' need for protein, particularly chicken, depletion of other protein sources, and a change of food habit that buys broiler. The market demand is high but local production and supply is inadequate, leading to some shortages. Export potential for poultry products exists, but is not feasible at the moment due to high local demand.

Day by day increase the intake rate of animal protein; here poultry is the first choice to fulfil the protein requirement of human. On the other hand several types of festivals like; Eid, marriage ceremonies, and any other occasion have led to a greater potential for poultry business in Bangladesh. So it is proved that the market demand is always create. For fulfil the consumers demand fortunately, fast growth of broiler chicken has effectively met this

increasing demand but still now people kept the interest & test to buying the backyard poultry's egg and meat. Considering the consumers demand, backyard poultry's egg and meat are not sufficiently available in the market but it is also having information that our 100% HHs in rural area are rearing at 1-4 birds of the backyard poultry the growing demand has been noticed particularly in the urban and semi-urban areas where people have developed their habits of eating fast foods, some of which are made from the poultry pieces. As a result, chicken, which earlier was an expensive source of protein, became adequately available at a cheaper price within the means of people from different classes. In this regard, poultry farming are considered as a profitable business to meet a huge demand of the increasing population of Bangladesh.

The growth trend in poultry business is upward. Unless infected by unwarranted diseases, productivity and profitability are generally high. High profit margin has attracted many entrepreneurs to invest in the poultry sector.

5.2.2. Output market:

Backyard poultry egg market is not going to the formal system have not any specific market place. This market is running with the part of other marketing channel. After started the layer farming system, some of egg collection centre or Arot has established and their business mainly running & depends by the production of layer farm. On the other hand, meat's retailer & Piker market also depends on Broiler farm. There are no any shops and market where any entrepreneur has continued their business depends on backyard poultry's egg and meat, rather this business are continued with the part of other business. Beside the normal practice of backyard poultry marketing system is, farmers always selling their products (egg & meat) in market by taken as a secondary task or backyard poultry's income money use for buying the households necessity. Milk marketing of this zone are not well organized, Mobile milk collector (locally called Ghos) mainly handle the total milk marketing channel, although national level milk processing company have been continuing their business but they are fully depends on the mobile milk collector. Causes behind is; company did not take any initiative to form and manage the milk producing association or group/Samity so that they can easily and directly collect milk from the producers.

But in many cases all type of livestock producer does not get the fare price because, mostly they are not collecting the enough marketing information. Then also poultry sub-sector is more organized than other sectors and price is determined by demand supply mechanism. The suppliers try to form some kind of syndicate and control the market price; however the actual price depends on demand. Many of these growers have their own sales outlets and they have a direct control over supply. However, the demand fluctuates and price varies

depending on market forces. The main target group comprises of middle, upper-middle and rich class consumers who mostly live in urban areas. Hotels, restaurants and fast food corners also comprise a major consumer segment of poultry. Many middlemen/traders are involved in the process of livestock marketing. The marketing of livestock and livestock products are characterized by poor and unhygienic market places, unorganized traders, absence of grading, and lack of information, seasonality in demand and price variation. The marketing of livestock products has remained underdeveloped for a long time. The overall egg and meat marketing in the polder 29 is depends on the weekly local markets (market list shown Table 00).Egg and meat marketing is mostly carried out in an unorganized manner. Polder dwellers sell their eggs in the weekly local markets and also district markets and bapari from inside and outside polder.

5.2.3. Input Market:

Livestock input market is developed compare to others agriculture sub sector input market. There is no any specific numerical data that how many companies are working in that area. Approximately 60 plus veterinary pharmaceutical company have been continuing the technical and marketing related service to the stakeholder. All company working by touching and consulting with DLS and it is true that only about 18-20 Company have very good technical service and quality medicine to the producer's level and those company always tries to keep the maximum level of consumer's satisfaction by providing their best services and ultimately farmers get the actual services. By this way all type of input like feed, medicine and need based treatment support (with consulting the DLS) are available at rural level.

5.2.4. DLS delivered Animal health & extension services:

- i) Vaccination
- ii) Artificial insemination
- iii) Fodder production
- iv) Technology transfer
- v) Treatment support

5.3. Fisheries:

Satkhira as well as Polder-2 is very much focused on fisheries activities. In the polder area fisheries (both shrimp/prawn and white fish) sector provide support of the local people on major sources of income, nutrition, employment and livelihoods.

In the polder area two type fishing system are practiced, 1st one is white fish culture that are also depends on two sources; one is pond and another is open water fishing, 2nd is marine fish culture as farm (Gher) practiced that are also classified as Shrimp culture and prawn culture and in some area are practiced as mixed cultured (both prawn & white fish).

North parts (Iabsa, Brahmarajpur) of the Polder are practiced on White fish culture activities and in very limited area are covered by mixed culture both in prawn & white fish. South parts (Dhulihar, Fingri Budhata Kulla) of the Polder are mostly practiced in shrimp culture as commercial basis by farming (Gher) system. A very remarkable area of south parts of the polder are not produced the agricultural crops, here agricultural production is zero.

5.3.1. Involve in fish culture:

In generally 33% area are covered under fish culture activities. In the polder area out of total population, 22.32% are directly involved in fish sector among them 17.44% are mostly involved in fish culture activities (both in shrimp. Prawn and white fish) and 4.88% (table 60) involved in fishing activities by capturing fish from open water bodies or involved as a labour in fish farm (gher)

By considering the households (HHs) information, 44% HHs have no any ponds or they are not involve in any other fishing activities like; share fishing and capture fish from open water bodies. 26% HHs have small size ponds up to 10 decimal among them some are cultivate its only for households consumption but not as commercially or business purpose and some ponds are fully uncultivable just use for homestead work. 15% HHs have medium size ponds up to 30 decimal and normally this type of ponds come under cultural activities by apply both own & share fishing system. 9% HHs have large type of ponds, the general situation of the polder area about this type of ponds is most of the ponds are leased to other who took fishing as business for maintain their livelihoods and some of culture by themselves. And lastly 6% people have farm/gher owner who are fully depends the farm/gher (shrimp or prawn) culture activities.

