

**Master File
On
Polder 29
Blue Gold Program
Khulna**

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1. Background:

1.1 Introduction: The Blue Gold program has a clear focus on the improvement of the livelihood condition for the benefit of communities living in the polders. The entry point is improved water resources management by enhancing social development and increase agriculture productivity in the program area and to efficient sub sector/value chain. 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.

(Sources; Inception Report)

Program Components:

Community Mobilization and Institutional Strengthening:

The community participation which was undertaken to ensure that the community would be at the driver's seat for the development of its area has significantly increased the sustainability of the Program. The community participation has proven its value for the water sector as the WMGs/WMAs participate actively in the design and planning of the water resources infrastructure and even in its implementation by labour contracts and also monitoring. Moreover, the WMGs will take over part of the operation and maintenance for the water related infrastructure.

Integrated Water Resources Management:

Under Blue Gold, the BWDB will create effective protection in the polders against floods and an infrastructure for water management inside the polder (irrigation and drainage) so that it can be effectively used by the producers (crops, horticulture, fish, livestock, forest). A total area of 25,000 ha will be rehabilitated and 135,000 ha will have further fine-tuning their water distribution and drainage system. The BWDB will sign MoUs with the cooperatives on shared water operation and maintenance responsibilities. In already rehabilitated polders, further fine-tuning could be conducted as to adapt the water distribution system more to the wishes of the producers and the communities at large. The Bangladesh water knowledge centres (IWM and CEGIS) will cooperate with Dutch water institutes to develop and test sustainable solutions for the protection of the polders and other themes like erosion and salt intrusion.

The water resources management component includes two sub-components:

1. Rehabilitation of water resources management infrastructure in selected polders. Erosion and sedimentation, increased salinization of groundwater, cyclone surges and climate change are major challenges for an effective water resources management. Whenever applicable innovative solutions will be applied to increase sustainability of the infrastructure. Optimization of the water use for the productive sectors, often overcoming conflicting interests, will have to be ensured.
2. Capacity building of the BWDB district officers in particular in: participatory water resources development with the community as well with other stakeholders, high quality standards of design and implementation, introduction of innovative concepts and technical solutions.

Food Security and Agricultural Development:

Once the water resources management is effectively rehabilitated, the producers can use this to increase their productivity and their production intensity. Arrangements will have been made between different types of water users (i.e. crop versus shrimps). The increase of productivity will only be possible if farmers are well informed about the improved varieties, crop husbandry practices, thus about the results of the research through effective research extension linkages. The Farmers Field Schools will be the entry point for farmers to test inputs and husbandry practices. Introduction of (small-scale) mechanization will alleviate labour work, in particular for land preparation and processing. Intensification will be by have two or three crops per year, whereby the sea water intrusion in the rivers will limit water intake during part of the year and thus planning among the producers is needed where to use the available (little) water. Blue Gold will facilitate this process of information and train the FFS facilitators and provide some seed money for testing new inputs and technologies.

Business Development and Private Sector Involvement:

The objective of Business development component is; To capture the full benefit of this increase in polder productivity the farming households, their representative organizations, public and private service providers and other market actors are supported by the Business Development Component. This component seeks to enhance the market linkages and system, to create opportunities for value adding and to develop enterprises through value chain development to the benefit of the polder community.

Ultimately the objective is to increase farm household income from agricultural production, to generate business income and expand employment to improve livelihoods and to reduce poverty through market orientation and development. Underlying are the secondary objectives to improve access to more diverse and higher quality food, to reduce periods of food shortfalls and deprivation, and to increase household assets and the consumption of services.

Value Chain Development Steps: Three steps are distinguished within Value Chain Development in Blue Gold, namely Value Chain Selection (VCS), Value Chain Analysis (VCA) and Value Chain Development (VCD). The Value Chain Selection or Prioritization will be an input to the Polder Development Plan (PDP), and constitutes a matching process between participatory defined priorities, available resources and identified market opportunities. The Value Chain Analyses will steer the Business Plans, defining the business opportunities and assessing the feasibility of proposed interventions for a variety of actors. The final Value Chain Development step will implement a value chain intervention strategy and the Capacity Development Plan (CDP) envisaged for the range of actors.

(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 development and 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.

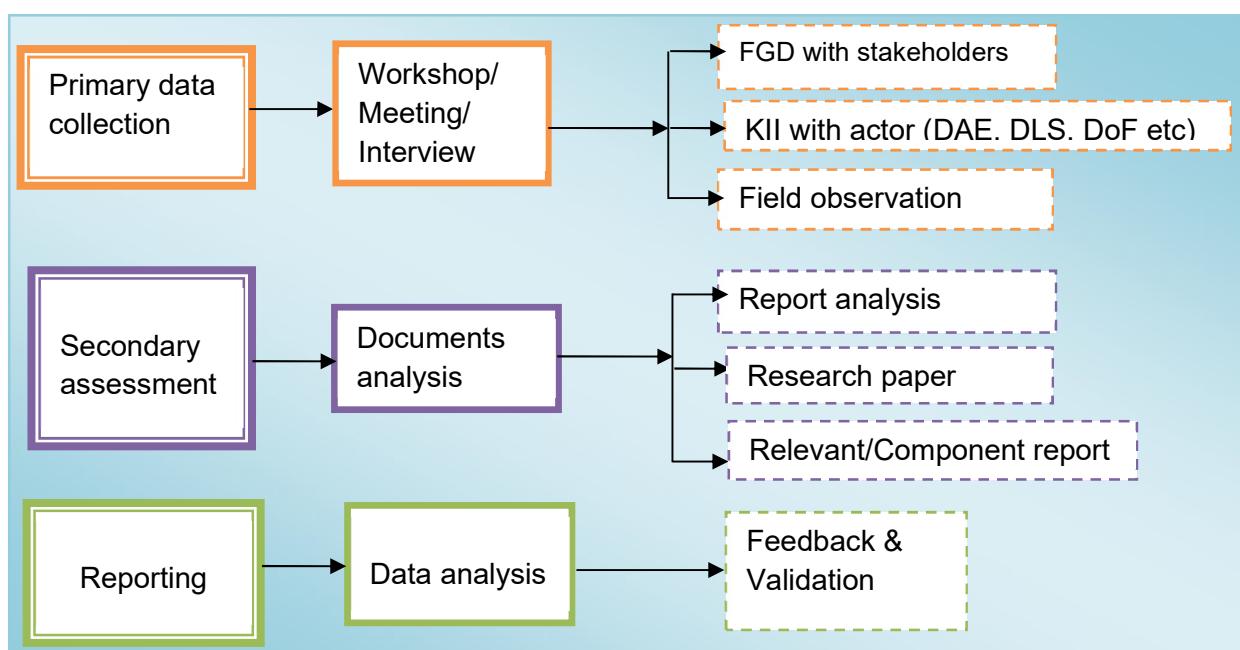
Therefore, this master file also helps to other component of Blue Gold program for use as a effective tools to know the overall situation of livelihoods status, Agril production, marketing and local context in polder area.

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;



Step 01: Primary data collection;

Workshop/meeting/Interview: 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 making the common observation about the polder 29. In this step we conducted 14 FGD (09 with WMG & 05 with producers), facilitated KII with 11 government official (DAE, DLS DoF), 04 NGOs officials, 17 market actors, 02 private sectors and face to face discussion with more than 120 people also visited more than 35 village in polder area. 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.

Step 02: Secondary assessment;

Observation: After accomplished the all methods and learnt inside & outside of the project activities and it is a process to give some of comments in relation to new leaning, challenges and recommendation on specific observation.

Documents and report analysis: Different type of project documents like; log frame, result chain, annual plan of operation and project progress report were kept and analysis in order to gathered the inside knowledge and idea about the project. It has also used as a primary data sources for prepared the field report.

6. 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.

The ground level in drained marshes subsides over time and thus all polders will eventually be below the surrounding water level some or all of the time. Water enters the low-lying polder through water pressure of ground water, 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. Care must be taken not to set the internal water level too low. Polder land made up of peat (former marshland) will sink in relation to its previous level, because of peat decomposing in dry conditions.

Polders are at risk from flooding at all times and care must be taken to protect the surrounding dikes. Dikes are typically built with locally available materials and each material has its own risks: sand is prone to collapse owing to saturation by water; dry peat is lighter than water and potentially unable to retain water in very dry seasons. Some animals dig tunnels in the barrier, allowing water to infiltrate the structure.

Polders are man-made structures consisting of mud walls surrounding a hydrological unit. It is an infrastructure created in the coastal zones of Bangladesh in the 1960s to protect communities from flooding, inundation and salinity intrusion. Polder functions have changed over time and they now play a vital role in providing shelter from disasters and to increase food production.

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.

Overall, the potential of polders as a barrier to salinity greatly relies on a need for better management and maintenance anticipating future changes of climate, combined with policies ensuring controlled and sustainable management of shrimp farming,” said Melody Braun, a climate change specialist with WorldFish in Dhaka.

“With the dikes surrounding the floodplains, the land is protected from the tides. One-way sluice gates regulate the water flow from the polder area out into the channel. Thus the land within the polder zone is free of water logging, salinity intrusion and can be used for farming and other agricultural work,” said Mohammad Emdad Hossain, a scientist and monitoring and evaluation specialist at the [Consultative Group on International Agricultural Research](#).

(Sources; <http://www.irinnews.org/report/98292/bangladesh-polders-under-threat>)

7. Geographical Description of Polder:

3.1 Physical features and Topography:

Polder 29 lies between Latitude 22° 38'00" and 22° 49'00" North and Longitude 89° 23'00" and 89° 28'00" East. The gross area of the polder is about 8,218 ha, with a net cultivable area of 7,232. It is roughly shaped in the form of a triangle, with the North/South axis more than twice as long as the East/West one.

3.2 Geographical location of Polder

Polder 29 consists of 74 mouzas under 5 Unions (including parts of two Unions) of Dumuria and Batiaghata (part) Upazila of Khulna district. The pouroshova included in the Polder is Dumuria and the 5 Unions are Dumuria (part), Bhandarpara, Sahas, Sarafpur and Surkhali (part).

Starting point of Polder 29 is very adjacent from Upazila head quarter and 15 km distance from District head quarter. The total area of Dumuria Upazila is 454.23 KM

The location of Polder 29 is northeast part surrounded by polder 27/1 & 28/2, southeast part surrounded by Polder 31 (part) & Polder 22, northwest part surrounded by polder 26, southwest part surrounded by polder 17/1 and east part is surrounded by polder 30.

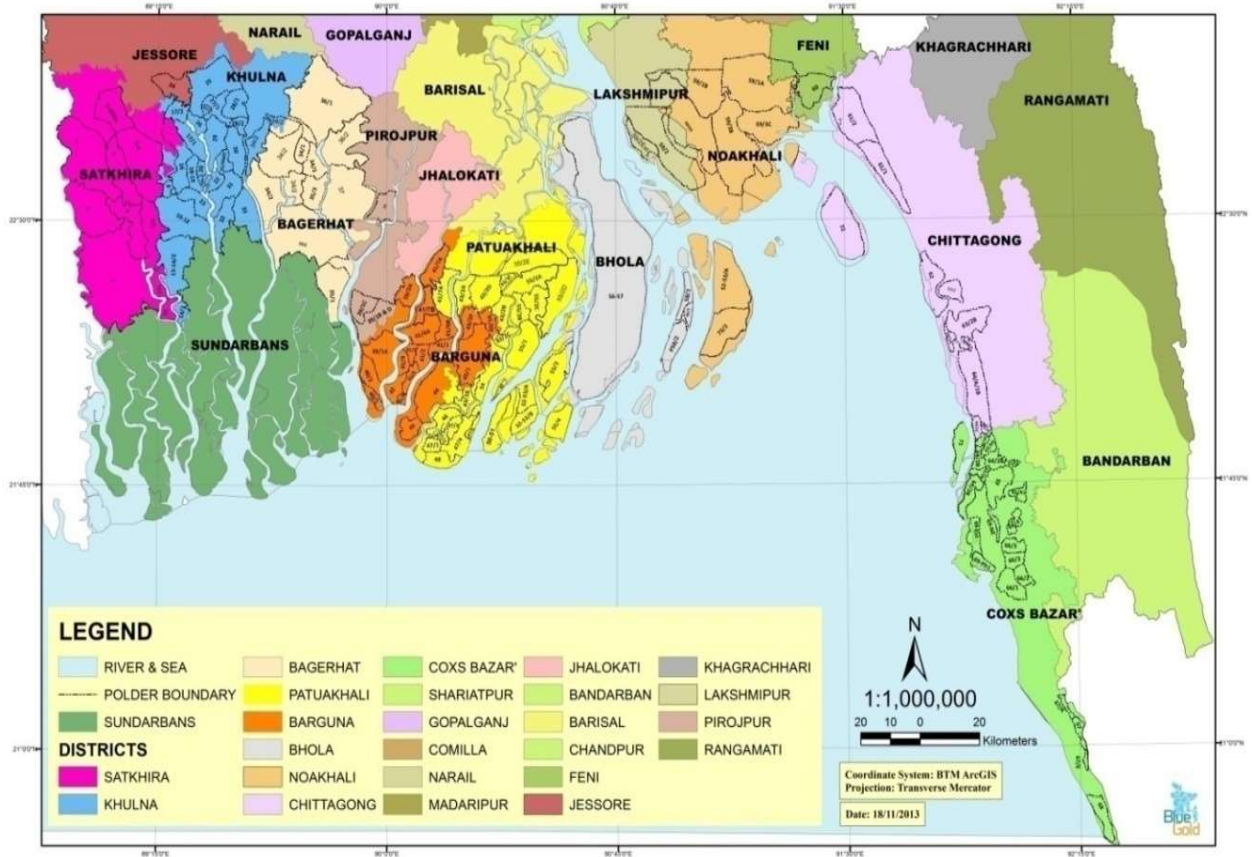
Table 01: Polder at Khulna

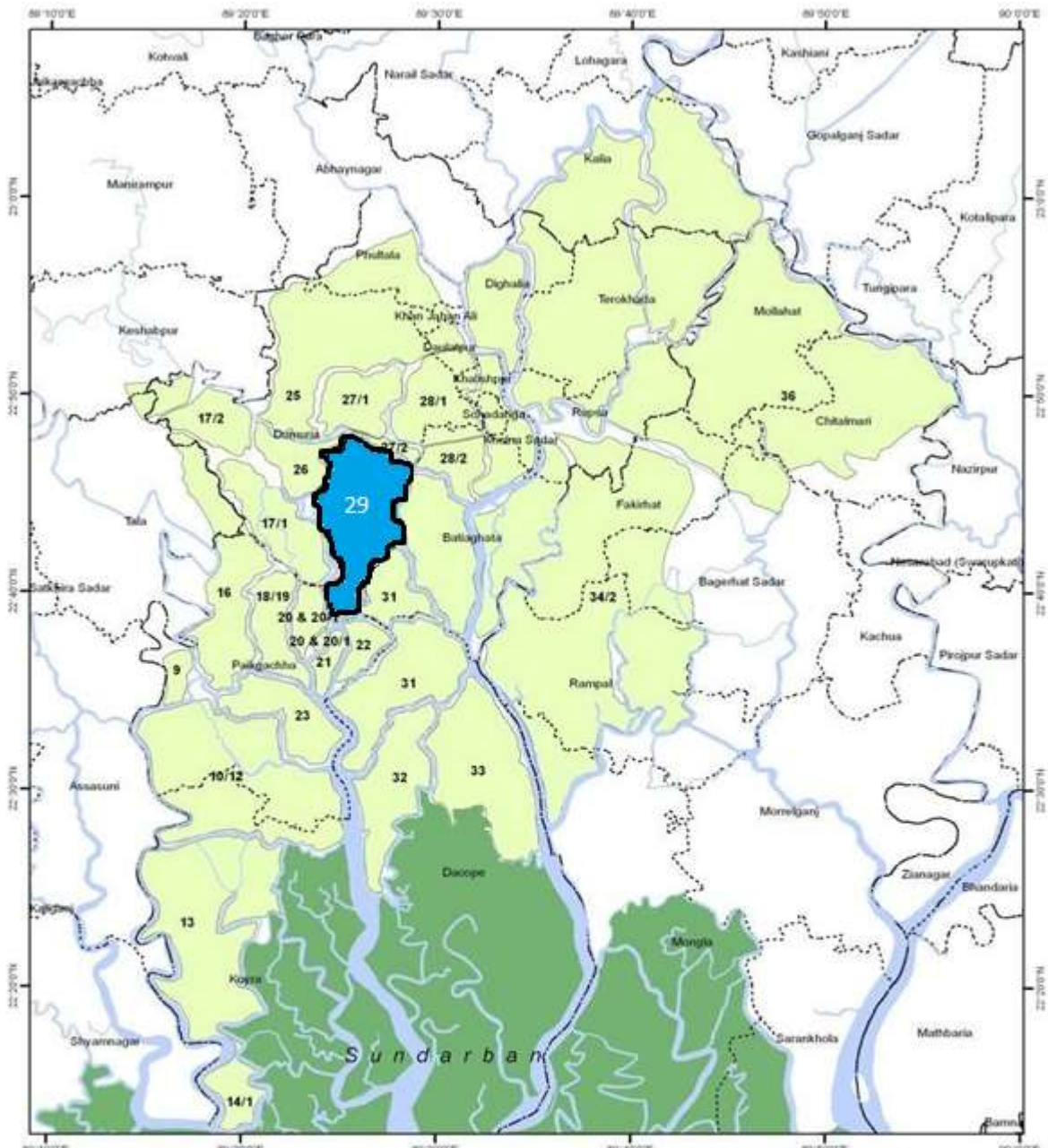
Polder No.	Upazila	Gross Area	Net Area	No. OF WMA	No. Of WMG	Regulator	Flushing Inlet	Drain Channel
22	Paikgacha	1630	1417	1	12	4	48	0
30	Batiaghata	6396	4048	1	41	21	3	37
31 Part	Batiaghata	4848	4048	-	-	9	2	29
29	Batiaghata & Dumuria	8218	6570	2	56	13	11	20
26	Dumuria	2696	2100	-	-	4	0	18

3.3 Weather & Climate

Polder 29 is humid during summer and pleasant in winter. Polder 29 has an annual average temperature of 26.3 °C (79.4 °F) and monthly means varying between 12.4 °C (54.3 °F) in January and 34.3 °C (93.7 °F) in May. Annual average rainfall is 1809.4 millimeters (71.2 in). Approximately 87% of the annual average rainfall occurs between May and October.