Table-33: Average HHs pond size

Ponds type	HHs %	Remarks
Pond less (0 decimal)	44%	
Small ponds (Up to 10 dec)	26%	Some of cultivate and some are not
Medium ponds (11- 30 dec)	15	Cultivate by own or share culture system
Large ponds (31-50 dec)	9	Most of ponds lease to others
Farm/Gher (51 or more dec)	6%	Bagda & Galda-mixed culture

(Sources; FGD with WMG)

5.3.1.a. White fish culture: In the Polder area different type of sources use for cultured and captured the white fish like; ponds, wetlands (open water body, flooded area, beel), cannel (khal) and river etc. As a data of Satkhira sadar Upazila it was observed that 1657.24 hectare area are cultured and captured the white fish. In addition prawn cultured area also practiced to culture the white fish by covering 3058 ha area and in some cases very few numbers of shrimp cultured area are practiced by culture the white fish (Table:00). Total of white fish production in those areas is 17326 Mt. Satkhira sadar produced the 45% surplus fish and sales to other district in country wide. As analysis the data also discussion with concern department (DoF), the Polder area's production is more than the outside production within the Upazila boundary (table:00).

5.3.1.b. Wetland fisheries: Wetlands are among the most fertile and productive that support the life cycle of different fauna and flora resources of an area which ensure the fish productivity gradually. Satkhira sadar are enriched with 7705 ha open water fisheries which are available in rivers, khals/cannel, beel and floodplain. More than 5 cannels (Salikhar khal, Pransyarer khan, Jhawardanga khal) are flow inside the polder area by covered the 66 km area. Beside 13 beel, 5 open water body (Jalmahal) and also vast cropped area are included as a fishing sources during flooded. The total production in those areas is 208 Mt. There is no any specific data in Polder areas but considering the geographical distribution also discussion with DoF it has information that the major percentage of open water fish come from the polder area out of total production of Upazila.

Table-34: Khal (cannel) and beel information in Polder

SI no	Name of Khal/beel	Area (ha)
1	Boalmari beel	13.40
2	Kachur beel	13.40
3	Gabindakatir beel	66.80
4	Wariar beel	66
5	Debnagar beel	66
6	Buramarir beel	65
7	Behula paschim	70
8	Kurermath beel	45
9	Naoapara beel	55

10	Setpurer beel	50
11	Pakrer beel	65
12	Kundaria beel	60
13	Paikhali beel	40
		675.6

(sources; DoF)

5.3.1.c. Pond fish Culture: In upazila specifically 798.6 ha area are covered under fish culture where total production approximately 2480 metric ton, On the other hand it is calculated with prawn (Galda) mixed culture where covered 3058 ha for carp fish culture and production is approximately 4100 metric ton.

Table-35: Covered area under fish culture in Satkhira Sadar Upazila

	Type of water body	no	Area (ha)	Production (mt)
1	Pond (White fish culture)	64115	798.6	2840
2	Open water body (<i>Jalmahal</i>)	5	15.5	54
3	Flooded area (<i>beel</i>)	12	461	115
4	River	3	152	24
5	Khal	31	142	15
6	Gov. Fish farm	2	17.14	3131
7	Shrimp (Bagda) farm	2105	4065	Shrimp-1015 White fish-3400
8	Prawn farm	3058	3413	Prawn-1700 White fish-4100
9	Fish nursery	40	71.	
10	Others			3671
	Total	69371	8993.24	White fish-17326 Shrimp-1015 Prawn-1700

(Sources; DoF, Satkhira Sadar)

5.3.1.d. Shrimp & Prawn culture:

Shrimp culture is widely practiced in the Polder area by taking in saline water, especially in the areas adjacent to the embankments where saline water intake is easier. South parts of the Satkhira district as well as Polder are very much focused as shrimp & prawn producing zone. In this area different types of new business have been continuing on depends and centred of the shrimp & prawn culture business. The local people take it as highly profitable business and for this perspective people go to culture the more area under shrimp & prawn culture activities. Major percentage economy are depends on shrimp & prawn culture business. Especially the south part s of polder (Fingri, Dhulihar and Budhata) is saline prone area. In our Polder area (only data for Sadar upazila) total of 1106 shrimp (Bagda) culture farm have been continuing the farming system by covered 2443 ha area. And north parts (labsa, Brahmarajpur) of the Polder are both prawn & white fish culture zone, in this area total of 1003 prawn farm continuing the farm business by covered 1211 ha area (table:00) .

We could not collect the data from Budhata and kulla union of Assasuni upazila but major percentage area of this upazila are affected by waterlogged and salinity, that why this area are focused on shrimp and prawn culture activities and agriculture is the secondary position. During field visit and discussion with different stakeholder like; WMG members, fish arotder, shrimp culture fishers and input supplier, It was observed that the shrimp culture is the main earning sources of Assasuni (Budhata union) upazila.

Table 36: Shrimp and Prawn culture in the Polder area

Union	Shrimp		Prawn		Total	
	No	Area (ha)	No	Area (ha)	No	Area (ha)
Fingri	317	453	142	153	459	606
Bramahrajpur	188	560	145	145	333	705
Dhulihar	400	969			400	969
Labsa	251	400	98	100	389	500
Jhaodanga			332	427	332	327
Balli	50	61	286	386	336	447
Budhata						
Kulla						
Nagarghata						
Total	1106	2443	1003	1211	2109	3654

(Sources; DoF, Satkhira Sadar)

5.3.2. Demand and supply analysis of fish production:

By analyzing the different data it is clearly mentioned that Satkhira is focused as shrimp and prawn producing zone and this area have contribute to increase the national economy by earning the foreign currency. Shrimp & prawn is the export based business and major percentage products exported to the foreign country. Shrimp & prawn fish local demand is very low and it is not mentionable as amount, high graded all fish consider as export quality only low graded or small size fish are marketable in local market. So produced all amount of shrimp & prawn are consider as 100% surplus production based on the local demand. On the other side white fish production is also 45.63% surplus considering the local demand in the polder area (table: 37).

Table-37: Variety wise fish production and supply

Variety	Production (mt)	Demand (mt)	Surplus/Deficit	Remarks
White fish	17326	9420	7906 (+)	45.63% (+)
Shrimp	1700		1700 (+)	100% (+)
Prawn	1016		1016(+)	100% (+)

(Sources; DoF, Satkhira Sadar)

5.3.3. Fish Input Market:

Normally fish input market are not in good compare to others input market because no of limited company have serve their product marketing in together with other sub sector (with Agriculture & livestock inputs). On the other hand usually farmer are not used readymade fish feed due to the lack of knowledge and awareness, instead they use own made feed i.e. rice bran, rice husk, mustard oil cake and leafy green parts of hyacinth. Still now most of the farmers followed the traditional culture practiced. Some of farmers try to followed the improve culture technology and they used the readymade feed & medicine but not sufficient as the actual requirement of fish.

Satkhira is a fish producing zone so here all kind of input provider and few numbers of fish feed company or manufacturer have been continuing the input and service delivery to the fish sector. In the All type of input supplier like; white fish nursery owner, prawn & shrimp hatchery and supplier, brood fish hatchery and different fish feed processor and supplier Most of the input provider are available in Upazila level and some of area union level especial the different business point. And all are try to providing quality input as well as technical services to the fish producer's level.

Fish input retailing and dealership are not develop independently it has continued business jointly with others sub sectors. Readymade feed form as granule and pellet size and have contain different nutrients for nursery feed, starter, grower and finisher. The primary ingredients of readymade feed are rice bran and mustard oil cake, but during formulation with other ingredients the producer ensures the required protein percentage (35%). However it was found that input retailers are situated in village or union level but company and dealer are mostly concentrated in upazila level and they maintain the distribution channel from upazila to union level.

Table 38: Fingerlings supplier

	Variety	No of owner	No of Farm	Area	Production (lac)
1	White fish nursery	40	275	89.20	296
2	Mono Sex Telapia	5			650
3	Prawn Hatchery	1			40
4	Shrimp Hatchery	5			
5	Brood fish farm	1			430
6	Fingerlings (Shrimp & prawn) supplier	35			

(Sources; DoF, Satkhira Sadar)

Table-39: Variety wise fingerling production and supply

	Variety	Production (lac)	Demand (lac)	Surplus/Deficit	Remarks
1	Carp variety fingerlings	300	519	219 (-)	
2	Mono sex Telapia	650	450	200 (+)	
3	Pangas		24	24 (-)	
4	Shrimp		1220	1220(-)	
5	Prawn	40	340	300(-)	

(Sources; DoF, Satkhira Sadar)

Table-40: List of Fish feed supplier

SI no	Enterprise Name	Traders name	Mobile No	Location
1	Shajahan krishi ghar	Md. Shajahan sardar		Dhulihar bazer
2		Easin sardar		Gobindapur bazer
3	Mesars Sardar traders	Md. Sahidul Islam	01715330117	Dhulihar bazer
4	Mallik fish feed	MA Hannan	01712640051	Jhawdanga bazer
5	Mesars Kamal fish feed	Md. Kamal hossen	01730913917	Check post bazer,
6	Akota enterprise	Md. Golam kuddus	01711010987	Jhawdanga bazer
7	Sonali fish feed	Md. Abdur Rashid	01712514794	Jhawdanga bazer
8	Mesars sawon enterprise	Md. Abu Bakkar	01716779727	Jhawdanga bazer
9	Narion vander & fish feed	Gopal Chandra das	01711390478	Madhopkati bazer
10	Mesars Sharmeen fish feed	Md. Azizul	01725104034	Balli natun bazer
11	Joty poultry & fish feed			Labsa
12	Satkhira feed ltd	Mahfuj haque	047164848	Labsa
13	Saudi-Bangla fish feed ltd	Asraful karim	01711309964	Katiatala
14	Krishi ghar	Azmal Haque		Sultanpur baro bazer

(Sources; DoF, Satkhira Sadar)

Table-41: Fish output market:

SI No	Market actor	Number
1	Fish processing centre	1
2	Fish Depot	35
3	Fish Arot	98
4	Ice mill	7
5	Fish feed processing	1
6	Fish feed seller	40
7	Service centre	1
8	Fish Market	51

5.3.4. Major problem in Fish sector:

- Water logging is the major problem in this zone, it is partially advantage for open water fisheries and get more time for growth but some time it is not good for culture fisheries.
- Absence of proper water management practices of open water areas or concern department (DoF) did not take management initiative open water fisheries.
- Unplanned construction of road, sluice gate, embankment and cross-dam etc are decreasing open water fisheries production.
- Extensive use of agro-pesticide, chemical and fertilizer have makes negative impacts on open water fisheries.
- Low quality and under size fingerlings are decrease the productivity.
- High price of fish feed discouraging the fish culture.
- Frequently and in some cases depth flooding interrupt the culture practice and damage the farm productivity.
- Siltation rapidly storage the sand on the river and ultimately raise the river height. During monsoon, tidal saline water flow is moving towards the marshy land and devastated the crop field as well as pond and fish go away to open water which decrease the pond productivity.

5.3.5. The unfavourable impacts of shrimp cultivation on the situation are:

- Shrimp cultivation needs the intrusion of saline water, which affects soil quality through Stalinization, and so the yield of T. Aman. It also causes delay in transplanting of paddy seedlings after shrimp cultivation, which also contributes to a reduction in paddy production.
- Shrimp cultivation enhances the income of rich people (shrimp gher owners) sharply and thus economic inequality among the people of the area is increased; this creates social imbalances and resentment in the area.
- New trees cannot grow, and the growth of existing trees is affected due to salinity intrusion for shrimp cultivation. This reduces the production of fruit and timber and affects the shelter and security of birds and their propagation.
- Shrimp cultivation creates an unemployment problem in the area by reducing the labor required in crop cultivation, and outsider shrimp cultivators employ labor from outside the area. This causes emigration of local poor people.

(Sources; KII with DoF and IPSWAM planning study-2005)

6. Potential Value chain in Polder-2

6.1. Potential VC list in Polder

1. Boro rice
2. T-Aman
3. Wheat
4. Vegetable
5. Mustard
6. Jute
7. Prawn (Galda)
8. Shrimp (Bagda)
9. Culture fish (Table fish)
10. Backyard Poultry
11. Milk