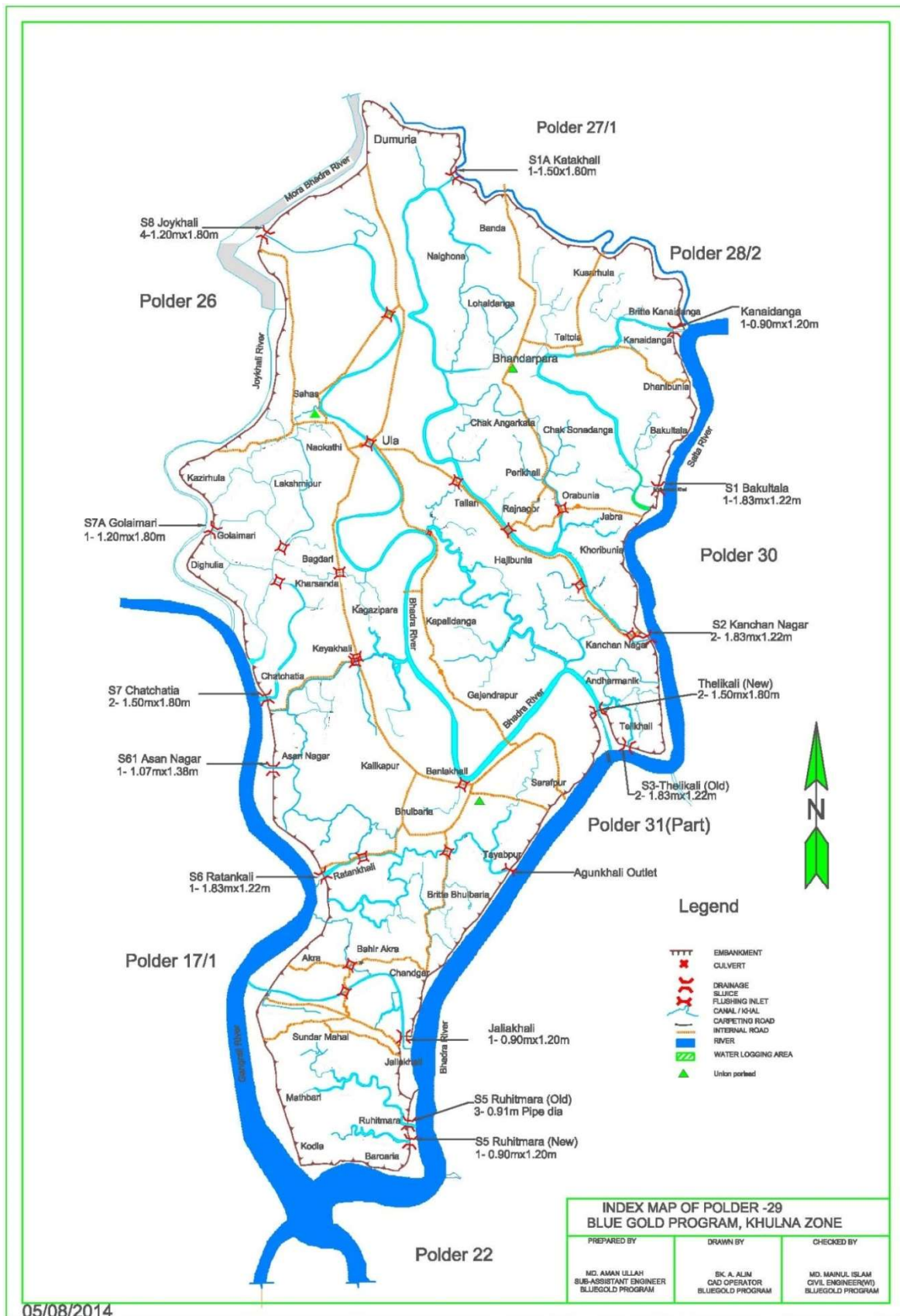
3.4 Map of Bangladesh costal Polders





Polders of Khulna District	
Legend	
— International Boundary	Existing Project
— Major River	Sundarban
— District Boundary	
..... Upazila Boundary	

Map of Polder 29



4. Present situation of Polder:

4.1 General statistics:

District	Khulna	
Upazila	Dumurea and Batiaghata	
Union	Dumurea sadar (part), Vanderpara, Sahos and Sarafpur under Dumurea Upazila and Surkhali (part) under Batiaghata Upazila	
Mouza	74 (70 under Dumurea and 4 under Batiaghata)	
Village	78 (74 under Dumurea and 4 under Batiaghata)	
WMG	56	
WMA	02	

Table 02: Demographic feature of Polder area

	Total population	Male	Female	Total HHs
Upazila	307644	155361	152280	62150
Dumuria (part)	8746	4585	4161	2038
Sahoh	18647	9569	9078	3551
Bhanderpara	16749	8397	8352	3504
Sarafpur	25359	13694	11665	4702
Surkhali (part)	5654	2885	2769	1229
Total in Polder	75155	39130	36025	15024

Table 03: Union wise basic data

	Dumuria sadar	Sahos	Vanderpara	Sarafpur	Surkhali
Area (sqkm)	18.71	12.89	35.12	14.70	14.70
Population	29203	18647	16749	28288	26109
Village	09	22	23	19	30
Mouza	09	20	35	14	35
Hat/bazer	02	4	4	3	4
Education rate	52.6%	66%	62%	69%	82%
Primary school	11	16	15	12	11
High school	4	3	3	1	3
Madrassa	5	11	2	2	10
Mosque		39	13	27	14
Bank	2	0	0	1	0
Road (km)		Pacca-25.04 Kacha-54.13	Pacca-38.5 Kacha-25.90	Pacca-13 Kacha-50	
Hand tub well		197	236	145	
Shelter centre	0	3	1	2	
Community health centre		2	4	3	
NGOs	9	7	4	5	8

(Sources; Upazila website)

4.2 Land ownership:

Land is one of the most important assets in rural society. In a village context, not only does 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 society. The survey results show that for many number of households in the polder this valuable asset is far removed from their life - about 30% of the total households of the area do not have agricultural land, while 4% of households do not even own any homestead area; the percentage of households without agricultural land is particularly high in Dumuria because much of it is an urban area. The people who do not even have their own homestead area, they have houses/huts on khas (common) land or on some other people's land under some (informal) arrangement. In the latter instance, in some cases the tenants pay some annual rent but in most cases they do not have to pay any rent while they always have to show general subservience to the landowners and, have to comply with their various demands.

Table 04: Ownership of Agricultural land: (better with % & total)

Farmer type	Uz Total HHs	Dumurea sadar	Sarafpur	Bhanderpara	Shahos	Surkhali
Land less Farmer(0-0.02ha)	6836	525	1890	151	400	432
Marginal Farmer(0.02-0.2ha)	22995	1045	1306	1137	700	1815
Small farmer(0.2-1ha)	21753	594	1178	1478	2000	2400
Medium Farmer(1-3 ha)	8080	113	254	636	800	600
Large Farmer(<3ha)	2486	20	60	158	350	200
Total	62151 HHs	2297 HHs	4688 HHs	3560 HHs	4250 HHs	5427HHs

(Sources: DAE & KII with SAAO)

Table 05: Land use in different purpose

Land use	Total Uz	Union wise land use (ha)				
		Dumuria sadar	Sarafpur	Bhanderpara	Shahos	Surkhali
HHs	9084	561	564	705	677	
Homestead forest	8646	532	490	545	592	807
Fish culture (pond & Ghair)	15148	351	615	1362	1076	1540
Crop land	31614	1085	1968	2502	2040	4447

(Sources; Land Zoning Report: Dumuria Upazila-2011 & KII with SAAO)

Chart 01: Land use in Upazila

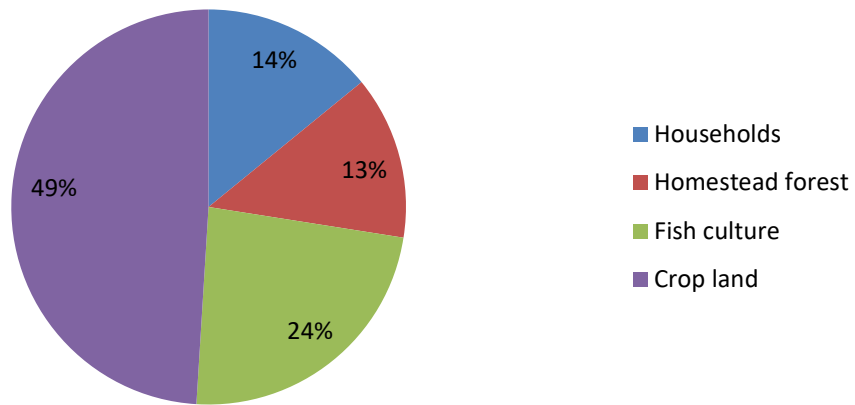


Chart 02: Land use in Polder

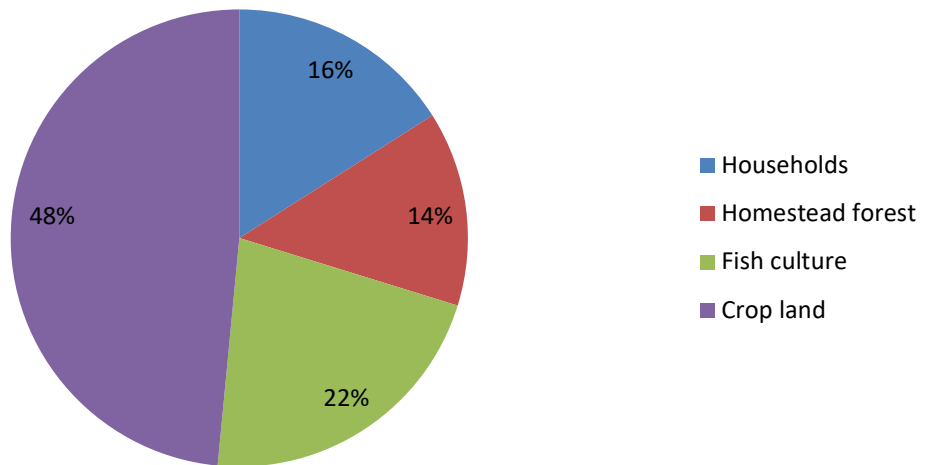


Chart 03: Union wise Land use comparison

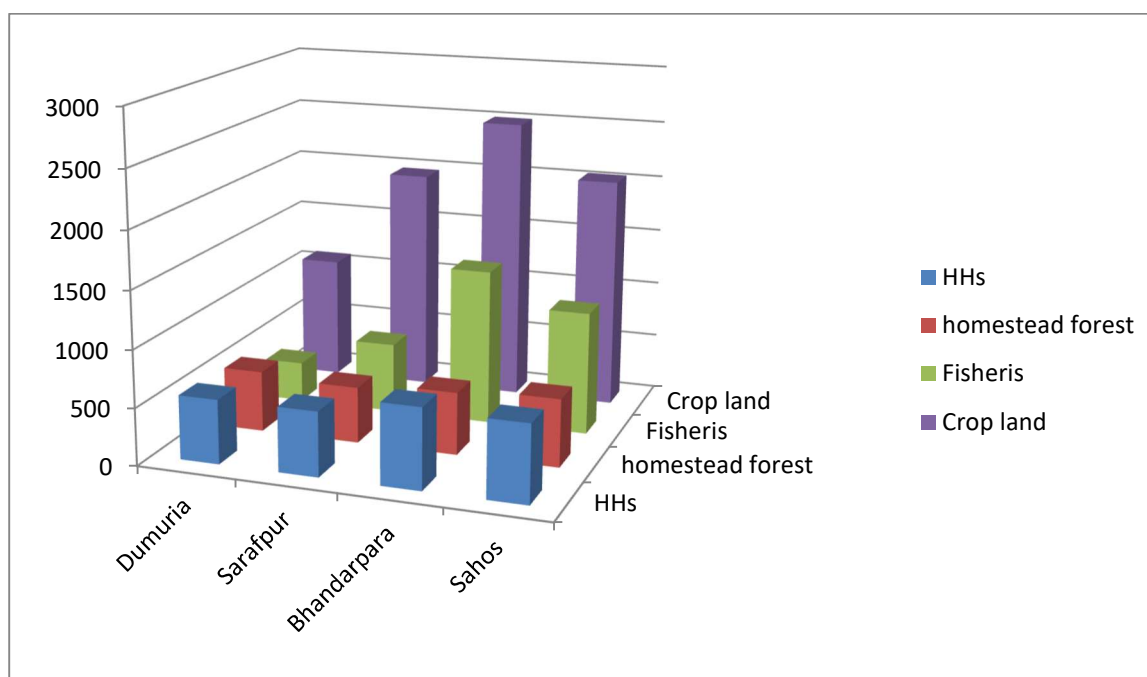


Table 06: Access to land property of different categories of women in polder

Asset	Local female leader	Women of large farmer's HHs	Women of small farmer's HHs
Homestead			
• Use right	√	√	√
• Ownership	X	X	X
• Can decided to sell	X	X	X
Farming land			
• Use right	√	√	√
• Ownership	X	X	X
• Can decided to sell	X	X	X

(Sources: planning study of polder-29 (2007))

4.3 Main income sources and livelihoods:

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 31% of households are depends agriculture as their major sources of income, 20% households selling labor in agriculture, 17% households selling labor in non agricultural sector. A good numbers (13%) of households consider business 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. Business

enterprises of the polder area included 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.

A crop cultivation become less profitable compare to others income sources so people gradually migrated to others business. Considering the geographical context, people gradually inclined towards fish culture activities especially in shrimp culture because people know that the profit margin is high compare to others but initial investment or required money is more for this business.

Some of are involved in services in government office, NGOs, banks, schools and very few numbers (3%) are involved in self-employed like tailoring, mechanics, carpenters etc.

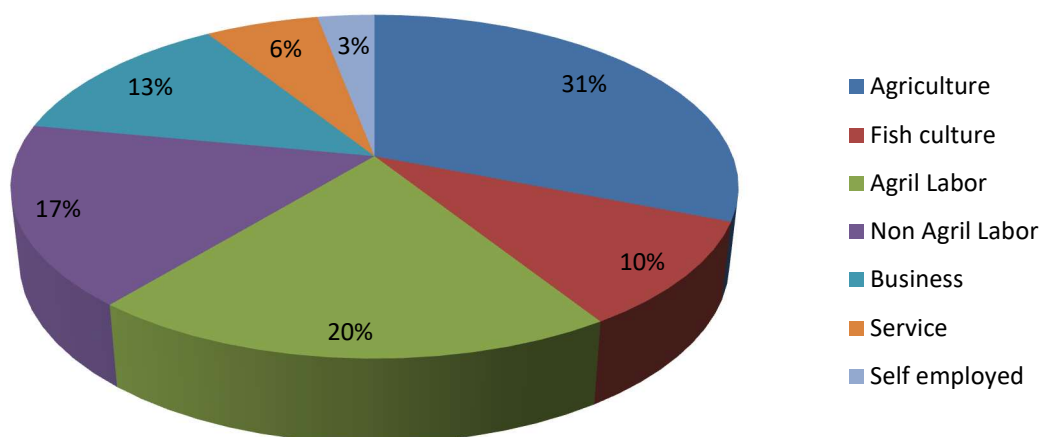
A large number of female-headed households are depending on selling households labor. The female laborers usually get engaged in wage laboring mostly in harvest and post harvest activities. They also get involve in earth work (road/gher construction and maintenance of rural infrastructure). They receive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

Table -07: Major income sources of People.

Name of Union		Total No of HHs	Distribution of HHs according to their major income sources						
			Agric ulture	Fish culture	Agril Labor	Non Agril Labor	Business /trading	Service	Self-employed
Dumuria	No	939	186	149	131	224	176	59	14
	%		20	16	14	24	19	6	1
Bhandar para	No	3385	985	458	687	498	396	269	92
	%		29	13	20	15	12	8	3
Sahos	No	3992	1326	250	639	919	483	239	137
	%		33	6	16	23	12	6	4
Sharafpur	No	3540	1260	300	822	380	487	183	108
	%		36	8	23	11	14	5	3
Surkhali	No	1032	267	160	245	161	88	61	50
	%		26	16	24	16	9	6	5
Total	No	12888	4024	1317	2513	2182	1630	811	401
	%		31	10	20	17	13	6	3

(Sources; Para to para survey IPSWAM planning study-2005)

Chart 04: Major sources of incomes



4.4 Socio economic status:

Without house to house survey, it was difficult to measure the actual socio economic status of every people. Besides, it has not completed the household's survey report for categories on well being status of households in polder 29 as the task of component -1. But it is more required to know the people's socio economic status which indicates the overall scenario of communities. During assessment period, we followed different data collection process by conducting FGD with WMG, individual interview with community's peoples, KII with Union Parishad representative, and sometime over discussion with WMG's president and secretary for get the more information about this issues. Just we set some of criteria to distinguish well being status in four categories. During data collection time it has observed that major percentage people have been continuing their livelihoods by involved in agricultural occupation like; field crop cultivation, fish culture and selling agriculture labor so that most of the peoples are bellow to poor (Extreme poor and poor) some of people are medium rich (Motamuty sachchal) and negligible numbers of people are rich (sachchal). The bellows criteria follows to categories the well being status;-

Extreme poor (Ati Garib)

- 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 deprived from education facilities and involved in selling 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 the back in health care facilities or do not get the treatment support in a timely and sufficient manner.
- Numbers of family members are always more than the numbers of earning members that is dependence on members is always high.
- They are landless and have not any fixed asset and always they are living on government land or land owned by a donor.

Poor (Garib)

- These people sell physical labor throughout the year both in agricultural and non-agricultural fields.
- They do not have any cultivable land only have an own homestead.
- Some time they are 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 value of food.
- They have not ability to cope with any crisis situation without external help.
- They are always living on an unkind loan repayment cycle by receiving money to overcome the crisis.
- They are pulling cycle-van, rickshaw and any other man driven vehicle.
- Some of them are engaged in petty trade.
- They make their living from catching fish and crabs.
- Some of them go outside the area for selling labor and to do some odd jobs.

Medium rich (motamuti sachchal)

- 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 share cropping some more land.
- From their own agricultural production they are able to supply food for their own consumption up to 8-10 months in a year.
- They have *ghers* (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)

- 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 own *ghers* (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.

The following table reflects people own assessment of their well-being status. IPSWAM implemented households surveyed report where only consider the three categories 1st status is poor (Garib) where extreme poor and poor is calculated, 2nd status is medium rich (Motamuti sachchal) and last is rich (sachchal).