6.2. Value Chain Identification

Criteria →	Indicate market level (Local, District, Regional, National, International)	Growth Potential (32)					Impact (32)						Structure of the Industry (15)				Gender & Employment (17)		Collective Action(4)	Risk	Total Weighted Value	Rank	
		Market Size	Unmet market demand	Potential productivity improvement	Expansion of area / capacity	Value adding to raw materials	Current production	Number of households involved	Contribution to HH income and wealth	Short or longer production/harvesting	Food Security	Nutrition	Forward / backward linkages conducive to market based	Existence of service providers	Favourable business environment	Other programme interests	Involvement of women	Employment generation	Collective Action Opportunities	Major risks (No., High, Medium, Low)			
Weight →		7%	6%	6%	7%	6%	5%	5%	6%	5%	6%	5%	5%	4%	4%	2%	9%	8%	4%		100%		
<i>Food</i>																							
Boro Rice	National	5	2	3	3	2	5	3	5	1	5	2	1	2	2	0	2	3	0		2.76	7	
T Aman	National	5	1	1	2	1	3	3	2	1	5	1	1	2	2	0	2	2	1		2.08	10	
Wheat	National	3	1	1	2	1	1	1	1	1	3	1	1	1	1	0	1	1	1		1.31	11	
Vegetable	National	3	2	2	3	3	2	2	2	2	2	3	3	2	1	2	4	4	2		2.60	9	
Mustard seed	Regional	5	5	5	5	4	3	3	4	2	2	2	3	1	2	0	6	4	2		3.61	1	
<i>Non Food</i>																					0		
Jute	National	5	4	4	4	2	3	2	4	2	2	0	1	0	2	0	3	4	0		2.66	8	
<i>Aquaculture</i>																					0		
Golda	International	4	4	3	3	3	4	3	4	3	3	3	3	3	3	2	2	4	1		3.13	5	
Bagda	International	5	5	3	2	3	4	3	4	3	3	3	3	3	3	2	1	4	1		3.10	6	
Culture fish	National	5	3	3	3	5	3	3	3	3	3	3	3	3	3	2	2	4	3		3.23	4	
<i>Livestock</i>																					0		
Backyard Poultry (Egg)	Regional	3	5	2	4	2	3	5	3	5	3	3	3	3	3	1	7	1	3		3.43	3	
Milk	Regional	5	3	5	3	4	4	4	4	4	3	4	3	3	3	2	1	6	1	1		3.49	2

6.3. VC selection scoring information

- A. Growth Potential (32)
- B. Impact (32)
- C. Structure of the Industry (15)
- D. Gender & Employment (17)
- E. Collective action opportunities (4):
- F. Risk

A. Growth Potential (32)					
Criteria	Measuring criteria	Product gain score			
		Score-5 plus	Score-3-4	Score-1-2	Score-0
<u>Present Market size</u> (7)	- Local, regional, national, or international level of envisaged end-market has been defined, - consider volume, or value of the market to compare, cereals are usually large volumes & values = 5, but scavenging eggs are low volume & value in comparison = 1,	Boro Rice T-Aman Mustard Jute Shrimp, Culture fish & Milk	Vegetable Wheat Prawn Poultry		
Unmet market demand (6)	- Is the demand trend increasing, does the market growth by a high %? - Do you recognize any potential for quick expansion; do buyers clearly seek more than the supply available? than we score this 5, - Markets who only grow on the basis of population growth get 1, and market demand that is decreasing, some products get out of our diet or are replaced by substitutes =0	Shrimp Poultry mustard	Jute prawn Culture fish milk	Boro Rice T-Aman Wheat Vegetable	
Productivity Improvement (6):	- do we know of accessible technological (broad sense) improvements? - If no potential to improve productivity, score =0, very limited potential (<10%)=1, Medium potential(10-19%) = 3, High potential to increase productivity (≥20%) =5	Mustard Milk	Culture fish Shrimp Prawn Poultry Boro Rice Jute	T-Aman Wheat Vegetable	
Expansion of areas/capacity (7):	If no scope to expand, e.g. T. Amman rice score =0, very limited scope (<10%) =1, Medium scope (10-20%)= 3, High potential (≥20%) e.g. winter crops where cropping intensity is still very low due to infrastructure constraints=5	Mustard	Boro rice Vegetable Jute Poultry Prawn Milk Culture fish	T-Aman Wheat Shrimp	
Value Addition (6):	the potential for farmers or small or micro enterprises to add value and increase earnings locally would score 5, if it requires a much larger investment by a processor at regional level =3 or even 1, when technically there is no value addition possible =0. If no value addition possible, score =0, very limited chance =1 (<10%), Medium potential (10-19%)= 3, High potential (≥20%)=5	Culture fish	Mustard Vegetable Prawn Milk Shrimp	Boro Rice T-Aman Wheat Jute Poultry	
B. Impact (32)					

Criteria	Measuring criteria	Product gain score			
		Score-5 plus	Score-3-4	Score-1-2	Score-0
-Current production(5):	the % of the land presently under cultivation of this crop, or the present scale (scavenging versus large broiler farms) or volume of production sets the foundation for the level of impact that can be expected. T. Aman is produced on nearly 100% of the area available =5, a crop that only commands a very small percentage of the area =1 and a crop that still needs to be introduced =0, If a crop is produced on say around 50% of land then score=3	Boro Rice	T-Aman Vegetable Mustard Jute Culture fish Shrimp Prawn Milk Poultry	Wheat	
No. of HH Involved (5):	If less than <5% HH Involved, score =0, involvement by (5-20%) =1, by (20-60%)= 3, High potential (>60%)=5 (explanations are similar as above	Poultry	Boro rice Culture fish Shrimp, Milk Prawn T-Aman Mustard	Wheat Jute Vegetable	
Contribution to HH income(6):	consider the present versus potential contribution to HH income (contribution to yearly income as %), score =0 (only loss making produce), very limited potential to contribution (>5%) =1 (a produce which will always be low in volume, and value despite productivity improvements), Medium potential (6-25%)= 3, High potential (>25%)=5,	Boro rice	Culture fish Shrimp, Milk Prawn Mustard Jute Poultry	Wheat Vegetable T-Aman	
Seasonality -Short or long harvesting season(5):	Short peak harvesting window, in combination or not of being perishable, or yearlong production with regular income makes a big difference to HH financial situation. A product with a short critical harvesting window, moreover being a perishable product having to be sold rapidly score =0, if short harvesting period but not perishable =1, while a crop with a lengthy harvesting period say milk =3, while the permanent production like betel leaf =5	Poultry	Culture fish Shrimp, Milk Prawn Jute	Wheat Vegetable T-Aman Boro rice Mustard	
Food Security (6): is it a food crop contributing to food security (availability and access in the polder)?	If no impact on food security as non-food product score =0, a food product already being produced locally in surplus has very limited impact opportunity =1, Medium potential for impact= 3, a food crop which regularly has to be imported to maintain food security in the area, has high potential to impact=5	Boro rice T-Aman	Culture fish Shrimp, Milk Prawn Poultry Wheat	Vegetable Mustard Jute	
Nutrition - potential of increasing	some product which is needed to ensure proper nutritional food intake, e.g. some micro elements usually in		Culture fish Shrimp, Milk	Wheat Vegetable T-Aman	Jute