Table-08: Well being categories of households better with %

Name of union	No of HHs	Poor	Medium rich	Rich
Dumuria	939	301	430	208
		32	46	22
Bhanderpara	3385	1439	1381	565
		42	41	17
Sahos	3992	2485	1191	316
		62	30	8
Sarafpur	3540	1056	1872	612
		30	53	17
Surkhali	1032	445	391	196
		43	38	19
Total	12888	5726	2651	1897
		44	41	15

4.5 Population density:

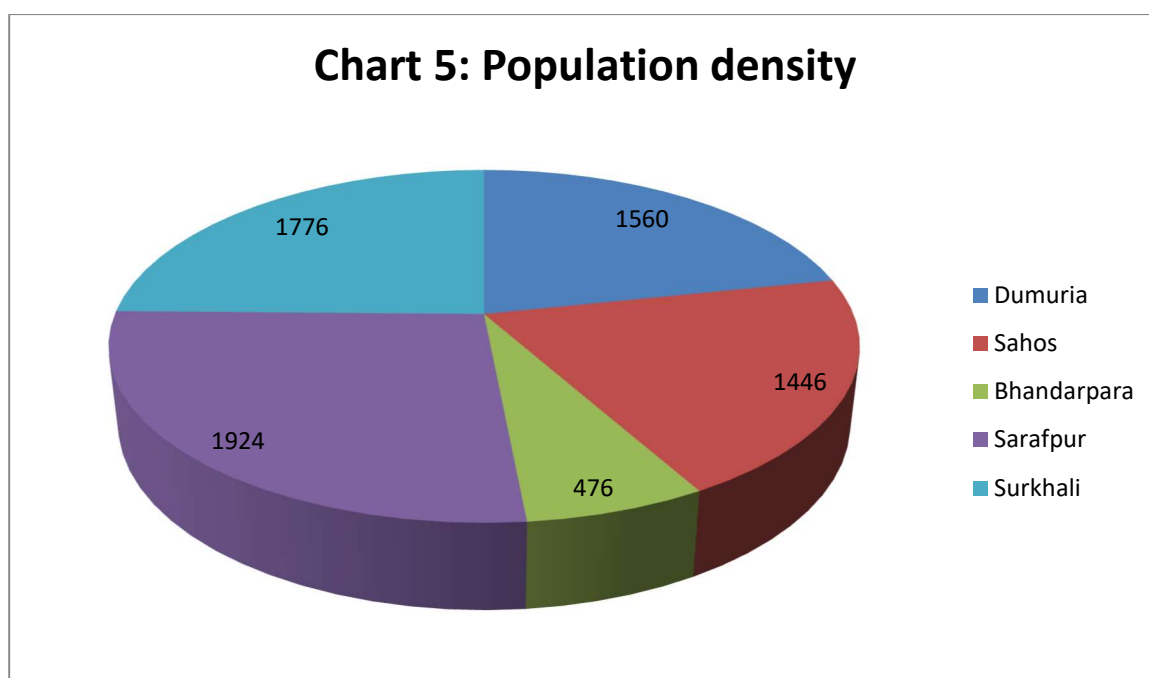
The natural, physical, human, social and financial assets are totally disrupted when the population density of an area become tremendously high. The causes behind of high population density is where have opportunity to find out different livelihoods option, natural resources are available, and people 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 Dumuria union and lowest in Bhandarpara union.

Table 09: Union wise population density

Union	Total population	Total area (sq.km)	Population density/sqkm
Dumuria	29203	18.71	1560
Sahos	18647	12.89	1446
Bhandarpara	16749	35.12	476
Sarafpur	28288	14.70	1924
Surkhali	26109	14.70	1776

(Sources; Union website)



4.6 Daily wage rate:

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 and another causes is female get flexibility in time or never done comparatively hard work in the field. It is not equal in wage rate in rural area and urban area, urban area (Dumuria) wage rate always higher than the union or village area. Wage rate also differentiated considering the nature of work, like earth work or construction related work wage rate always higher than the agricultural work. Again in considering the agricultural sector, wage rate in fish culture (shrimp culture) is always higher than the field work. Table below It is the normal phenomenon in our country context that wage rate always fluctuated by considering the season.

Table 10: Male-Female wage rate

Type of work	Male	Female
Earth work in road construction	300	250
Earth work in <i>gher</i> construction	300	250
Paddy Harvesting	400	300
Paddy Threshing	400	300
Bed/land preparation of vegetables field	300	220
Intercultural operation in vegetable field	300	220
Shrimp and Prawn Harvesting	300	250
Cleaning shrimp and prawn for sale	300	250
Labor (rajmistri)	400	330

(Sources: KII with WMG)

4.7 Drainage facilities:

LGED has constructed several small segments of drains at the growth centers and also beside some road of the Upazila at urban area and in some cases at union level. On the other hand, 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 in some cases due to lack of necessary river training activities and lack of water flow from upstream, the 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:

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. The water salinity is normally flushed during monsoon but cannot fully remove the soil salinity. There is a scarcity of good drinking water in of the polder area especially in the dry season; it is difficult to get a non-saline ground water layer in most areas and the installation cost of such (deep-set) tube-wells is also very high. So, not only is the number of tube-wells for drinking water small in the polder area, in some villages there are no tube-wells at all.

People of such villages have to go to other villages to collect drinking water. Alternatively people of some villages collect drinking water from ponds; in some cases, even such ponds are nonexistent within village boundaries and pond water also gets polluted. And it is mainly women who take pains to bring water, even from long distances, for all household members.

The problem of getting good drinking water becomes intense during the rainy season. People also harvest rain-water for drinking purpose; but it requires a certain capability, which most poor people are not able. For salinity problem ground water are suitable to use in irrigation so shallow tube well and deep tube well are not establish in the polder area only surface water use in irrigation purpose. For ensuring supply of safe drinking water at these areas, several medications might be adopted-digging big ponds and providing the surface water to people by tube well through filtration, through rain water harvesting and also by installing arsenic filter in the existing arsenic affected shallow hand tube wells. However the impact of salinity on environment still remains countable in the area.

DPHE has achieved 100% sanitation coverage at the upazila. During data collection period when discussed with WMG we found that, in rural area a good numbers of peoples (80%) are used healthy & hygienic sanitary latrine (water-seal), It is mainly the poor people (20%) due to their lack of awareness they 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 and in some cases it is questionable as healthy point of view but never people go to the open field to use the latrine.

There are 01 upazila health complex, 03 hospital, and 12 health and family welfare centers at the upazila. (Sources; upazila website). But in polder area 00 community health clinic or family welfare center have been continuing the health related service to the community level. Local people opined that the quality of service being provided at the government health setups should be improved and regular attendance of all officials at these government bodies should be ensured through development of a transparent and answerable services.

4.9 Physical infrastructure:

Dumuria Upazila is covered 454.23 sq km of land, out of which 6.93 sk km is designated as urban are (BBS 2001 community series data base) Compare the physical infrastructure, Dumuria upazila is one of the **developed upazila specially in road communication facilities** from union to upazila level, upazila to district level also inter linked road within the union boundary. Khulna-Satkhira road has passed through the meddle of Dumuria Upazila. In this upazila have sufficient for all sort of services like; different government office provide their all responsible service to peoples, non government organization delivery the financial and development service, private sector & company providing quality input and technical services, and different government and non government bank have been serving the financial transaction for all kind of people at the door step.

4.10 Government office:

Government managed total of 30 different specialized office (DAE, DLS, DoF, land office, social welfare, cooperative department, Health & family planning, BWDB, LGED, Education office, Youth development, DPHE etc) and institutions have been working and provide their specialized service to the peoples. Total of 315 educational institutions have been continuing educational service to the people for make a educated and independent nation. 373 holy place are established for all religious people for completed the religious activities.

Table 11: Government service providing institution and office at Upazila

Sl No	Institution/office	Number
1	Government primary school	110
2	Registered primary school	92
3	High school	63
4	College	12
5	Madrasha	30
6	Community school	05
7	NGO's managed school	03
8	Mosque	237
9	Temple	132
10	Charge (Girja)	04
11	Clinic & hospital	03
12	Health & family planning center	12
13	Orphan center	12
14	Hat-Bazer	42
15	Bank	11
16	Government office	30

(Source: Upazila website)

Table 12: Government service providing infrastructure at Polder area

	Dumuria sadar	Sahos	Vanderpara	Sarafpur	Surkhali
Hat/bazer	02	4	4	3	2
Primary school	11	16	15	12	
High school	4	3	3	1	
Madrasa	5	11	2	2	
Mosque		39	13	27	
Bank	2	0	0	2	
Shelter centre		3	1	2	
Community health centre		2	4	3	

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, PROSHIKA, Projukti Pith, PKSF Palli Unnayon Sangista, CARITAS, CCD A, Buro Bangladesh, HEED Bangladesh, RRD, Ashroy Foundation, Shusilon, Rupantor are active 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; CSISA–MI, SaFal, CNFA, FAO, and World Fish center have been working for implementing their designed activities. It is quite striking to see that more than 50% 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.

Table 13: NGOs and their services

Name of NGOs	Type of service
BRAC	Micro credit, education and health program
ASA	Micro credit
Grameen Bank	Micro credit
Nijera Kori	Micro credit and development program
PROSHIKA	Micro credit
HEED Bangladesh	Micro credit
Ashroy foundation	Micro credit and development program
Shusilon	Micro credit and development program
Rupantor	Micro credit and development program
CSISA- MI	Improving the cereal cropping system including fish through farm mechanization.
SaFal	Strengthening supply chain on Horticulture (vegetable), Aquaculture (fish) and Diary (milk) by value chain approach limited to aquaculture in P29
FAO	Farm mechanization and technology transfer.
World fish center	

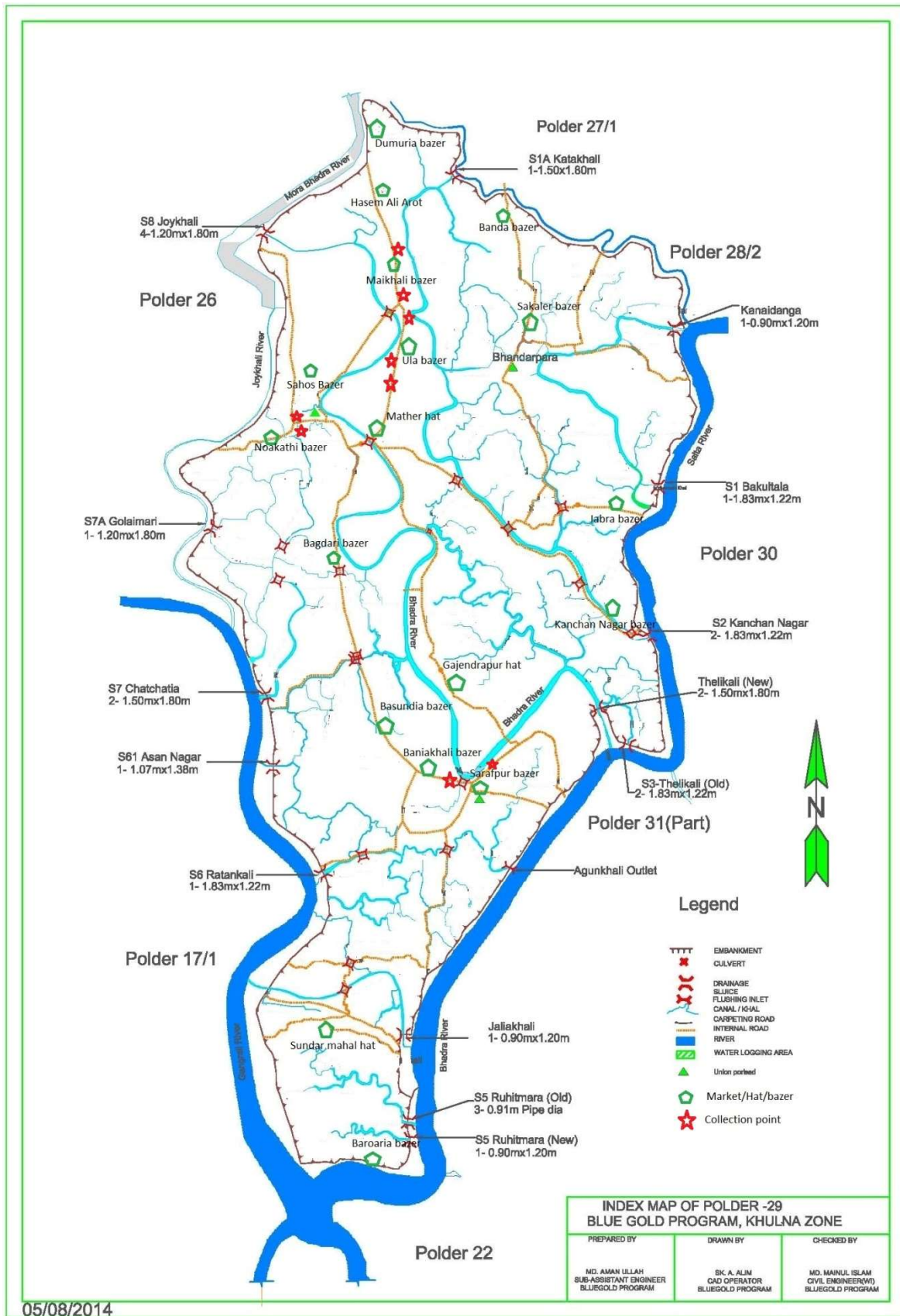
4.12 Market infrastructure:

4.12. a Permanent Market: Upazila administration managed and listed total of 42 markets place (hat-bazer) are established in the Upazila boundary and in Polder area total of 15 markets place are situated. The roof of the permanent markets is constructed by tin-shed and floor are carpeting by brick and in some cases concrete carpeting. 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, fish, and cereal crop marketing. 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. In the Polder area Baroaria, sahos hat, Noakathi bazer, Dula bazer Baniakhali bazer, Matherhat, Senpara bazer and Banda bazer etc sited in particular day and people have got marketing facilities in every day by round the week. Hasem ali Kacha maler Arot (daily fresh vegetable and fish Arot) is the biggest and famous market in the Upazila as well as polder. The big pikers come in this wholesale market from Outside, particularly from Dhaka, Khulna, Jasohor and Barisal. So this market creates an opportunity especially for vegetable and fish producers.

4.12.b Temporary Market: Approximately temporary basis 120 market (hat-bazer) have been running in the upazila boundary, generally this unrecognized market is situated in the center 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. Here markets are splits with different segments like fish, vegetable, rice, sapling etc. Usually poor producer have got the opportunity to sale their surplus product (vegetable, fish, milk, egg, and poultry) and 10-15 different type of retailer (depends on market size) have running the business by collecting the products from outside area.

4.12.c. Collection Point: Generally Dumuria sadar, Sahos and part of Bhanderpara union are focused as vegetable production zone (Yearly 131500 Metric Ton). Hasem ali Kacha maler Arot is the only one vegetable wholesale market in this upazila. Although it is situated in the polder area but it is not enough to give the wholesale facilities for all vegetable producers. In peak season it is create a problem especially vegetable load–unload facilities on the track. For avoiding this circumstance, large farmers directly linked with outside big pikers through local collector/bapary and in some cases authority (traders association of Hasem ali kacha maler Arot) provide business support to build the linkage between the producer and piker. In the vegetable peak season approximately 15 unrecognized collection point are continue by the management of producer and collector. Most of the collection points are situated in front of producer’s house or roadside. Producers harvest the fresh vegetable from field and collect in a point only for load the track. In vegetable peak season, so many points are visible at Moikhali, Ula, Sarafpur and Noakathi village. The vegetable producers have got the marketing facilities through 110 local collectors and 20 Bapary for sale the vegetable to the Dhaka market directly.

4.12.d. Market location Map at Polder 29



4.12.e. Different market inside the polder

Table 14: Hat/bazer inside the polder

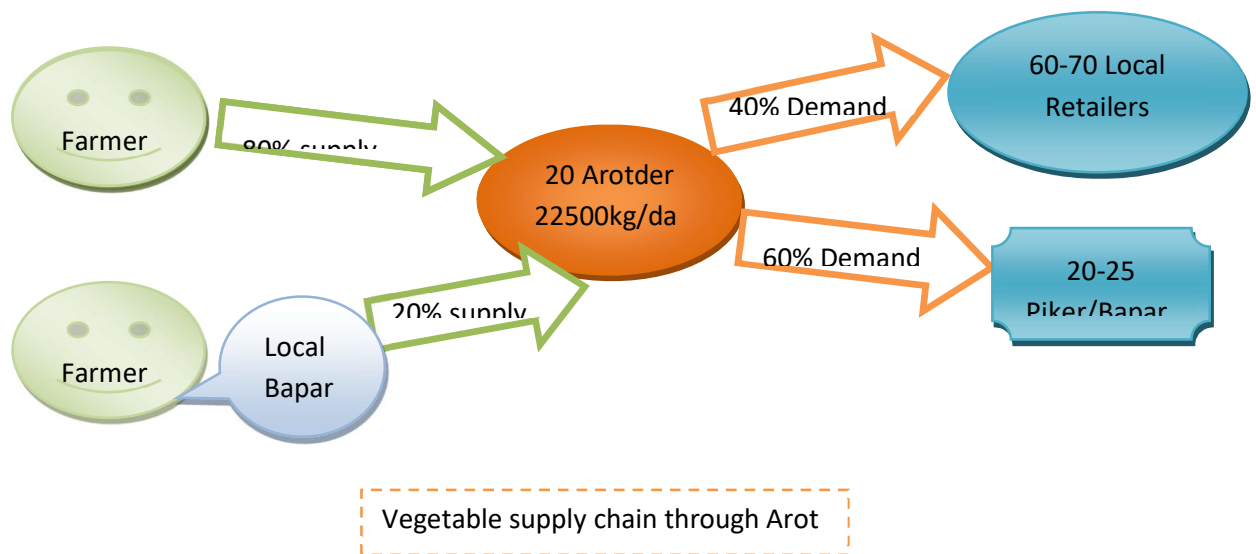
SI No	Name of Hat/Bazer	Effective day	Nature of market	Distance from Upazila (km)
1	Dumuria bazer	Friday, Monday	- All commodities sell - Distance piker come in the market - well infrastructure	0
2	Hasem ali Arot	Every day	- Fish & vegetable Arot - Distance piker come in the market - well infrastructure	0.5
3	Sakaler bazer		- All commodities sell - Fresh vegetable and fish retailing.	6
4	Noakathi bazer	Saturday, Tuesday	- All commodities sell - Fresh vegetable and fish retailing. - Seasonally vegetable wholesale - seasonal collection point	6
5	Ula bazer	Monday, Thursday	- All commodities sell - Fresh vegetable and fish retailing. - seasonal collection point	5
6	Mather hat	Wednesday, Sunday	- All commodities sell - Fresh vegetable and fish retailing.	5.5
7	Sundarmal bazer	Sunday, Wednesday	- All commodities sell - Fresh vegetable and fish retailing. - Seasonally vegetable wholesale	17
8	Baniakhali bazer	Saturday, Tuesday	- All commodities sell - Fresh vegetable and fish retailing.	15
9	Sarafpur bazer	Monday, Friday	- All commodities sell - Fresh vegetable and fish retailing. -seasonal collection point	15
10	Moikhali bazer	Sunday, Wednesday	- All commodities sell - Fresh vegetable and fish retailing. - Seasonally vegetable wholesale - seasonal collection point	4
11	Banda bazer	Sunday, Tuesday, Thursday	- All commodities sell - Fresh vegetable and fish retailing.	4
12	Basundia hat	Monday,	- All commodities sell	9

		Thursday	- Fresh vegetable and fish retailing. - Seasonally vegetable wholesale	
13	Baroaria bazer	Tuesday	- All commodities sell - Fresh vegetable and fish retailing. - Fish wholesaling market	20
14	Kanchan nagar	Sunday, Wednesday,	- All commodities sell - Fresh vegetable and fish retailing.	12
15	Gajendrapur hat	Sunday	- All commodities sell - Fresh vegetable and fish retailing. - Seasonally vegetable wholesale	15

4.12.f. Over view of Hasem Ali Kacha Maler Arot:

It is very great opportunity of polder dweller that Hasem Ali kacha maler (vegetable & fish) Arot are situated in this area and give the very good contribution especially in operate the vegetable & fish business. It is very adjacent to upazila head quarter. This market are situated by the touching of three connecting road so very easy to road communication, one road go to connecting the Khulna-Satkhira high way road just distance is 200 meter, one road go to the Dumuria bazer (Upzila HQ, town) and another road go for connecting with other union like Sahos, Bhanderpara, Sarafpur and Surkhali (part). Well decorated infrastructure in this market also drainage facilities, electricity, load-unload facilities, and transportation vehicle parking facilities is very good. Vegetable and fish Arot are fully separated by two segments and each segments divided by two rows and every rows is longest shape as like a veranda/gallery but splitting by 8 shop/room/Arot so almost 32 arot in this market. Here have a 7 membership strong management committee and they play very good responsibility for directly price negotiation between piker and farmers.