Nutrition intake (5):	shortage should score high; If no impact possible on nutritional intake (e.g. no food crop) , score =0, very limited potential =1, Medium potential = 3, High potential =5 e.g. moringa with recognized high nutritional value.		Prawn Poultry	Boro rice Mustard	
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C. Structure of the Industry (15)					
Criteria	Measuring criteria	Product gain score			
		Score-5 plus	Score-3-4	Score-1-2	Score-0
Forward/backward linkage and MD Approach (5):	Consider existence of lead firms, in either inputs, processing or marketing, the suitability of these actors and ease of getting them involved, will determine potential. If no potential for Market linkage or development approach, e.g. due to complete absence score =0, very limited potential =1, Medium potential = 3, High potential =5		Culture fish Shrimp, Milk Prawn Mustard Poultry Vegetable	Wheat T-Aman Boro rice Jute	
Existence of Service Providers (4):	Similar to above, existence and performance of public and private service providers to the value chain actors. If no existence for SP, score =0, very limited presence (1/2) =1, Medium presence (2-5)= 3, High existence (>5) =5		Culture fish Shrimp, Milk Prawn Poultry Vegetable	Wheat T-Aman Boro rice Mustard	Jute
Favorable Business Environment(4):	Consider relevant issues in the BEE. Absence of constraints or existence of support measures to doing business scores high, the extent of government involvement distorting the market could be negative. If business environment is obstructive in several ways score =0, score higher in accordance with the business environment being more developed (e.g. aquaculture standards are available) and supportive (any subsidies, high on government policy priorities) or not.		Culture fish Shrimp, Prawn Poultry	Wheat T-Aman Boro rice Mustard Vegetable Jute Milk	
Other program Interest(2):	The extent there are opportunities for coordination, complementary action and synergy with other local programmes. If no NGO/Orgn working in the same sector, score =0, very limited presence (1-2) =1, Medium presence (3-5)= 3, High presence (>5)=5			Culture fish Shrimp, Milk Prawn Poultry Vegetable	Jute Wheat T-Aman Boro rice Mustard

D. Gender and Employment (17)					
Criteria	Measuring criteria	Product gain score			
		Score-5	Score-3	Score-1	Score-0
Involvement of women (9):	Focus is on the contribution to women empowerment, not just more work while they are already overburdened and only would be to the detriment of the family. Aim is to give them for example an opportunity to retain income. If no	Mustard Milk Poultry	Vegetable Jute	Wheat T-Aman Boro rice Culture fish Shrimp, Prawn	

	women involvement potential, score =0, very limited potential =1, Medium potential = 3, High potential =5				
Employment Generation (8):	Labour intensity of the envisaged intervention (could be area expansion, adding value, productivity increase). Number of employment creation, the type (quality) of employment and opportune timing thereof. If no potential for employment generation, score =0, very limited potential (<5%)=1, Medium potential (5-10%)= 3, High potential (>10%)=5		Culture fish Shrimp, Prawn Boro rice Mustard Jute Vegetable	Wheat T-Aman Milk Poultry	

E. Collective action opportunities (4):					
Criteria	Measuring criteria	Product gain score			
		Score-5	Score-3	Score-1	Score-0
	-Does this product lend itself to Business ideas for cooperatives, on the input or market side, and producer groups benefitting of doing these collectively. - If no opportunities for collective action (working in collaboration/ as cooperatives), score =0, very limited potential =1, Medium potential = 3, High potential =5		Culture fish Poultry	Shrimp, Prawn Mustard Vegetable Wheat T-Aman Milk	Boro rice Jute

F. Risks					
Criteria	Measuring criteria	Product gain score			
		No	High	Medium	Low
	Consider major risks for this product (the absence of risks will score green, general prevalence of risks orange, but risks with high certainty of occurrence and extremely damaging to the produce should be given red.	Wheat Vegetable	Culture fish Shrimp Prwan	Jute T-Aman	Boro rice Mustard Poultry Milk

6.4.1. An overview of identify Value Chain:

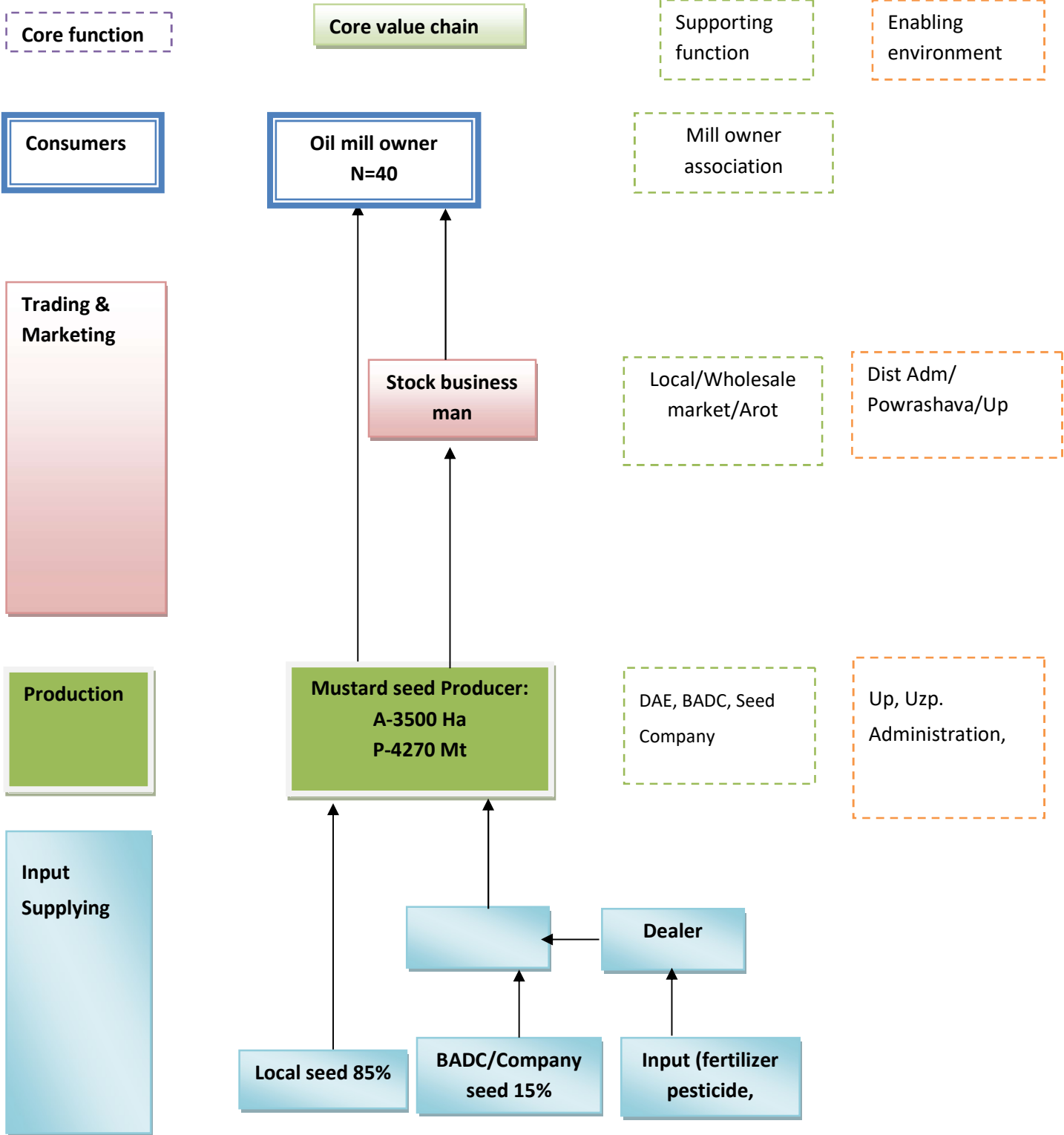
Rice is the staple food in Bangladesh, so farmers give the extra emphasis and interest to cultivate the rice. While most households in the polder areas are engaged in rice cultivation especially the Boro rice cultivation as their main income sources of major percentage peoples. Although agricultural sector are very much related with water management practice but then also have a limited scope for work as value chain; like low value addition of product, market demand is saturated, and lastly limited scope to take intervention and activities for improving the this product (rice) because farmer independently take decision and practice all activities from input collection to production and marketing. Other than few numbers are people are involves in fish culture activities both shrimp, prawn and white fish culture, here have also limited scope to work as value chain. Because likeminded other project and DoF