In this Arot every day approximately 20-25 pikers come from Dhaka, Barisal, Pabna and Khulna, 60-70 local level retailer come from different hat/bazer and 150-200 producers have got opportunity to selling their vegetable. A total of 20 Arotder have provided the marketing facilities and their calculation is each Arotder have transected or exchanged 1500kg vegetable per day in peak season. Mainly this Arot are fully depends on the farmer's vegetable and all categories farmer get the facilities to selling the very low to big amount vegetables. On the other hand 000 fish piker come from Khulna and Dhaka also 80 local retailers come from different local level hat/bazer. Every day approximately 30 culture fisher, 75 open water fisher, and 25 shrimp culture fisher got the fish marketing facilities.



Graph text ?

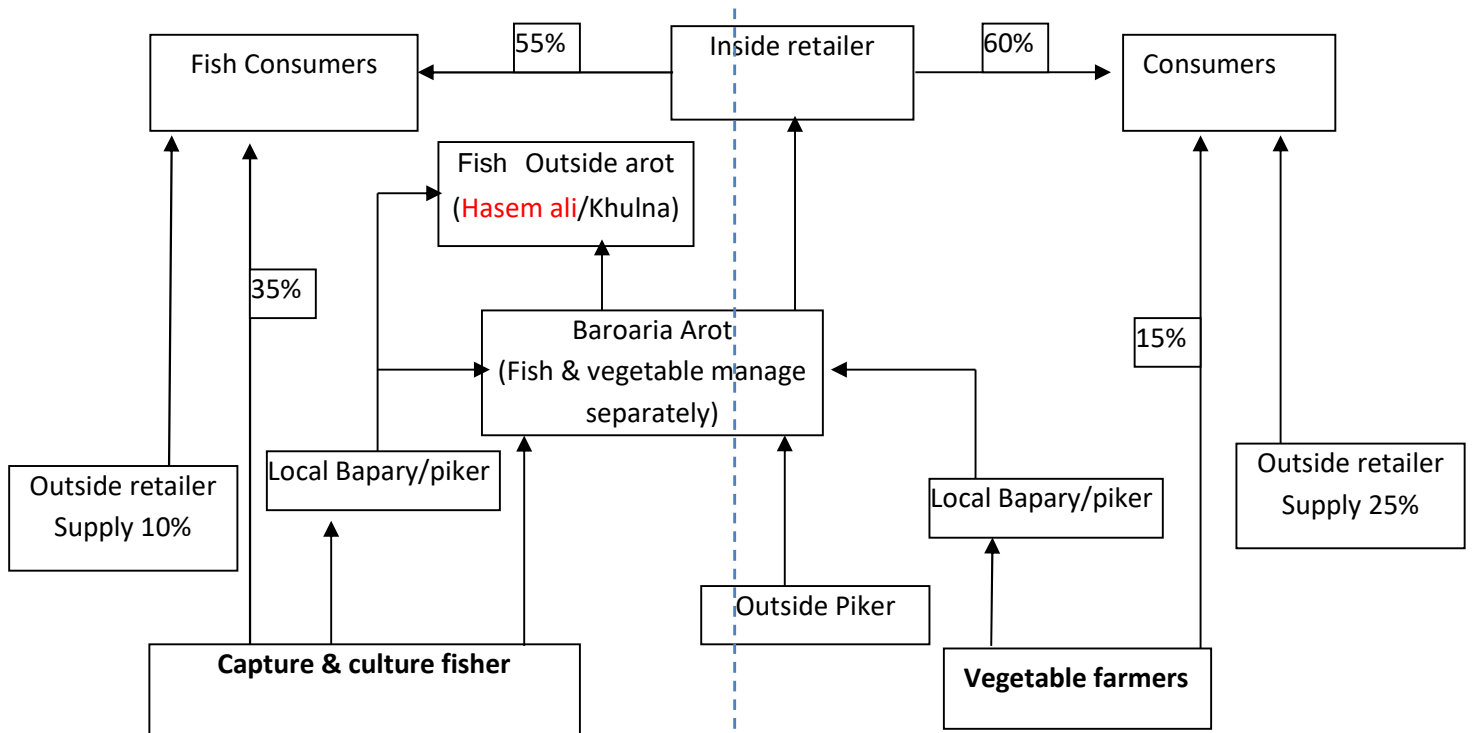
4.12.g. Overview of Baroaria bazer:

This bazer are situated in the last corner of the south of Polder 29. It is very big bazer and here buyer & seller come from approximately 50 villages (inside & outside of polder). Basically this market is focused on fish marketing. All type of market actors like; wholesaler, piker, retailer, supplier, and producer have exchange their goods and services. Vegetable, fish, milk, poultry, rice, sesame and grocery commodities and all type of input like; seed & seedling, fertilizer, pesticide, equipment of agro machineries are available in this bazer. This market is well constructed and has more than 180 small shops which effectively can serve the business activities in the market day. Usually small producers can easily access to selling their surplus product.

In case of Fish market: This area mainly focused by fishing zone and here so many Bagda and Galda hatchery are cultured also fishermen captured more fish from *Vadra* river which has flown by touching East-south side of the bazer. So that both culture and capture fish are available in this area. Considering 100% demands of consumers, 35% fish supply directly from fishermen (both culture & capture), 55% fish supply from inside retailer who collect fish from Baroaria Arot, and only 10 % fish supply from outside retailer basically who come from polder 22 & 30.

In case of vegetable market: In surrounding the Baroaria bazer Considering the consumers demands, 15% vegetable supply directly from farmers, the causes behind is only homestead vegetable supply, 60% vegetable supply from inside retailer who collect vegetable from Baroaria arot and this arot collect vegetable from outside Piker/Bapary and very few amount

from vegetable farmers, and 25% directly supply from outside retailer. By analyzing this market it is clear that only 15% consumer's demands are able to fulfill by local production. But consider the vegetable production in polder area the situation is reversing than compare this market. The causes behind is this market is situated in the Batiaghata upazila and last part of the polder and it is remote connection with vegetable zone in polder (Dumuria sadar, sahos & Bhanderpara).



4.13 Transportation facilities:

Khulna-Satkhira road has passed through the middle of Dumuria Upazila and north part of the polder-29 also touching the Dumuria bazar and upazila head Quarter. The road has insured the easy communication for the upazila with Khulna city, Satkhira town and adjoining the upazilas. LGED is assigned to improve the internal roadway network of the upazila. Most of the LGED roads are narrow, and lack of efficient road-side drainage facility at the high density areas affects roadway condition during the monsoon. Due to the bad condition of internal links road from upazila HQs to union HQs as well as village, the people are cannot easily move here and there. In the links road, Auto bike, Mahindra, Nosimon, Tempo, horse pulling car (Ghorargari), rickshaw, van and motor cycle is the main transportation vehicle in the polder area. There are no any railway coverage in the Dumuria upazila but river Bhadra has passed through the middle of the upazila and another branch of river Bhadra has flown through the eastern part of the upazila. River Salta has flown through the western part of the upazila and has fallen into the river Bhadra. Beside, huge numbers canals have flown over the whole upazila just like fishing net. Good number of water vessel (boat, traller- Shallow machine driven boat)) are used for transportation vehicle to carry both goods/commodities and passengers. However, all of those rivers are affected by natural siltation and navigation of them is under threat.

4.14 Drinking Water Availability:

The area belongs to the coastal zone thus in the Southern part the shallow ground water is saline and not suitable for drinking; consequently a deeper layer had to be explored for availing potable water in the area. Moreover, in this part of the area a suitable water layer is not available in many village areas for the installation of tube-wells, thus inhabitants of these villages have to collect drinking water from distant areas, where a suitable water layer exists. Thus many people, mostly women, have to walk long distances to carry drinking water, which is more difficult during the rainy season. In spite of all these hazards people of the area mostly drink tube-well water. In some villages there exist large ponds, which are well protected from river tidal flow and some women collect water from them for drinking purpose. Provision of sand filters to the protected large ponds could facilitate the availability of pure drinking water to the villagers, who otherwise need to be motivated to boil the pond water before drinking.

4.15 Environmental Hazards:

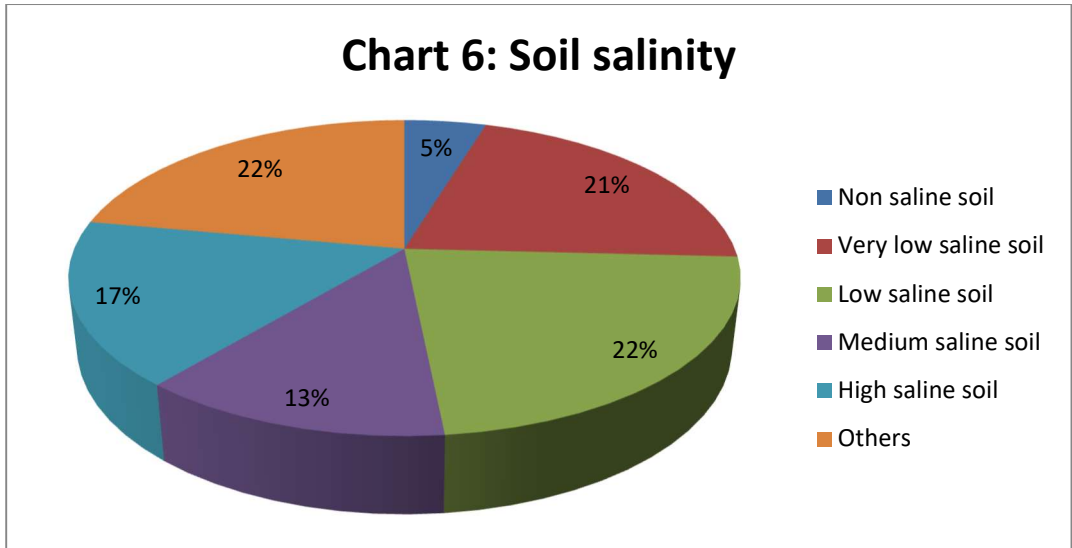
4.15. a. Soil salinity;

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, so it 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.

Table 15: Saline affected area in the Upazila

Soil salinity	Covered area (ha)	Percentage (%)
Non saline soil	2100	4.7
Very low saline soil	9468	21.1
Low saline soil	10100	22.6
Medium saline soil	5710	12.7
High saline soil	7500	16.8
Others	9911	22.1

(Sources;DAE)



Sources; DAE

4.15.b. Siltation:

Siltation is the common problem of Dumuria upazila. 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 caused barriers to the water flow of the rivers and canals and created water logging in the beels and floodplains that enhanced the deposition of silt carried out in the rainy season, as a result, low land or bottom of the beel have been raised. As soon as the beels are silted up, the conjunction of the canals mouth are also raised rapidly and resulting the devastated the connectivity between rivers/canals and beel/low land. This is how the water is logged at the different location and disrupted the normal ecosystem.

4.15.c. Water logging:

Water logging is the major problem of Dumuria upazila. Siltation is one of the main causes of water logging. All the year most of the outlet of the water canals that are supposed to drain out the water have been raised much higher than low land or beels, floodplains etc. Water logging does not happen only the geographical position rather human intervention like different construction 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. 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. It has created the **crisis of firewood** along with destruction of herbs and shrubs, so people in some area have started to collect pit coal, which is used as an alternative fire wood just after drying it up in the sun for 2-4 days.

4.15.d. River erosion:

River erosion is one of the big issues of Dumuria upazila. In general, the river erosion is observed along the eastern and southern side of the polder. Sharafpur, Bhandarpara and Surkhali unions are very much affected by the river erosion. The main river Bhadra flows beside the northern part of the upazila that has caused the river erosion all over the upazila. The upstream discharge carries a lot of sediment that is deposited on the river bed, reducing the water holding capacity. As a result, during monsoon, excessive water flow causes a crisis and changes the direction of water flow, which ultimately turns to erosion in many areas. Sharafpur union is the most affected area by the river erosion crisis. By this time, people become homeless, lose their property, and flood 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 places to search for food and shelter.

4.15.e. Cyclone and tidal surge:

Everyone knows that the coastal belt of Khulna is severely affected by natural disasters like cyclones and tidal surges forming in the Bay of Bengal. Due to its geographical location, Dumuria upazila is more vulnerable to cyclones and tidal surges. Wind speeds (240 km per hour) accompanied by extreme rain and tidal inundation up to 6 to 7 meters hit the coastal area, maintaining uncertainty but as a normal phenomenon in the nearest sea area. People become helpless, fishermen are lost or die due to lack of or absence of, or ignore the weather forecasting or not having life-saving appliances. Apart from the loss of lives, there is a high economic loss like properties, settlements, infrastructures, forests, field crops, livestock, etc. There is evidence that the devastating cyclone Aila on 25th May 2009 caused damage to the lives and properties of this upazila.

4.15.f. Arsenic contamination

By June 2003, testing for arsenic contamination was completed in all the shallow and deep tube-wells in Dumuria Upazila by a local NGO, ADAMS, under the supervision of DPHE. About 65-70% of shallow tube-wells in the whole of Dumuria Upazila were contaminated by arsenic (>0.05 mg/l). No deep-set HTW has been found to contain arsenic contamination.

According to DPHE personnel no shallow tube-well is being installed at present, rather deep tube-wells are being installed, although the progress is slow.

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 lung 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 protected from arsenic contamination.

4.16 Vulnerability and their impact:

Table 16: Vulnerability impact in the Polder

Vulnerability	Possible impact	Union	Intensity of Impact
Salinity	<ul style="list-style-type: none"> • Decrease the freshwater availability. • Negative effect of crop production. 	Sarafpur, Sahos and Bhandarpara	Increasing
Flood	<ul style="list-style-type: none"> • Poor people become vulnerable • Loss of properties and damage of agricultural production. • Embankment damage. • People become helpless and suffer from malnutrition. • Scarcity of food and shelter. 	All union in polder	
River erosion	<ul style="list-style-type: none"> • Loss of life and properties • People become helpless and suffer from malnutrition. • Poor people become vulnerable 	Sarafpur	Increasing
Siltation	<ul style="list-style-type: none"> • Unusual flooding • Water logging in different place • Reduce the soil fertility 	All union in polder	

	<ul style="list-style-type: none"> • Raised the canal and river bed 		
Water logging	<ul style="list-style-type: none"> • Damage the agricultural crop. • Interrupt the cropping schedule. • Drainage blockage affects transportation system. • Polluted the surface water which is the responsible for water born disease and create other health hazards. 	Sarafpur,Sahos	increasing
Cyclone	<ul style="list-style-type: none"> • High economic loss like properties, settlement, infrastructures, forest, field crops, livestock. • Water born disease • All people become more vulnerable. • Required post rehabilitation activities. 	All union in polder	
Arsenic	<ul style="list-style-type: none"> • 		

(Sources; Land Zoning Report: Dumuria Upazila-2011, KII & FGD)

4.17. Crisis Period In the area:

Considering the well being situation of the people in the polder area 00% **results from copy and paste** people under the poor (poor & extreme poor) and all are not have a “surplus food saving” through year. Most of them are living hand to mouth by doing hard work and always searching the new income sources. 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. In the Polder area there are very limited agricultural activities during the months of Aswin, Karlik and first half of Agrahayan (mid September to mid November), 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 shops on credit; and they minimize the amount of meals a day.

The following table gives a picture of the overall situation of the majority of people with reference to crisis.

Table 17: Crisis period for the people at polder area.

Union	Crisis period												
	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
	Baishakh	Jaistha	Asher	Srabhon	Vadra	Aswin	Kartik	Agrahayan	Pows	Magh	Falgun	Chaitra	
Dumuria							A						
Bhanderpara	B						A			C			
Sahos							A						
Sarafpur	B1						A						
Surkhali							A						

Sources; IPSWAM planning study 2005

A=All village

B= Nalghona, Ghona taltala, Ghona, Telikhali, Purbo Kanchannagar.