have been working as value chain approach. Both income sources (Rice and Fish) peoples are also engage in backyard poultry and milk production activities as their second income sources which contribute to increase the wealth and nutritional status. Have a good scope to working value chain activities in this livestock sector (milk and backyard poultry) as second priority but this sector are not directly address the water management practice but during over flooded it is harmful for all living beings. In milk value chain, it is little bit relation with water management specially on fodder production.

Based on our field observation and assessment, Mustard seed is getting a first priority as a value chain product for the Polder 2. This value chain are fully depends on water management practice because water logging directly affected the mustard seed production and productivity in the area. The locally produced all mustard seed are sale in the local market and mill owner is the main buyer. In the Polder area so many mustard oil mill have been producing the quality mustard oil. Some of mill owner sale mustard oil by followed their own branding and someone oil supply to wholesale market and they are marketing by branding or non branding through retailer. Still now locally have an unmet market demand of mustard seed. By analyzing the demand side, oil mill owner collect the 65% raw material (mustard seed) from outside (Patkelghat under Tala Upazilla) of the Polder for continue their business by efficiently. Mustard seed producer cannot meet the local demand, beside harvested major percentage mustard seed go to the mill owner within very short time and rest mustard seed are stocked by the seasonal business man who storage for certain period and waiting for high profit. Considering the marketing situation we can start and take mustard seed as short value chain.

Potential Value Chain Map Analysis:

Mustard seed Short Value chain Map



Legend: A= Area, N=No of person, P=production,

Table-42: Mustard producing area:

Union	Village/WMG
Fingri	Balitha, Foyjallapur, Fingri, South Fingri, Rishipara
Dhulihar	Nathpara, Gobindapur, Baradal, bagdangi
Budhata	Budhata, Shetpur, Paddabehula, Behula, Paikhali, Kanduria, Naowapara
Brahmarajpur	

Table-43: Mustard seed Value Chain actor

Core function	Name of actor	Numbers
Input Supply	Seed supplier	Own seed
	Fertilizer & pesticide retailer	130
Production	Producers	
	Area	3500 ha
Trading	Oil mill owner	40
	Stock business man	Not fixed
Supporting function	Market place/Hat	35
	Arotder	80
	DAE	

Potentiality for selection of Mustard seed as Value Chain:

- Rice and vegetable production requires larger investment costs (in particular due to labour, fertilizer) other hand mustard seed production to be preferred by farmers for low investment in relation to production cost in particularly require the zero or minimum tillage, need very light irrigation and in some cases no irrigation, no need to extra fertilizer and take a very limited intercultural operation.
- Water logging is the main problems in this area, and keep the enormous water from June to September and in some area this situation also elongated up to November. But this time (November) is very crucial for starting (seed bed preparation) Boro rice. Which land free from water in the month of November or December, there no option to cultivate the T-Aman and any other interim crops. But which area are free from water logging within mid October those area's farmers cannot cultivate T-Aman of this short period and ultimately land are obtain free from cultivation practices, the main reason is farmers do not neglect the Boro season because Boro rice is the main agricultural crops in this areas. By considering that problem, farmers try to minimize and take strategies for avoid the water logging situation and want to take proper utilization for this short duration. Mustard seed cultivation is the way to partially

mitigate the waterlogged losses in the area. Because the Mustard is only suitable crops in this area which require only 65 days to fulfill the cultivation cycle and after harvesting the mustard seed, farmers easily can go to cultivate the Boro rice in timely.

- Considering the present market situation, locally produced mustard seed never meet the market demand. So have an option to increase production area as well as productivity.
- Have a good employment opportunity for women especially on harvesting and storage activities. In the polder area, women have been done 100% harvesting activities like; mature mustard plant collection, threshing, seed harvesting, drying, and also packaging activities.
- Have scope to store mustard seed in long time for getting high profit and also have scope for collective action.
- Very easy and adoptable production technology and do not take any intercultural operation.
- It requires very minimum investment, in some areas only need seed money and need some harvesting cost.
- Mustard seed also cultivated as relay crop with T-Aman rice by zero tillage methods.

Constraint:

- Mustard seed pod borer and leaf spot is the major problem of mustard seed cultivation.
- Wet condition of land or if water stays in certain periods during standing plants in the field must increase the mustard seed production life cycle up to 7-10 days which is disturbing for next crops of Boro rice cultivation.
- Mustard seed production fully damaged or zero to production if saline water comes on the field.
- Productivity year to year decreases due to using the same seed again and again.
- If land is not free from water before mid-October it is difficult to start mustard seed production in the area, but in high land areas water logging is not affected directly.