B1= Kalikapur, Sarafpur, Taltala, Bhulbaria, Britti Bhulbaria

C= Purbo Kanchannagar. **Why? This area then?**

Table 18: 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	Rich man always savings the surplus money and food for provide to other for copping the situation

4.18. Water Management Group (WMG) and Farmers Field School (FFS).

Sl. No.	Name of Union Council	Name of WMG	Total Member			No. FFS	Name of Village	Distance from Upazila HQ in Km
			M	F	Total			
1	Sahos Union	SahosJoykhali WMG	29	6	35	8		Up to 10 Km
2		SahosRazapur WMG	39	11	50			Up to 10 Km
3		SahosModdhopara WMG	39	51	90		Sahas Madhyapara	Up to 10 Km
4		SahosKumarghata WMG	62	42	104			Up to 10 Km
5		SahosGhoshgati WMG	35	30	65		Sahas Ghoshgati	Up to 10 Km
6		SahosNoakathi WMG	112	131	243		Noakathi	Up to 10 Km
7		KDC (Kazir hula, Dudher hula, Charabon)WMG	33	45	78		KDC (Kazir Hula, - Dudher Hula,- Charabon)	11 to 20 Km
8		Bagdari WMG	69	81	150		Bagdari	11 to 20 Km
9		Kukhiya WMG	22	6	28			11 to 20 Km
10		Kharshanda WMG	96	36	132		Kharshanda	11 to 20 Km
11		DGKC(Digholia .Golaimari, Khotakhali ,Chotobond) WMG	38	58	96			11 to 20 Km
12		Kagojipara WMG	52	29	81			11 to 20 Km
13		Chatchatia WMG	30	41	71			11 to 20 Km
14		KapaliDanga, Char Kapalidanga WMG	24	11	35			11 to 20 Km
15		Gazendropur (North)WMG	72	28	100		Gazendropur (Uttar)	11 to 20 Km
16		Gazendropur (South) WMG	25	25	50		Gajendropur (Dakshin)	11 to 20 Km
17	Sharafpur Union	Keyakhali WMG	40	17	57		11 to 20 Km	
18		UttorKalikapur WMG	131	59	190	Uttar Kalikapur	11 to 20 Km	
19		Senpara WMG	69	31	100	Senpara	11 to 20 Km	
20		AshanNagor WMG	26	36	62		11 to 20 Km	
21		DokkhinKalikapur WMG	17	55	72	Dakshin Kalikabari	11 to 20 Km	
22		Jhaltala WMG	28	37	65		11 to 20 Km	
23		Ratankhali WMG	21	29	50		11 to 20 Km	
24		Bhulbaria WMG	81	23	104	Bhulbaria	11 to 20 Km	
25		Britti –Bhulbaria WMG	40	21	61	Britti Bhulbaria	11 to 20 Km	
26		Baniakhali WMG	35	37	72	Baniakhali	11 to 20 Km	
27		Sharafpur (North) WMG	51	34	85		More than 20 Km	
28	Sharafpur (South)WMG	66	24	90		More than 20 Km		

Sl. No.	Name of Union Council	Name of WMG	Total Member			No. FFS	Name of Village	Distance from Upazila HQ in Km
			M	F	Total			
29		Taiyebpur WMG	103	27	130		More than 20 Km	
30		BCG(Britti- Birala- Chandghar-Jaliakhali) WMG	35	25	60		BCG (Britti Birala, Chandghar, Jaliakhali)	
31		Akra-Bahirakra WMG	40	42	82		Akra BahirAakra	
32	Bhandarpara Union	Bhandarpara WMG	28	5	33	8		
33		RazibpurDokkhinMahal WMG	54	23	77			
34		Moikhali WMG	58	22	80			
35		UlaCharail WMG	24	70	94			
36		UlaDokkhinWMG	32	69	101			
37		Banda WMG	90	110	200			
38		Ghona WMG	65	45	110			
39		Lohaidanga WMG	20	30	50			
40		Taltala-Kushan Hula WMG	36	70	106			
41		DKB(Dhanibunia-Kanaidanga - Brittikanaidanga) WMG	16	19	35			
42		Perikhali-Chalk sonadanga WMG	30	42	72			
43		Orabunia-RaznagorWMG	27	33	60			
44		Bakultala WMG	41	19	60			
45		Jabra WMG	40	34	74			
46		Kharibunia WMG	77	17	94			
47		KanchonNagor, Potkhali ,Andharmanik WMG	24	26	50			
48		Telikhali WMG	27	31	58			
49	Hajibunia, Taliyan WMG	70	69	139				
						Hajibunia	11 to 20 Km	

Sl. No.	Name of Union Council	Name of WMG	Total Member			No. FFS	Name of Village	Distance from Upazila HQ in Km
			M	F	Total			
50	Dumuria Union	Dumuria (North) WMG	19	11	30			Up to 10 Km
51		Dumuria (South) WMG	40	36	76			Up to 10 Km
52	Shurkhali Union	Sundormahol (East) WMG	13	22	35			More than 20 Km
53		Sundormahol (West) WMG	30	14	44			More than 20 Km
54		KodlaMottbari WMG	62	47	109			More than 20 Km
55		ShomvuNagor WMG	67	28	95			More than 20 Km
56		Baroaria- Ruhitmara WMG	53	38	91			More than 20 Km
Total			2603	2058	4661			

5. Economic sector: **only polder interest**

A developing country, Bangladesh was the world's 48th largest economy as of 2008, as graded by the International Monetary Fund. At US\$1,500, the per capita income of the country is much lower than its neighbors India and Pakistan. During the first decade of the 21st century, Bangladesh's economy grew at a rate of 6%-7% annually.

(Sources;http://www.economywatch.com/world_economy/bangladesh/structure-of-economy.html)

The economic structure of Bangladesh can be divided into the following three sectors:

Primary Sector: With 45% of the workforce engaged in the primary sector (est. 2008), Bangladesh can be called an agrarian economy. Agriculture contributes 30% of the country's GDP and enables Bangladesh to achieve its macroeconomic objectives, including food security, poverty alleviation, human resources development and employment generation. Cooperatives are increasingly motivating farmers to employ modern machinery. Bangladesh primarily produces jute, rice, tobacco, tea, sugarcane, vegetable, pulses and wheat. According to the composition of sub sectors, the crop sector contributes 72% of the production, followed by Fisheries at 10.33%, livestock at 10.11% and forestry at 7.33%. The unpredictable weather and natural calamities disrupt the country's economy frequently. To overcome this problem, the government has constructed several irrigation projects to conserve rainwater and control floods. The projects also include controlling pests and using high quality seeds.

Secondary Sector: This sector mainly comprises of small and medium enterprises that give employment to 30% of the country's workforce (est. 2008). It generates 25% of the GDP and 40% of the gross manufacturing output. There are several mills and factories, producing jute, garments, cotton, paper, textile, pharmaceuticals and fertilizers, among other things. This sector mainly continue the economic activities based in the urban area especially center in Dhaka.

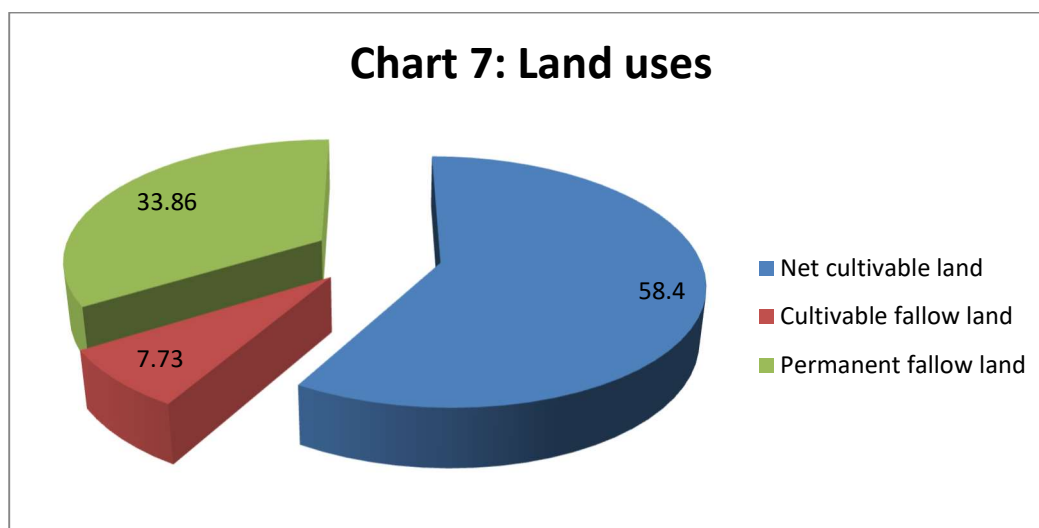
Tertiary Sector: In the last two decades, Bangladesh has seen incredible growth in its service sector. As of 2008, 25% (2008 est.) of the country's workforce was employed in this sector. Although this percentage is lesser than the primary and secondary sectors, a large part of the country's GDP comes from service sector. Basically employment generation in government sector, development organization, Bank, credit organization, marketing company, and any other sector has shown considerable growth.

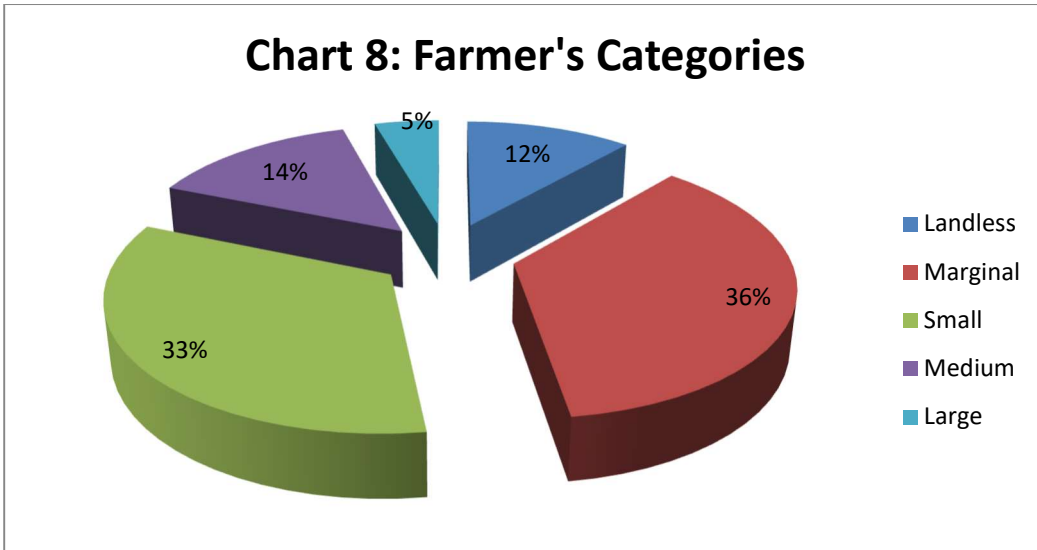
But in our Polder area total economy are depends in primary sector, in particularly 51% people are involve in the agricultural production, processing and marketing activities and very few numbers of people are involve in secondary and tertiary sector, the causes behind that the rural economy are fully depends on agricultural sectors.

5.1 Agriculture

5.1.1 General Description:

Dumuria Upazilais comprised of 14 unions, 206 mouzas, 226 villages, 30 blocks, having a total of 307644 population (male-155361, female-152280). The total land area is 45423 ha of which total cultivable land is 30860 ha, net cultivable land is 30500 and fallow land 14443 ha. The numbers of Agril family is 62150 where about 18% are share croppers and different farmer's categories are landless farmer 6836, marginal 22995, small 21753, medium 8080, and large 2486 respectively. The land of Dumuria upazila of Khulna district is intensively used for agriculture, housing and settlement with homestead forest, shrimp or prawn culture, table fish culture and mixed cultivation (fisheries with rice). The **major crop cultivation** in this upazilla are Boro rice, Aus, T-Aman (HYV/LIV), wheat, cash crop (jute, betel nut, sugarcane), oil crop (mustard, sesame), spices (onion, garlic, green chili, ginger, turmeric), pulses crop (lentil, mugh), vegetable (potato, bottle gourd, wax gourd, bitter gourd, cabbage, cauliflower, tomato, country bean) and different homestead fruits. This diversified uses of land giving the financial benefit in one hand and other hand create a scope for employment generation. Agricultural land is the most valuable resource among all the natural resources of a country which provides us food, clothes, shelters, and even life savings elements for our survival. Bangladesh has long history of proudness for her rich and diversified land and water resources.





Sources; DAE

Polder 29 is comprised of 74 mouzas having a total area of 10226 ha of which net cultivable land 7595 ha and permanent fallow land 1230 ha and temporary fallow land 1401. The number of Agricultural family is 14766 where about 25% share croppers. The area under irrigation is about 57% which indicate that agricultural practices are dominant in the polder. Boro (HYV/LIV) is the main irrigated crop intensively cultivated using mainly surface water, vegetable also intensively cultivated in winter season by using surface water as well as deep water.

Table 19; Union wise Land use

	Dumuria	Sahos	Sarafpur	Vanderpara	Surkhali
Total area	1872	2508	2313	3533	4447
Net cultivable area (NCA)	1085	2040	1968	2502	3900
Agri family	3685	4072	3520	3489	5427
Share croppers	20%	5%	50%	25%	35%
Irrigated land	90%	15%	46%	75%	8%

(Sources; Land Zoning Report: Dumuria Upazila-2011)

5.1.2 Land type and classification

Land type is the dominant factor guiding choices of crop cultivation and cropping patterns of any area. Selection of crops/cropping pattern largely depends on the topographic position of land in relation to seasonal inundation depth and its duration. The area is almost level and broken up by numerous tidal creeks along which there are narrow strips standing 0.5 metre to 0.6 metre higher than the flat areas. Most of the areas are seasonally flooded in the rainy season and the depth of flooding rises to a maximum of 90 cm. The tidal deposits are more

or less uniform in texture. The soils are slightly saline to highly saline in the dry season due to capillary upward movement of moisture to the surface from the saline ground water. The most of the land area are medium high land and it is free from monsoon so land is suitable for T-Aman (HYV/LIV) rice cultivation and vegetable cultivation.

Table 20: Land type in Upazila

Land type	Area (ha)	%
High land	7722	17.00
Medium high land	28162	61.99
Medium low land	6813	14.99
Low land	2726	6.00

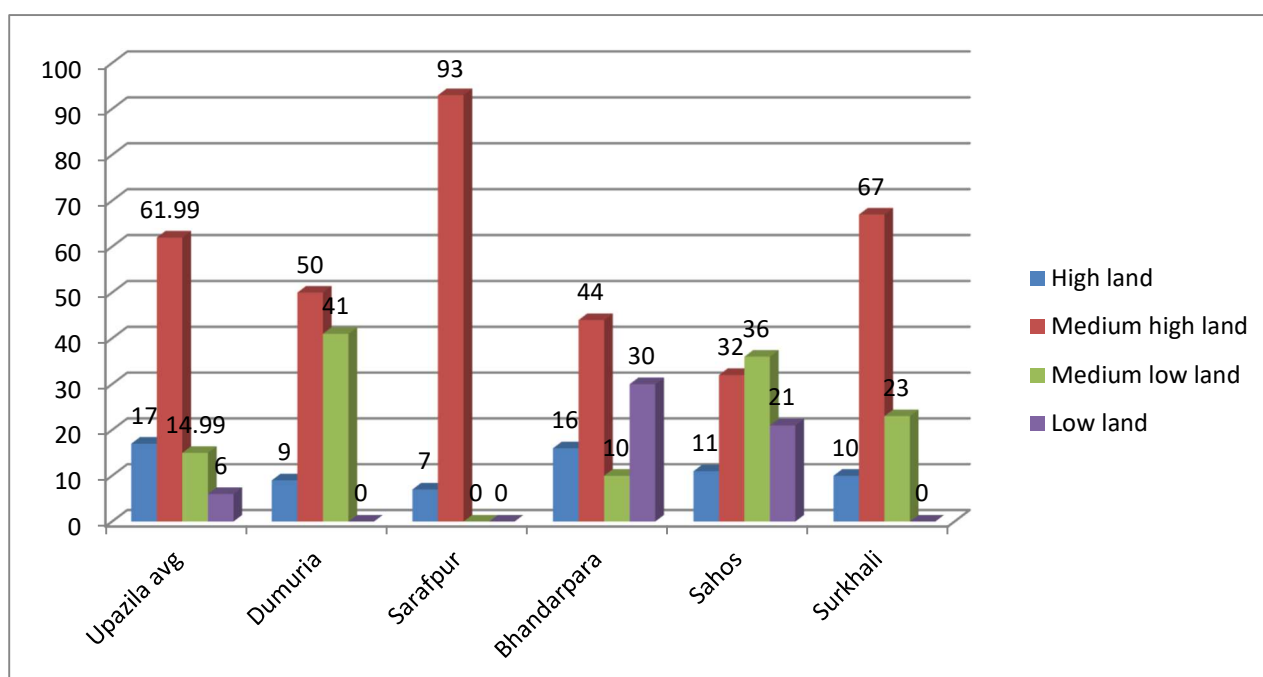
Sources; DAE

Table 21: Land type in Polder

Land type	Union wais land area (ha & %)									
	Dumurea sadar		Sarapur		Bhandarpara		Shahaos		Surkhali	
	Area	%	Area	%	Area	%	Area	%	Area	%
High land	100	9	140	7	400	16	225	11	250	10
Medium High Land	545	50	1828	93	1100	44	650	32	1668	67
Medium Low Land	440	41	0	0	250	10	740	36	572	23
Low land	0	0	0	0	752	30	425	21	0	0

(Sources; Land Zoning Report: Dumuria Upazila-2011)

Chart 9: Union wise Land type



Soil:

The polder 29 area is lies under Agro-ecological zons; Ganges Tidal Floodplain (AEZ-13B). The soil are clay loam to clay and clay sediments and are seasonally flooded, poorly drained except soils of high land area. The soil possesses medium low to high saline condition. The soils are grey to dark grey calcareous silt loams to silty clays occupying the riverbanks and basin margins, and non-calcareous silty clays occupying the basin centres.