Backyard Poultry Egg Value Chain Map

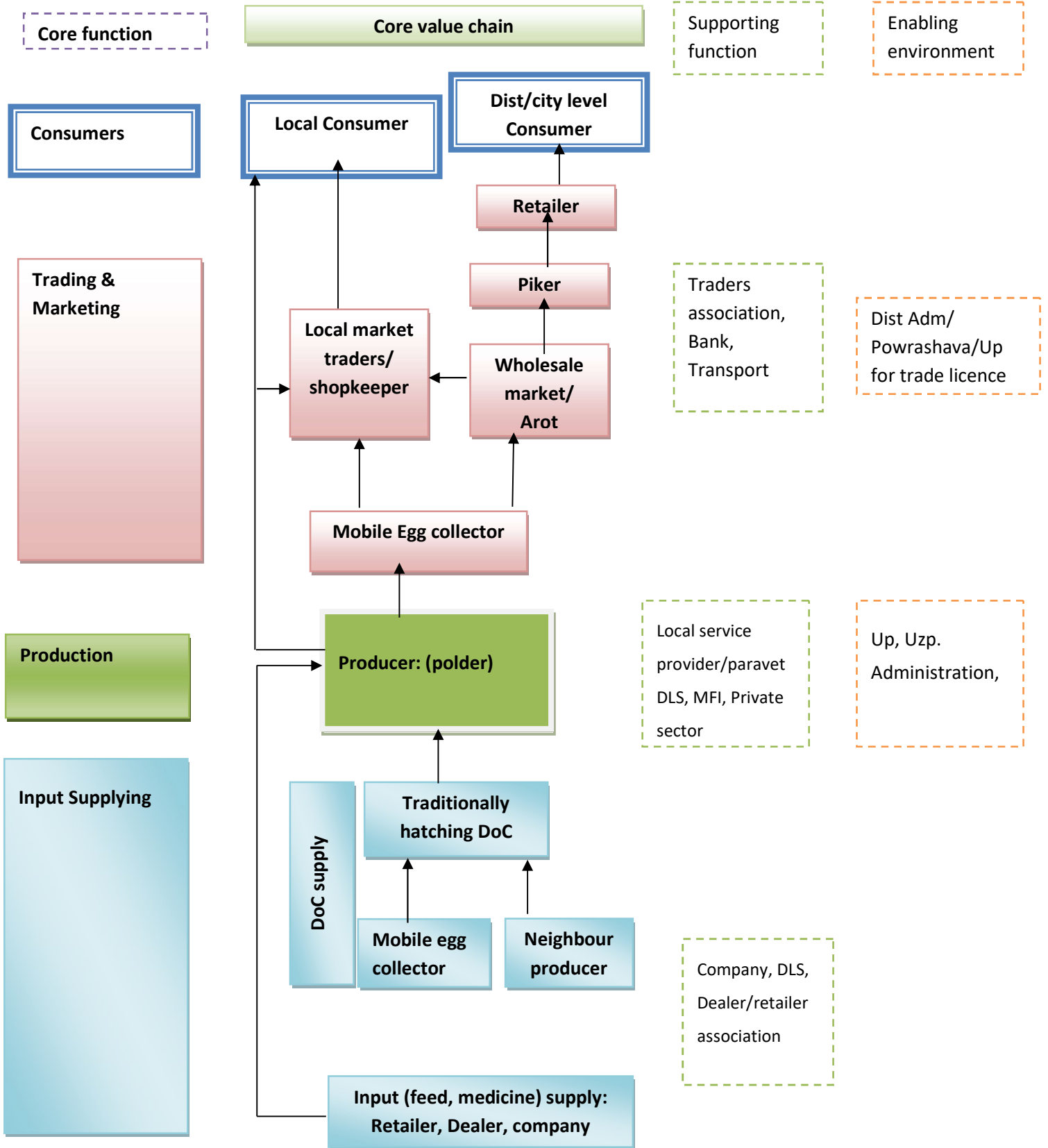


Table-44: Value Chain actor

Core function	Name of actor	Function	Numbers
Input Supply	Mobile egg collector	Egg supply	450
	Neighbour producers	Egg supply	
	Retailer	Feed & medicine	145
	Dealer	Feed & medicine	40
	Company	Feed, medicine	60 at Uz
Producers	Producers	Egg production	100% HHs
Trading	Shopkeeper/retailer (for egg)	Egg selling	300
	Piker	Egg supplier	85
	Wholesaler/Arot		25
Service provider	DLS	Treatment & vaccination service	3
	Local service provider (paravet/Vet doctor)/vaccinator	Treatment & vaccination service	55
	Company	Technical service	
Supporting function	Market place/Hat	Scope for trading	35
	Company/private sector	Licence/dealership	60
	MFI	Credit	15
	Traders association	Scope for trading	

(Sources; KII with market actor)

Potentiality for VC selection:

- Almost every family of this polder is involved with poultry rearing (100%) and 100% managed by women and still now they are established the rights and ownership on this asset.
- It is a women intervention and a family business.
- Major percentage of animal protein is come from egg and meat which easily uptake by rural women and children.
- Have scope to start collective action opportunity leaded by the women through establish the collection point.
- Backyard poultry rearing by traditional method specially housing, feeding and treatment facilities are not improved, so have a scope to improve rearing system as well as productivity improvement.
- Still now consumers have keep the maximum interest in backyard poultry's egg and meat, so have an unmet market demands of this sector.
- The producers did not use the supplementary feed and improved variety DoC as input for increase their productivity, for this perspective have a good scope to introduce and value adding the raw materials.
- Have a scope to create another business as women vaccinator to support this sector.

Opportunity:

- The earning all money from this sector mostly goes to the pocket of women
- Very easy technology and every family have the skill.
- It requires minimum investment and in some cases zero investment

- Still now backyard poultry's egg and meat has higher demand and price in the market.
- In polder area approximately 55 local service provider (Paravet)/vaccinator have been providing the technical services
- More the 60 company have been feed, medicine and in some cases technical support to the poultry owner.
- Approximately 300 shopkeepers/ retailers, 85 piker have been working for effective the output market system.
- All are rearing backyard poultry by traditionally specially the poor housing facilities and not use the supplementary feeding system.

Constraint:

- Women are reared this valuable asset by traditionally and have no any improved technical knowledge on their hand especially the housing facilities, feeding, and treatment.
- Producers are not awarded in vaccination, treatment and veterinary service for the backyard poultry.
- Women did not survey the market price or they have not any market information about the price and always they sold from the farm gate.