Table 22: Soil characteristics in Polder area

Characteristics	Union wais soil type				
	Dumurea sadar	Sarafpur	Vanderpara	Shahaos	Surkhali
Soil pH	6.5-8	6.5-7.0	6-8	7.5-7.8	6.5-7.0
Soil texture	Clay sediments	Clay loam to clay	Clay loam to clay	Clay loam to clay	Clay loam to clay
Soil condition	Low saline	Medium low to high saline	Medium low to high saline	Medium low to high saline	Medium low to high saline
Soil color	Grey to dark grey	Grey to dark grey	Grey to dark grey	Grey to dark grey	Grey to dark grey
Soil moisture	Moderate to high	Moderate to high	Moderate to high	Moderate to high	Moderate to high

Sources; Land Zoning Report: Dumuria Upazila-2011

Table 23: Soil Texture in Upazila

Soil structure	Area	%
Sandy loam	119	0.2
Clay loam	5922	12.8
Clay	17509	39.1
Organic	11528	25.8
Other	9919	22.1

(sources; DAE)

5.1.3 Major Agricultural crops:

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 Dumuria upazila. Although, this area is recognized as a coastal area and here 35% (16060 ha land) area effective in fish culture activities and approximately 19% people are fully maintenance their livelihoods in this sector. But then also this area is focused in vegetable cultivation area and so many businesses have been continuing to addressing the agriculture sector.

Major Field crop: Major area (87.99%) are covered by rice cultivation among which (73.16%) covered by T-Aman rice cultivation, second is Boro rice (22.47%) and very low area (4.34%) covered by Aus rice cultivation (chart-12). By considering the rice variety, High Yield variety (HYV) rice cultivation 69.04% area, local variety cultivation 29.92% and very low numbers of area (1.01%) are covered by hybrid cultivation (chart-11). During the Boro season major cultivated variety rice BRRI Dhan-28, 29, 45, 50, and BINA-6, and T-Aman rice major variety are cultivated 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. In Aus season major variety are cultivated BR-26, BRRI Dhan-28, 29, 48. As considering other field crop, very good numbers of area are covered by sesame cultivation; beside jute, wheat, and sugarcane are cultivated in very few numbers of area as field crop (table-25).

Major Vegetable: Tomato, cauliflower, Cabbage, olcapi, Radish, Red amaranth, Brinjal, Country bean are cultivated in Robi season and Ladies finger, Bitter gourd, bottle gourd, snack gourd, sweet gourd, Long yard bean, Pointed gourd are cultivated in Kharip-1 which continue production cycle up to Kharip-2.

Table 24: Major cultivated vegetable variety;

Sl No	Vegetable	Variety
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 IPISA lao-1
6	Sweet gourd	Swety, BARI Mistykumra-1
7	Country bean	BARI sheem-1, 2 IPISA sheem-1,2
8	Long yard bean	BARI-1

- a) **Major pulse crop:** Very few numbers of areas are covered by cultivated different pulse crop like; Lentil, gram, black gram, cheek pea, and mung bean. Most of the pulse crops are cultivated as mixed crop with vegetable in high land and medium high land area in Robi season.
- b) **Spices:** Ginger, turmeric, garlic, onion, and chilli cultivated very negligible numbers only for locally consume but chilli cultivated to selling purpose as high value crop to reaching the national market after fulfill the local demand.
- c) **Others:** Mustered, maize, sweet potato, Arahor, ground nut etc cultivated by covered very negligible area but it does not fulfill the local demand.

Table 25: Crop wise covered area and production amount (ha).

Sl No	Crop	Variety	Targeted area (ha)	Achieved area (ha)	Targeted production (Mt)	Achieved production (Mt)
1	Boro Rice	Hybrid	1400	18376	65800	75995
		HYV	27755	36132	102416	112995
		Local	2000	1225	3400	1973
Total			31155	55733	105816	190963
2	T-Aman	HYV	67900	69310	175861	187305
		Local	33480	32040	51224	55847
3	Aus	HYV	35	84	1288	3004
		Local	6000	4639	7200	5669
Total rice cultivation			138570	161806	341344	442788
4	Jute	Deshi	25	32	200 belt	248 belt
		Tosha	850	729	9350 belt	7966 belt
5	Sesame		5250	3351	4988	2976
6	Sugarcane		850	630	40800	32181
7	Wheat		180	210	415	475
Others Field crop			7155	4952	46203	35632
8	Vegetable	Winter	5300	5070	79500	94209
		Summer	4000	2924	52000	52741
Total Vegetable			9300	7994	131500	146950
9	Pulse crop		770	1225	776	1118
10	Spices		1125	867	3706	6247
11	Others		605	501	1069	856

Sources; DAE

(Note: The data does not mention the total land area, it is the cultivable area which address the cropping intensity of land)

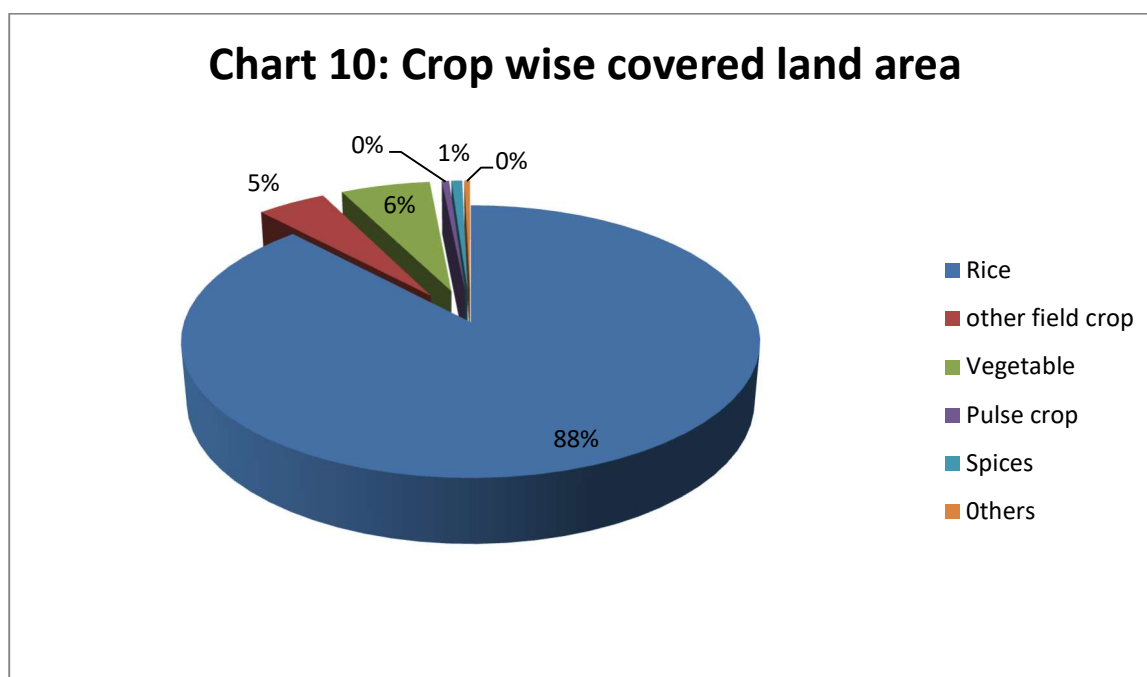


Chart 11: Variety wise rice cultivation

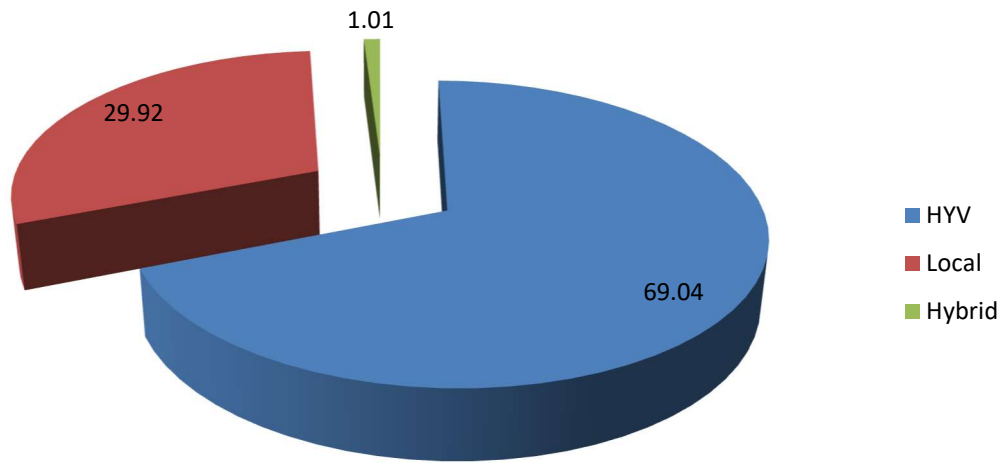
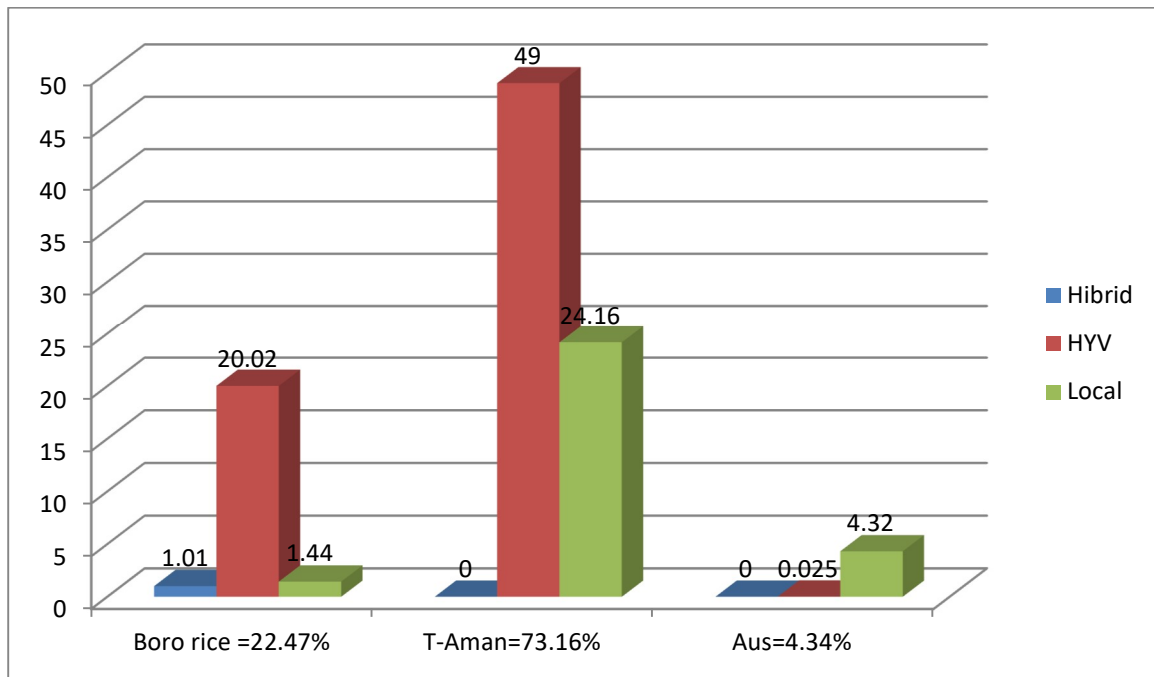
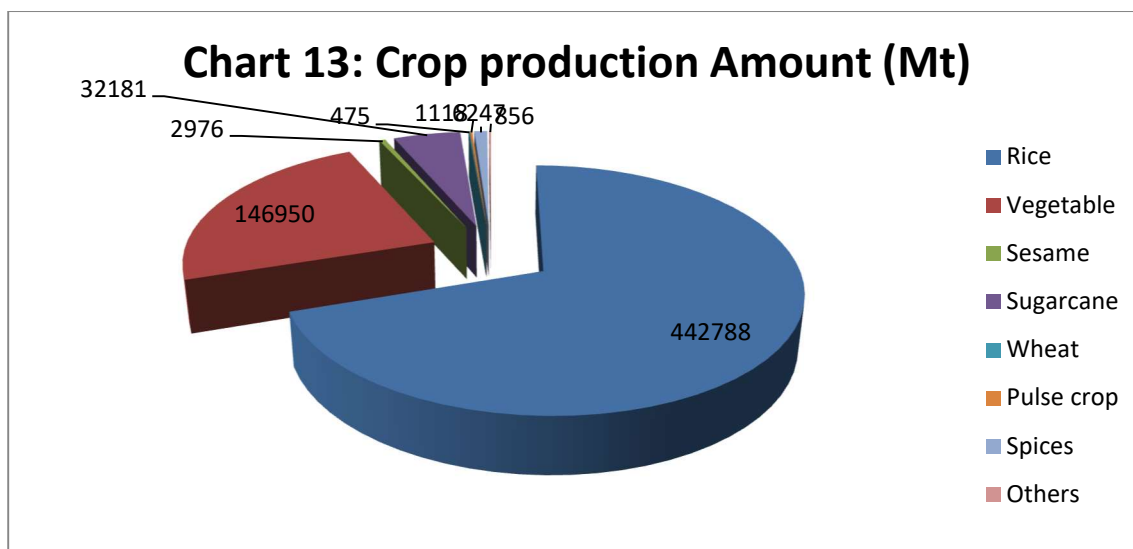


Chart 12: Season wise cultivated Rice variety





5.1.4 Average yield of different crops

Major crop	Yield (Ton/ha)		Gap
	Present	Good Farmer yield	
Rice	Boro=6.5ton/ha Aus=(HYV) 3.5 T-Amon=(HYV) 4.6	Boro=7/ha Aus=4/ha T-Amon= <5	Boro=1.5/ha Aus=0.1/ha T-Aman=0.4/ha
Vegetable	Robi season Patato=18 ton/ha Tomato=25 ton/ha Cauliflower=25 ton/ha Brinjal=30 ton/ha	Robi Potato=22 ton /ha Tomato=30 ton/ha Cauliflower=30 ton/ha Brinjal=35 ton/ha	Robi Potato=4 ton /ha Tomato=5 ton/ha Cauliflower=5 ton/ha Brinjal=5 ton/ha
	Summer Pointed gourd=15 ton/ha Ladies finger=12 ton/ha Bitter gourd=15 ton/ha Bottle gourd=22 ton/ha	Summer Pointed gourd=17 ton/ha Ladies finger=15 ton/ha Bitter gourd=18 ton/ha Bottle gourd=25 ton/ha	Pointed gourd=2 ton/ha Ladies finger=3 ton/ha Bitter gourd=3 ton/ha Bottle gourd=3 ton/ha
jute	2 ton/ha	2.2 ton/ha	0.2 ton/ha

Sources; DAE

5.1.5 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 cropping intensity of this polder is 205% which indicate that double cropped area covers maximum land. This is due to unfavorable soil condition, land characteristics, and hazards like; salinity, flood, water logging, post monsoon drainage congestion, scarcity of irrigation water, cyclonic storm surges etc. By considering the table, the polder is followed the major cropping pattern is Boro-Fallow-T Aman (NCA-35.5%) and second is Fallow –Fallow –T Aman (NCA-28.75%) and third is Boro-Fallow-Fisheries. In addition, vegetable and annual crops are growing in the high land and medium high land area. T-Aman rice iscultivated in the rainy season as the salinity decreases during the period.

Table 26: Union wise Major Cropping Pattern

Cropping pattern (K1-K2-R) (Mar to Feb)											Total	
	Dumuria		Sahos		Bhanderpara		Sarafpur		Surkhali		Area	NCA
	Area	NCA	Area	NCA	Area	NCA	Area	NCA	Area	NCA		
Fallow-T aman-Boro	565	52	306	15	1000	40	688	35	300	12	2859	29.55
Fallow-Fisheries-Boro	217	20	510	25	125	5	0	0			852	8.80
Fisheries-Fisheries- Boro	65	6	0	0	77	3	0	0			142	1.46
Fallow-Fallow-Boro	11	1	204	10	0	0	0	0			215	2.22
Sesame-T Aman-Boro					1000	40	0	0			1000	10.33
Fallow-T Aman-Fallow	108	10	918	45	125	5	1082	55	871	35	3104	32.08
K veg-K Veg-Robi Veg	11	1			125	5	0	0			136	1.40
Fallow-T Aman-Robi Veg	0	0	41	2	50	2	0	0			91	0.94
Aus/jute-T Aman-Robi Veg	0	0	61	3	0	0	20	1	124	5	205	2.11
Fisheries-T-Aman- Fallow									75	3	75	0.77
Sesame-T Aman- Fallow									373	15	373	3.85
K Veg-T-Aman-Fallow									623	25	623	6.43
Others							178	9			178	1.83
Total	1085	100	2040	100	2502	100	1968	100			9675	100

(Sources; Land Zoning Report: Dumuria Upazila-2011)

Table 27: Major cropping pattern in Polder

Cropping pattern	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
	Area	Kharip-1			Kharip-2			Robi				
Fallow-T aman- Boro	2859	Fallow			T -Aman			Boro				
Fallow- Fisheries- Boro	852	Fallow			Fisheries			Boro				
Fisheries- Fisheries-Boro	142	Fisheries			Fisheries			Boro				
Fallow-Fallow- Boro	215	Fallow			Fallow			Boro				
Sesame-T Aman-Boro	1000	Sesame			T-Aman			Boro				
Fallow-T Aman- Fallow	3104	Fallow			T-Aman			Fallow				
K veg-K Veg- Robi Veg	136	K1 Veg			K2 Veg			Robi Veg				
Fallow-T Aman- Robi Veg	91	Fallow			T-Aman			Robi Veg				
Aus/jute-T Aman-Robi Veg	205	Aus/Jute			T-Aman			Robi Veg				
Fisheries-T- Aman-Fallow	75	Fisheries			T-Aman			Fallow				
Sesame-T Aman-Fallow	373	Sesame			T-Aman			Fallow				
K Veg-T-Aman- Fallow	623	K1 Veg			T-Aman			Fallow				

Chart 14: Season wise cropping intensity

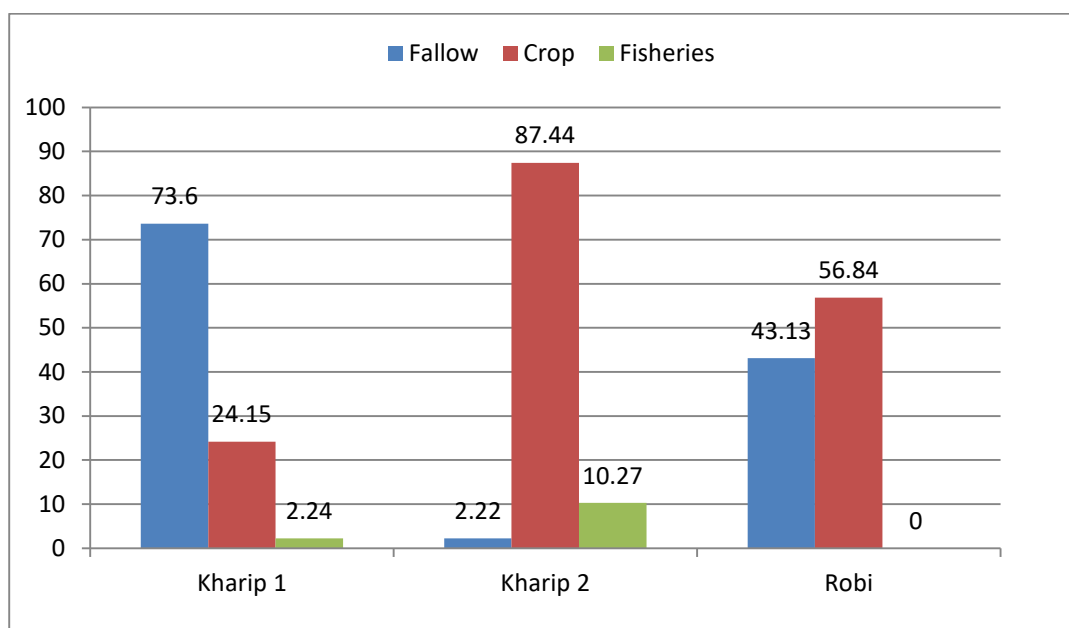


Table 28: Cropping intensity:

Cropping type	Uz Total	Dumuria	Sahos	Bhanderpara	Sarafpur	Surkhali
Single crop area	4563	184	1122	202	1220	1070
Double crop area	18540	782	898	1175	708	1296
Triple crop area	7140	119	20	1125	40	124
Net crop area	30500	1085	2040	2502	1968	2490
Total crop area	30860	2105	2978	5927	2756	4034
Cropping intensity	207%	197%	146%	237%	140%	177%

Sources; DAE

5.1.6 Crop calendar:

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 Aman (HYV)											
2	T Aman (Local)											
3	Sesame											
4	Potato											
5	Bottle gourd											
6	Bitter gourd											
7	Brinjal											
8	Cauliflower											
9	Cabbage											
10	Country been											
11	Jute											



Seed bed



Production



Harvesting

5.1.7 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 a project, named CSISA-MI and FAO working in this region for agricultural mechanization. “Cereal Systems Initiative for South Asia Mechanization and Irrigation (CSISA-M.I.)” is a 5 years project working in the southern coastal region and started from 2013. This project is being be implemented by a partnership between CIMMYT and International Development Enterprises (IDE).

The CSISA-M.I. initiative will unlock the agricultural productivity of southern Bangladesh by increasing the availability and adoption of resource conserving irrigation equipment, Conservation Agriculture (CA) based crop management practices and the use of scale-appropriate farm machineries.

IDE is facilitating for the expansion of four machineries namely-

Axial flow pump (AFP): costing is 15,200 – 30,000 BDT marketed by RFL and imported from Thailand and used for irrigation from a distance place.

Seeder: price is 57,000 & 58,000 BDT and marketed by RFL and used for tillage, seed sowing, fertilizing & leveling.

Bed planter: 40,000 BDT and marketed by ACI used for tillage, seed sowing, fertilizing & bedding.

Riper: 1,85,000 BDT and marketed by ACI used for harvesting of rice and wheat.

FAO exploring the opportunities for Mechanization:

There are 56 WMG in polder among them 25 WMG was received 3 type agro machineries like; Power tiller, thresher and low lift pump (LLP) from FAO through DAE

Table 28: Agro machineries at Upazila

Agro machineries	No of	Purpose
Deep Tube-well	09	Irrigation
Semi deep tube-well	7810	Irrigation
Power pump	7595	Irrigation
Power tiller	58	Tillage
Thrasher	25	Threshing
Low lift pump	50	Irrigation

Sources; DAE

Table 29: Information about FAO Supported Agro machineries at Polder 29

Name of Agro machineries	Use of purpose	No of machineries				
		Dumuria	Sahos	Bhandarpara	Sarafpur	Surkhali
Power tiller	Tillage	2	14	20	14	
Pedal threshers	Harvesting	1	7	10	7	
Low lift pump	Irrigation	2	14	20	14	
Total		5	35	50	35	

Sources; Component 1

**Information about FAO Supported Agro machineries
Polder 29**

Sl. No.	Name of WMG	Name of Union	No. of power tiller	No. of low lift pump	No. of Thresher
1	SahosModdhopara WMG	Sahos	2	2	1
2	SahosKumarghata WMG		2	2	1
3	SahosGhoshgati WMG		2	2	1
4	SahosNoakathi WMG		2	2	1
5	KDC (Kazir hula, Dudher hula, Charabon)WMG		2	2	1
6	Kharshanda WMG		2	2	1
7	DGKC(Digholia .Golaimari, Khotakhali ,Chotobond) WMG		2	2	1
8	UttorKalikapur WMG	Sarafpur	2	2	1
9	Senpara WMG		2	2	1
10	AshanNagor WMG		2	2	1
11	Britti –Bhulbaria WMG		2	2	1
12	Baniakhali WMG		2	2	1
13	Sharafpur (North) WMG		2	2	1
14	BCG(Britti- Biral-Chandghar-Jaliakhali) WMG		2	2	1
15	UlaDokkhinWMG	Bhandarpara	2	2	1
16	Banda WMG		2	2	1
17	Lohaidanga WMG		2	2	1
18	Taltala-Kushan Hula WMG		2	2	1
19	DKB(Dhanibunia-Kanaidanga -		2	2	1

	Brittikanaidanga) WMG				
20	Perikhali-Chalk sonadanga WMG		2	2	1
21	Bakultala WMG		2	2	1
22	Jabra WMG		2	2	1
23	Hajibunia, Taliyan WMG		2	2	1
24			2	2	1
25	Dumuria (South) WMG	Dumuria	2	2	1

Sources; Component 1

5.1.8 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 upazilla and also they are established close connection with farmers through the dealership system. In the upazila, DAE listed total of 120 fertilizer retailer, 13 BCIC fertilizer dealers, 14 BADC fertilizer dealers, 22 BADC seed dealer, company managed 37 seed & pesticide dealer, more than 200 seed & pesticide retailer including more than 65 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,

Table 30: Input supplier in Upazila and Polder

Type of input	No of Input supplier	
	In Upazila	In Polder
Fertilizer retailer	120	36
BCIC fertilizer dealer	13	5
BADC fertilizer dealer	14	8
BADC seed dealer	22	9
Seed & pesticide Dealer	37	12
Seed & pesticide retailer	200	65
Company & private sector	65	

(Sources DAE & KII with Input supplier)

Table 31:BCIC Fertilizer Dealer in Upazila

SI No	Name	Business name	Address	Mobile no
1	Shekh Najer Ali	Mesers Najer ali traders	Chuknagr bazer	01772558504
2	Shekh Sahidul Islam	Mesers S S Enterprise	18 mile bazer	01711280375
3	Gazi Abul Kalam Azad	Mesers Azad traders	Shapur bazer	01713903162
4	Saida Sharmin	Mesers Anabil Enterprise	Rudaghura	01711351094
5	Md. Ebrahim khan	Mesers Khan traders	Amvita bazer	
6	Md Abul Kawser	Mesers Johir Enterprise	Gabtala bazer	
7	Sahana Sultana	Mesers Tajul & Brothers	Dumuria bazer	
8	Md Abdus Salam	Mesers Sadia traders	Chechri bazer	01716166254
9	G M Abadulla	Mesers hazi store	Gutudia bazer	01819697139
10	Satajit chanda	Mesers Usha Enterprise	Ula bazer	01713916060
11	Md Alal uddin	Mesers Rupali krishi vander	Kharnia bazer	01711351093
12	Ahmed Halim	Mesers Glob International	Baniakhali	01711352744
13	Ajai roy	Mesers chitra Enterprise	Gajalia bazer	

(Sources; DAE)

Table 32: BADC fertilizer dealer in Upazila

SI No	Name	Business name	Address	Mobile no
1	Sankar Kumar nandi	Mesers sankar traders	Chuknagr bazer	
2	Md Muniruzzaman	Mesers krishi vander	Dumuria bazer	01712083105
3	Md. Rezwon hosen	Mesers Bismillah traders	Kharnia bazer	
4	Twafiq Ahmed sumon	Mesers Suman trader	Dumuria bazer	
5	Sree Palash kumar	Mesers Palash store	Baniakhali	
6	Abul Kasem sarder	Mesers Sarder Enterprise	Chechri bazer	
7	Md. Wahiduzzaman	Mesers Jwel krishi store	Baniakhali	
8	Sahed Amin	Mesers Sakib traders	Shahapur bazer	
9	Twafiq	Mesers Twafiq krishi vander	Jaikhali bazer	
10	Md Farid Sarder	Mesers Momena krishi vander	Dumuria bazer	
11	Sree Bishno preo das	Mesers Arjee traders	Delvita	
12	Md. Abdul Aziz	Mesers Agrosiv center	18 mile bazer	
13	Md Raisul Islam	Mesers Razzak traders	Chuknagar	
14	Md Eliash hosen	Mesers Akash krishi vander	Noakathi bazer	01713912135

(Sources; DAE)

Table 33:BADC seed dealer:

SI No	Name	Business name	Address	Mobile no
1	Gazi Abul Kalam Azad	Mesers Azad traders	Shapurbazer	01713903162
2	Saida Sharmin	Mesers Anabil Enterprise	Rudaghura	01711351094
3	Md. Ebrahim khan	Mesers Khan traders	Amvita bazer	
4	Sree Sankar kumar nandi	Mesers Nandi traders	Chuknagar	
5	G M Abadulla	Mesers hazi store	Gutudia bazer	01819697139
6	Satajit chanda	Mesers Usha Enterprise	Ula bazer	01713916060
7	Md Alal uddin	Mesers Rupali krishi	Kharnia bazer	01711351093

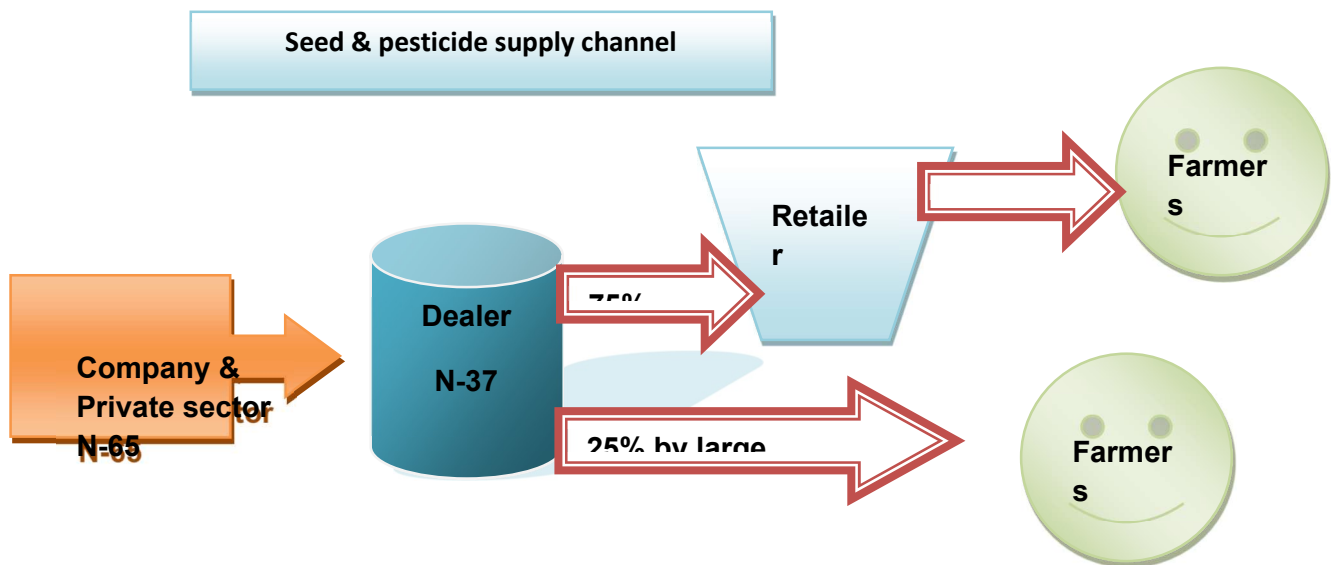
		vander		
8	Md Raisul Islam	Mesers Razzak traders	Chuknagar	
9	Md Muniruzzaman	Mesers krishi vander	Dumuria bazer	
10	Md. Rezwan hosen	Mesers Bismillah traders	Kharnia bazer	
11	Twafiq Ahmed sumon	Mesers Suman trader	Dumuria bazer	
12	Sree Palash kumar	Mesers Palash store	Baniakhali	
13	Abul Kasem sarder	Mesers Sarder Enterprise	Chechri bazer	
14	Md. Wahiduzzaman	Mesers Jwel krishi store	Baniakhali	
15	Sahed Amin	Mesers Sakib traders	Shahapur bazer	
16	Md Faruk Ahmed rana	Mesers Jebun nesa krishi vander	Dumuria bazer	
17	Md Farid Sarder	Mesers Momena krishi vander	Dumuria bazer	
18	Sree Bishno preo das	Mesers R G traders	Delvita	
19	Md Raisul Islam	Mesers Razzak traders	Chuknagar	
20	Md Eliash hosen	Mesers Akash krishi vander	Noakathi bazer	01713912135
21	Md. Abdul Aziz	Mesers Agrosiv center	18 mile bazer	

(Sources; DAE)

Table 34: Fertilizer Retailer in Polder Area

SI No	Name	Business name	Address	Mobile no
1	Sree Bishno preo das	Mesers R G traders	Delvita, Sarafpur	01717614093
2	Md Maruf Rasid	Mesers Lia Krishi vander	Basundia, Sarafpur	01713923432
3	Sattar Shekh	Mesers Abid Krishi vander	Natun rasta more, Sarafpur	
4	Md Azmal Hosen	Mesers Azmal traders	Akra, Sarafpur	
5	Md. Wahiduzzaman	Mesers Jwel krishi store	Baniakhali, Sarafpur	
6	Manmath Roy	Mesers Roy traders	Baniakhali, Sarafpur	
7	Subal Roy	Mesers Roy traders	Baniakhali, Sarafpur	
8	Karimul Islam	Mesers Akash krishi vander	Noakathi bazer, Sahos	01729438944
9	Md Farhad Hosen	Mesers Abuzer krishi vander	Gajendrapur, Sahos	01918980331
10	Md Gausul Haque		Gajendrapur, Sahos	
11	Abdul Halim		Noakathi bazer, Sahos	
12	Shekh Abul Hosen		Bagdari more, Sahos	
13	Kuntal Biswas		Kapalidanga, Sahos	
14	Susendranath Dhali	Mesers Sarala Store	Ghona bazer, Bhandarpara	01714907958
15	Asim Mandal	Mesers Happy Vander	Ghona bazer, Bhandarpara	01713689200
16	Depak Biswas	Mesers Biswas fish feed	Ghona bazer, Bhandarpara	01732858844
17	Kuntal Mandal		Banda bazer, Bhandarpara	
18	Mostafizur Rahman	Mesers Rubaia Krishi Vander	Ula bazer, Bhandarpara	01934805239
19	Sunil Mandal		Urabunia,	01915287108

			Bhandarpara	
20	Abdul Bari khan	Mesers Khan brothers	Dumuria bazer, Dumuria	01714703490
21	Avijit Kunda	Mesers Suman Krishi Vander	Dumuria bazer, Dumuria	01736010425
22	Md Muniruzzaman	Mesers krishi vander	Dumuria bazer	
23	Md Farid Sarder	Mesers Momena krishi vander	Dumuria bazer	



Text of graph

5.1.9 Output market in Agriculture sector:

There are 15 markets in the polder area (Table 00) where the Agriculture producers easily can access to selling their products including total of 42 markets are available in the upazila boundary. 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; Hasem Ali kacha maler arot specialist for vegetable and fish wholesaling market, Baroaria bazer specialist for fish wholesaling market, and Maikhali, Ula, Sarafpur, Noakathi are specialist seasonal vegetable wholesaling market by forming temporary collection point on the roadside (Table 00).

Table 35: Market actor and place

SI No	Market/actor	In Upazila	In Polder
1	Hat/Bazer/Market	42	15
2	Arot	12	2
3	Piker (Vegetable)	70	25
4	Piker (Field crop)	120	30
5	Retailer	300	70
6	Bapary (vegetable)	65	20
7	Collector (vegetable)	110	110
8	Collection point (vegetable)	15	15

5.1.10 Factors affecting the Agriculture Sector:

All type of agricultural crop depends on the seasonality. Different type of factor like; rain water logging, drought, labor crisis, low & high temperature, and tidal surge are mostly affected the normal crop calendar in the year. Some time people could not start the production cycle untill end the factors specially rainfall, water logging and drought so that factor very much considerable for maintain the crop calendar. On the other hand, if farmers started the seed bed preparation or any others primary stage activities in timely but they cannot complete the all cycle due to the interim time factors. 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 gradually.

Factors Affecting Crop Production through the year

Item	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall						Blue	Blue	Blue				
Draught				Green	Green							
Labour Demand	Purple			Purple				Purple				Purple
Tidal surge							Red	Red				
High Temperature			Light Blue	Light Blue								
Winter/cold stress	Olive	Olive										Olive
Cyclone/tonedo			Pink	Pink						Pink	Pink	
Water logging						Yellow	Yellow	Yellow				
Salinity		Grey	Grey									

Source: FGD & KII with SAAO

1.3.1 Common Agricultural practices:

Land cultivation: Bangladesh do not maintain and apply the 100% farm mechanization in agriculture but it is true that in the land preparation stage, all land are covered and cultivated by power tiller so it is cal that Bangladesh is going to the farm mechanization especially the tillage system. All of the activities for land preparation like; land tillage, labeling and in some cases channel making activities done by farm mechanization, now in polder area most of the land are cultivated by apply the modern technology.

Seed & seedling use: Considering the rice cultivation it was shown that 69.04% HYV varieties seed use in rice cultivation, very few number of farmers use the quality seed and seedling but they did not maintain the actual or improved production technology as per the guideline.

Planting & seed sowing: Very few percentage (Approximately 7%) farmers are followed the actual transplanting technique both in rice & vegetable cultivation. Most of the farmers are not skill or did not maintain the row to row and plant to plant distance for crop cultivation. They did not award about the seed & seedling requirement in the pit or space. Some of project have initiated (like CSISA MI) bed planter and drum seeder for seed sowing very few numbers (it not measurable in percentage) of farmers use this technology as trial process but not continuing due to the less skill or awareness.