Milk Value Chain Map

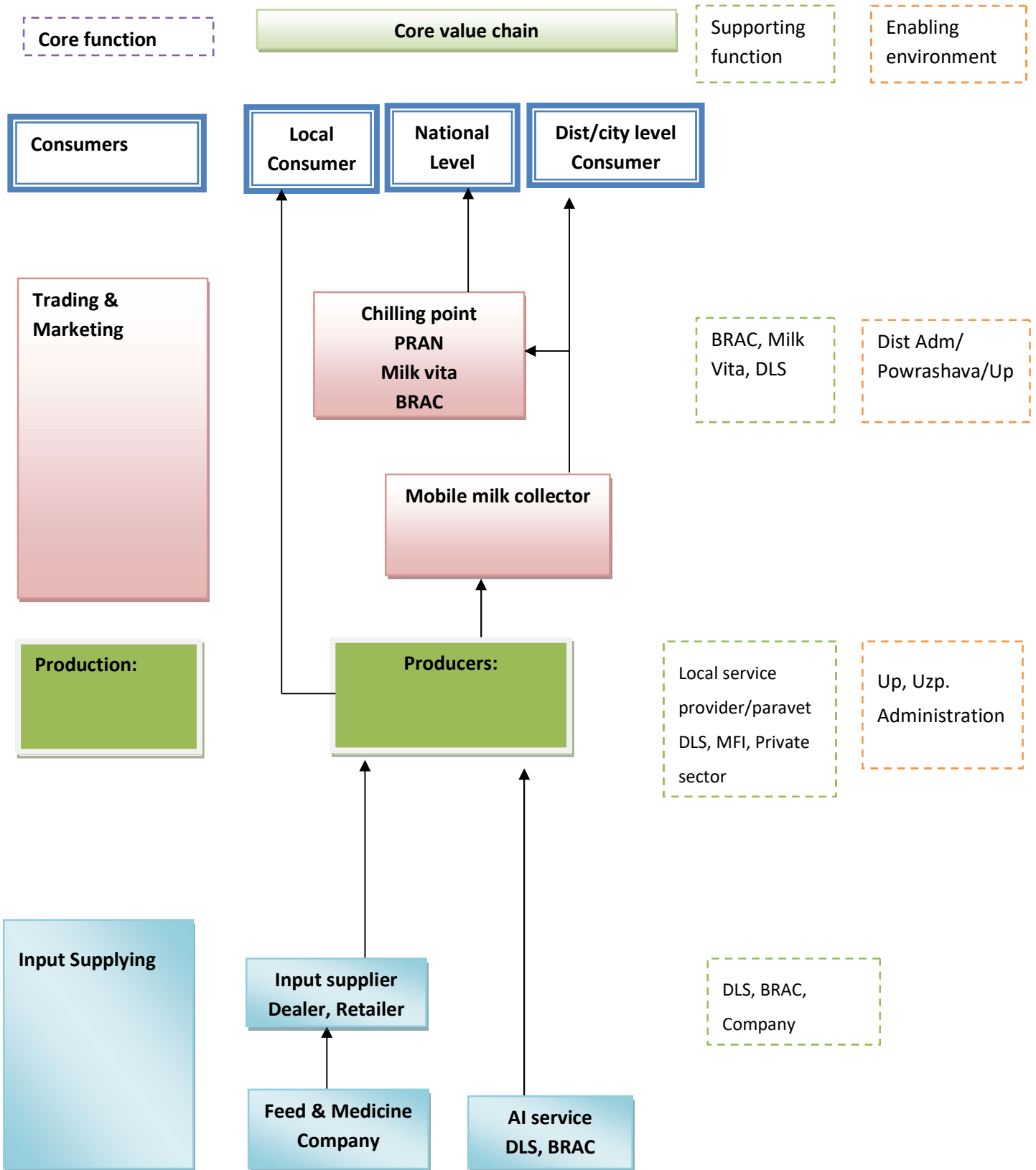


Table-45: Value Chain actor

Core function	Name of actor	Function	Numbers
Input Supply	Retailer	Feed and medicine	145
	Dealer	Feed & medicine	40
	AI inseminator	Artificial insemination	12
Production	Milk Producer		65% HHs
Trading	Milk Vita chilling point	Milk buyer	Outside the polder
	BRAC chilling point	Milk buyer	Inside the polder
	PRAN chilling point	Milk buyer	Inside the polder
	Mobile milk collector	Milk collect	125
Service provider	DLS	Treatment, vaccination, AI and fodder support	3
	Local service provider (paravet)	Treatment & vaccination support	55
	Company/BRAC	Technical service & AI	
Supporting function	DLS	Treatment, vaccination, AI and fodder support	
	Milk vita	Cooperative group formation	1
	BRAC	AI service	1
	MFI	Credit support	15
Enabling Environment	Union parishad, Upazila parishat, Powrashava	Trade Licence, market environment create,	

Potentiality for VC selection:

- Most of the activities done by female so it is scope to take it as a women entrepreneurship.
- It is normal calculation that the 4 membership small family easily maintain their livelihoods from earning sources of two milking cow.
- The producers get the long time return (6-7 months) and it is the great opportunity for poor & extreme poor people as the concern of food security.
- Easily open the different supporting business like; grass cultivation & marketing, fuel marketing by use the by product of cow dung, milk collection & marketing, and it is also possible to start milk processing (cream making) by effective the local technology at the rural area which make new business opportunity.
- In generally 65% households in the polder areas are reared at least one cow for producing milk.
- Three milk processing company like; Milk Vita, PRAN, BRAC are established chilling point and collect very day approximately 6000 litter milk which fulfil the 45% demand of three company.
- Local sweetmeat shops consume or buying the major percentage milk from the producer through mobile milk collector.
- Approximately 80% milking cow are cross breeding but questionable as productivity concern.
- In the area some people already start fodder production as new business

- Have an opportunity of share cow rearing system in the community.
- As the normal phenomenon that, rural women are skilled to manage the all responsibility in relation to cow rearing.

Constraint:

- Low productivity of milking cow, (1.2 litter/local breed and 3 litter/cross breed).
- Some farmers use supplementary feed but most of the farmers did not supply the supplementary feed only they depends the natural or green grass and straw.
- Always milk price fluctuated due to undeveloped milk marketing channel especially when company deny to buying the milk for certain period.
- Some time farmers take advance money from mobile collector and most of the cases it is create a problem to get fair price or they are bound to selling the milk to the collectors.
- Farmers are not aware about the nutritional feed which increase the fate rate as well as milk productivity.