Harvesting: In our agriculture still now crop harvesting system has been continuing by traditionally or human driven harvesting methods. The major causes behind that, unequal distribution of land type, most of the farmers are marginal to small so they could not maintaining the farming system crop cultivation by acquire huge area of land, high price of harvester, inadequate knowledge of operate the harvester.

5.1.12. Major Problem and its Impacts on crop cultivation:

- The canals of the polder are found mostly closed or silted up due to the unplanned constructed of different manmade intervention which are creating barriers of water flow and thus had happened severe drainage congestion and hampering timely T-Aman cultivation.
- Different manmade and naturally created factors like; rainfall, drought, salinity, water logging tidal surge are affecting the crop cultivation specially hampered the cropping pattern.
- Cyclone and storm surge frequently damage T.aman and other rabi crops and also cause huge damage to lives and properties of the people.

- Moderately to deep monsoon flooding which cause severe crop damage and intrusion of valuable agricultural land for different non agricultural uses.
- Saline water intrusion, over doses of chemical fertilizer, over use of pesticide and insecticide, scarcity of surface water for irrigation, inadequate drainage system, and siltation reduced the soil fertility as well as decline the soil productivity.
- Financial requirement is one of the problems to start the crop cultivation in timely. Some of Bank provide the crop loan but it is not easily accessible for farmers due to the long procedure system of bank and farmers do not get this type of loan in timely.
- Lack of farmer's knowledge specifically on; identifying the quality seed and seedling, updated market information and technology which restricts intensive agricultural practice of lands.
- Crisis of fertilizer and pesticides during the peak season due to inadequate supply (Though DD, DAE don't agree with farmers complain). Quality of pesticide is not good enough and sometimes does not work as standard one. There are some company's produces less quality pesticides and promoting their market at remote area (as people are not aware with the quality).
- Agricultural land very rapidly reduced the soil fertility due to unplanned shrimp culture (Ghers) activities. Saline water is very much required for continue the shrimp culture but polder activities especially sluice gates regulate the saline water flow from sea. At this situation shrimp culture fisher use the ground water as alternative sources and it is interrupt the biodiversity.
- The valuable agriculture land is reducing rapidly in every year due to unplanned construction of houses and settlements, industries, markets, river erosion and for different infrastructural development.
- Unplanned shrimp and prawn culture and water logging damaging sustainability of land in the area.
- The farmers of polder area face scarcity of irrigation water in the dry seasons and shortage of necessary agricultural inputs, which are hampering intensive agricultural practices in timely.
- Farmers unenthusiastic to adopt new technologies and not to maintained production cycle or planned way production.
- Scarcity of surface water for irrigation, higher price of agricultural machineries/equipment in the local markets is the major problem for intensive irrigation in the area.
- In some cases lack of market information happening the price fluctuation especially for vegetable marketing. Most of the cases farmers did not know the actual demand

of the local market and everybody storage the vegetable for selling into the same market at same time and ultimately market are over saturated by surplus vegetable. Here buyer gets an extra opportunity to hike the illegal price and farmers are loss the profit.

- In vegetable peak season, temporary basis 15 collection points have effected for serving the marketing facilities by sited on the road without any shading, winter it does not create problem but in summer season especially the rainy day it was happen critical problem for load-unload the vegetable on the track. On the other hand it was interrupt the easily movement of transporter and general people on the road.

5.2. Livestock

5.2.1. Introduction: national only relevant in direct comparison

The role of livestock sub-sector is vital for the economic development of agro-based Bangladesh. The contribution of livestock to National Gross Domestic Product (GDP) is 2.79 percent and which is 17.15 percent in Agricultural share. About 44 percent of the animal protein comes from livestock sources. Moreover, 4.31 percent of the total export is from the export of leather and leather goods. The 30 percent of the total tillage is still covered by livestock beside mechanical tillage. Furthermore, 20 percent of the population is directly and 50 percent of the population is partially dependent on livestock sector. The sub-sector enjoyed a growth rate of 5.85 percent during the last fiscal year. Poverty reduction, gender equity and empowerment of women are amongst eight set targets of millennium development goals (MDG). To achieve the goals, Bangladesh government has identified livestock as one of the key player of Poverty Reduction Strategy. The government has set strategic targets for meeting protein demand, employment generation, up-scaling export earning and women empowerment through the Livestock sub-sector. (sources; <http://www.dls.gov.bd/Introduction.php#>)

In our rural area, poultry, duck, cattle, dairy, buffalo, goat, sheep, pigeon are rearing as a major livestock. Bangladesh is rich in those farm animals. The proportion of improved cattle in the country is still found less than 3% and the number of is also very low. The number was found still insignificant in polder area there **is a high degree of inequality for land holdings, but a low degree of inequality for livestock holdings.** The distribution of indigenous breed is less unequal than the distribution of improved breeds. There is a possibility of improvement in rural income distribution with an increase in investment for indigenous livestock development. The landless and small farm holdings own the highest percentage of poultry; sheep and goats. 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 generate employment and income for the rural poor and thus improve livelihood.

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. 90% rural women involved to rearing at least 1-5 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.

5.2.2. Livestock population:

Table 36: Livestock population at Upazila

SI No	Livestock	Numbers
1	Cow (Local breed)	71805
2	Cow (Cross breed)	54682
3	Goat	73614
4	Sheep	5995
5	Buffalo	305
6	Horse	332
7	Poultry (local breed)	795752
8	Poultry (improve breed)	1643184

Sources; DLS

Table 37: HHs involve in Livestock sector

SI No	Livestock	% HHs
1	Poultry rearing	90% HHs
2	Milky Cow rearing	55% HHs
3	Bull fattening	20% HHs
4	Goat rearing	25% HHs
5	Duck rearing	30% HHs

Sources; KII with VFA

Table 38: Commercial Farm at Upazila level

SI No	Farm type	Numbers
1	Milking cow farm	355
2	Goat farm	80
3	Sheep farm	21
4	Duck farm	18
5	Poultry farm (layer)	286
6	Poultry farm (Broiler)	399

Sources; DLS

Table 39: Commercial Farm at Polder

SI No	Farm type	Numbers
1	Milking cow farm	50 correct?
2	Goat farm	8
3	Duck farm	4
4	Poultry farm (layer)	95
5	Poultry farm (Broiler)	160

Sources; KII with VFA

Table 40: Households involve in backyard poultry rearing

	Numbers	HHs	%
Backyard poultry	1-5	34183	55%
Backyard poultry	6-10	9322	15%
Backyard poultry	11-15	7458	12%
Backyard poultry	15-20	3108	5%
Backyard poultry	20+	1864	3%
No poultry	0	6215	10%
		62150	

Table 41: Egg & Meat Production situation.

Variety	No of poultry	Total production	Way of calculation
Local breed	795752	8,75,32,720 egg	poultry x 110 egg per year
Improve breed (layer)	686059	19,89,57,110 egg	Poultry x 290 egg per year
Improve breed (broiler)	957125	48,81,337 kg	Poultry x 1.7 kg/cycle x 3

(Sources; KII with VFA)

Table 42: Milk Production situation.

Variety	No of cow	Total production	Way of calculation
Cow (Local breed)	71805	10339920 liter	cow x 1.2 lt x 120/year
Cow (Improve breed)	54682	21325980 liter	Cow x 3 lt x 130/year
Total	126487	31665900 liter	

(Sources; KII with VFA)

5.2.3. Outreach

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. Currently there are reared 795752 local breed poultry bird, and 1643184 improve breed poultry bird in the upazila boundary including have 286 layer farms and 399 broiler farm. **But in our polder area 95 layer farm and 160 broiler farms are established. It is also having information that our 90% HHs (55935HHs) in rural area are reared the backyard poultry.**

In polder area approximately **37 local service provider (Paravet), 14 vaccinator, and 4 Artificial Inseminator** have been continuing their business by providing the technical services like; treatment support, vaccination, medicine sell and in some cases doing the artificial insemination by receiving inputs (improve breeding seed) and technology from DLS.

5.2.4. 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 fulfill 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 fulfill 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 90% HHs in rural area are reared 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.

5.2.5. Output market:

Backyard poultry egg market is not going to the formal system nor 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 center 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 other one households necessity. In some cases unrecognized traders come to the village and buying the egg & meat (poultry) to visit door to door. But in many cases farmers did not get the fare price because female are involve this practiced and mostly they are not collect 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.

5.2.6. Input Market:

Livestock input market is developed compare to others agriculture sub sector input market. More the 50 company have been continuing the technical and business related service to the stakeholder. 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 new improved technology are available at rural level. More than 16 company & private sector, 43 input seller (feed, medicine, DoC), 14 vaccinator, 37 local service provider (paravet) 5 AI service provider, 4 AI center and DLS have been continuing the input and technical services to the producers.

Table 43: Input & services market at Polder

Sl.No	Input & service	Input Seller				
		Dumuria	Sarafpur	Sahos	Bhanderpara	Surkhali
1	Poultry Feed & medicine seller	12	4	3	6	6
2	Day Old Check seller	12	0	0	0	0
3	Local service provider (Paravet)	10	10	7	6	4

4	Vaccinator	3	3	3	3	2
5	AI service provider	1	1	1	1	1
6	AI service center	1	1	1	1	0

Table 44: Company is available in Polder area

Company name	Product
RENETA Ltd	Medicine
NOVARTIS	Medicine & Vaccine
ACME Lab Ltd	Medicine
Chemist Ltd	Medicine
Progressive Enterprise	Medicine
Global Agrovet Ltd	Medicine
FnF Ltd	Medicine & Vaccine
Jaison farma	Medicine
Doctors	Medicine
Super power Ltd	Medicine
Aftab Feed Ltd	Poultry feed
Nourish Poultry & Fish feed Ltd	Poultry feed
JS feed Ltd	Poultry feed
MR Feed Ltd	Poultry feed
Kazi Farms Ltd	Poultry Feed

5.2.7. DLS delivered Animal health & extension services:

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

5.3. Fisheries

5.3.1. Introduction:

The fisheries of Dumuria upazila consist of inland open water fisheries and fresh water aquaculture. Fisheries of Dumuria upazila is a major sources of income, nutrition, employment and livelihoods support of the local people.

In Bangladesh fish provide 60 percent of animal protein, and this sub sector contributes about 5 percent to the GDP and approximately 9 percent to the total foreign exchange earnings. Nearly about 1.2 million people directly employed in this sub sector and another 11 million people are indirectly employed in activities related to this sector. (Sources; land zoning report).

In the polder area as well as Dumuria upazila, two type fishing system are practiced, one is open water fishing that is capture fisheries and another is culture fishing. Culture fishing also classified by pond culture, Galda mixed with carp culture and shrimp culture and fishing system cultured the more specific variety.

Open water fisheries: Wetlands are among the most fertile and productive that support the life cycle of different fauna and flora resources of an area. The polder is enriched with 416 ha open water fisheries which are available in rivers, khals/cannel, and floodplain. The open water fisheries are commonly found in the area is;

Bangla name	Scientific name
Koi	<i>Anabas testudineus</i>
Magur	<i>Clarias batrachus</i>
Sing	<i>Hetropneustes fossilis</i>
Taki	<i>Channa punctatus</i>
Tengra	<i>Mystus tengra</i>
Chanda	<i>Chanda ranga</i>
Shol	<i>Chana striatus</i>
Bashpata	<i>Ailia coila</i>
Rui	<i>Lebeo rohita</i>
Boal	<i>W atto</i>

Culture fisheries: In the polder area total of 297 ha land are covered by culture fisheries and the major area is homestead pond culture, small scale & large scale commercial culture were found in the area. The open water fisheries are commonly found in the area is;

Bangla name	Scientific name
Rui	<i>Lebeo rohita</i>
Mrigal	<i>Cirrhima mrigala</i>
Catla	<i>Catla catla</i>
Tilapia	<i>T nilotica</i>
Grass carp	<i>Ctenopharyngodon idella</i>
Silver carp	<i>Hypophthalmichthys militia</i>

Galda mixed with carp culture: Galda (prawn) has been culturing in this area from the last few years which is increasing day by day. The single cropped paddy field or the beel areas are generally used for Galda culture. A canal is dug in the outer side of land, the dug soil used as a dyke. This canal is locally called as 'per' 'top' or 'drain' which are stocking the larvae, the poor growth post larvae are also stocked here for nursing which could be used for next year. The prawn culture started from the Bengali month of Baishakh (April-May) and harvesting after 4-6 months. In the Polder area total of 2478 ha land are covered by prawn culture.

Shrimp culture: The polder comprises of about 629 ha area under shrimp culture which is contributing a lot of benefits to the socio economic development of the people. Shrimp cultivation is widely practiced in the project area by taking in saline water, especially in the areas adjacent to the embankments where saline water intake is easier. However local people hold different opinions on the cultivation of shrimp. These are summarized below:

- Some people have been found to be highly interested for shrimp cultivation and carry on culturing both bagda and go lida. They are confident that the area is suitable for shrimp cultivation and thus they have the legitimate right to cultivate shrimp, with the cultivation of agricultural crops becoming of secondary importance. These groups of people are composed of outsider shrimp cultivators, and large and medium local farm owners.
- There is a moderate group of people in the project area who prefer to grow agricultural crops rather than carry on shrimp cultivation, but they have to join in shrimp cultivation against their will. They try to grow agricultural crops whenever they manage to get rid of shrimp cultivation. This element consists of a large part of the population in the project area; its members belong to the medium to small farm owner groups.
- There is the third group of people who opposes shrimp cultivation and strongly supports producing agricultural crops. This group of people has initiated intensified agricultural crops, for example by increasing HYV boro cultivation. Most of these people belong to the small farmer and landless classes.

5.3.2. Area covered and production analysis:

In Culture fish: In upazila specifically 1404 ha area are covered under fish culture where total production approximately 3121 metric ton, commercial fish culture as farm for culture Carp, tilapia, Pangas, and singh by covered 201 ha where total production is 816 metric ton. On the other hand it is calculated with prawn (Galda) mixed culture where covered 8246 ha for carp culture and production is approximately 9165 metric ton addition carp fish, also 200 metric ton fish come from open water fisheries. In our polder area 297 ha area under fish culture, 416 ha for open water fisheries and 2478 ha carp mixed culture with prawn (galda) and total production among this area is 3504 metric ton.

Galda and Bagda: In upazila 6957 ha area covered under shrimp (Bagda) culture and total production is 2290.5 metric ton and 8246 area covered under prawn culture and production is 5099 metric ton.

Table 45: Covered area under fish culture in Upazila

Culture	No Gher/pond	Area (ha)	Production (Mt)
Shrimp culture	7734	6957	2290.35
Prawn culture	15427	8246	5099
Pond culture	4112	1404	3121.09
Open water capture fish		920	200

Table 46: Productivity ratio in culture fish

Type of farmers	Ponds	Area	Productivity (Mt/ha)
Marginal culture fisher (Up to 10 dec)	1768	71.58	1.23
Small culture fisher (11- 30 dec)	616	75	1.72
Medium culture fisher (31-50 dec)	123	24.97	1.98
Large culture fishers (51 or more dec)	70	34	2.47

Table 47: commercial fish culture

Type of farm	No of Farm	Area (ha)	Production(Mt)
Commercial carp farm	15	65	179
Commercial Pangas farm	8	10	70
Commercial Telapia farm	20	125	563
Commercial singh farm	1	1	4
Total	44	201	816

(Sources; DoF)

Table 48: Covered area under fish culture in Polder area.

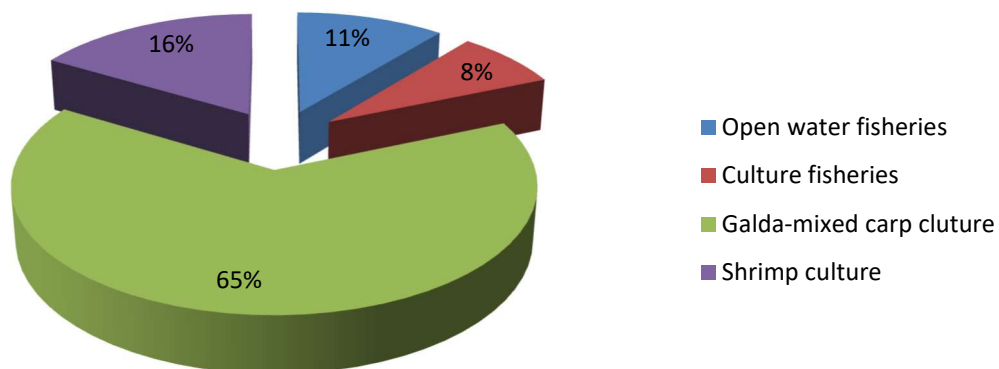
Union	Open water fisheries (ha)	Culture fisheries (ha)			Total wetland (ha)
		Culture fisheries	Galda mixed with carp culture	Shrimp culture	
Dumuria	0	97	254	0	351
Sahos	6	58	686	332	1082
Bhandarpara	198	83	1229	50	1560
Sarafpur	212	59	309	247	827
Surkhali (part)					
Total Polder	416	297	2478	629	3820

(Sources; Land Zoning Report: Dumuria Upazila-2011)

Table 49: Culture fish production in polder:

Type of culture	Area (ha)	Production (Mt)
Open water fish	416	90
Culture fish	297	660
Carp culture with prawn	2478	2754
Total	3191	3504

Chart 15: Fishing from different culture



Involve in fish culture: In generally 10% polder dwellers (7515 peoples) area mostly involved fish culture activities among them 47.3% are indirectly involved in fish culture activities by share fishing system or capture fish from open water bodies, approximately 52.7% (3960) are directly involved in fish culture activities. Among them 38.5 HHs have a up to 10 decimal ponds which all are not culture as commercially only they culture pond for their households purpose and most of the ponds are in homestead area. 10.5% HHs cultured their pond by commercial basis some of them are practiced table fish culture and some are practiced carp mixed culture with Galda, and this ponds are in field crop area and beside the village. On the other hand 2 & 1.7% are medium to large culture fisher who cultured their pond are fully commercial basis, and most of them are involve in Shrimp or Galda culture activities and very few numbers are culture table fish.

Table 50: Average HHs pond size

Farmers type	%	Remarks
Pond less (0 decimal)	47.3	
Marginal culture fisher (Up to 10 dec)	38.5	Mainly table fish culture
Small culture fisher (11- 30 dec)	10.5	Table fish & Galda-mixed culture
Medium culture fisher (31-50 dec)	2	Galda-mixed culture
Large culture fishers (51 or more dec)	1.7	Bagda & Galda-mixed culture

(Sources; FGD with WMG)

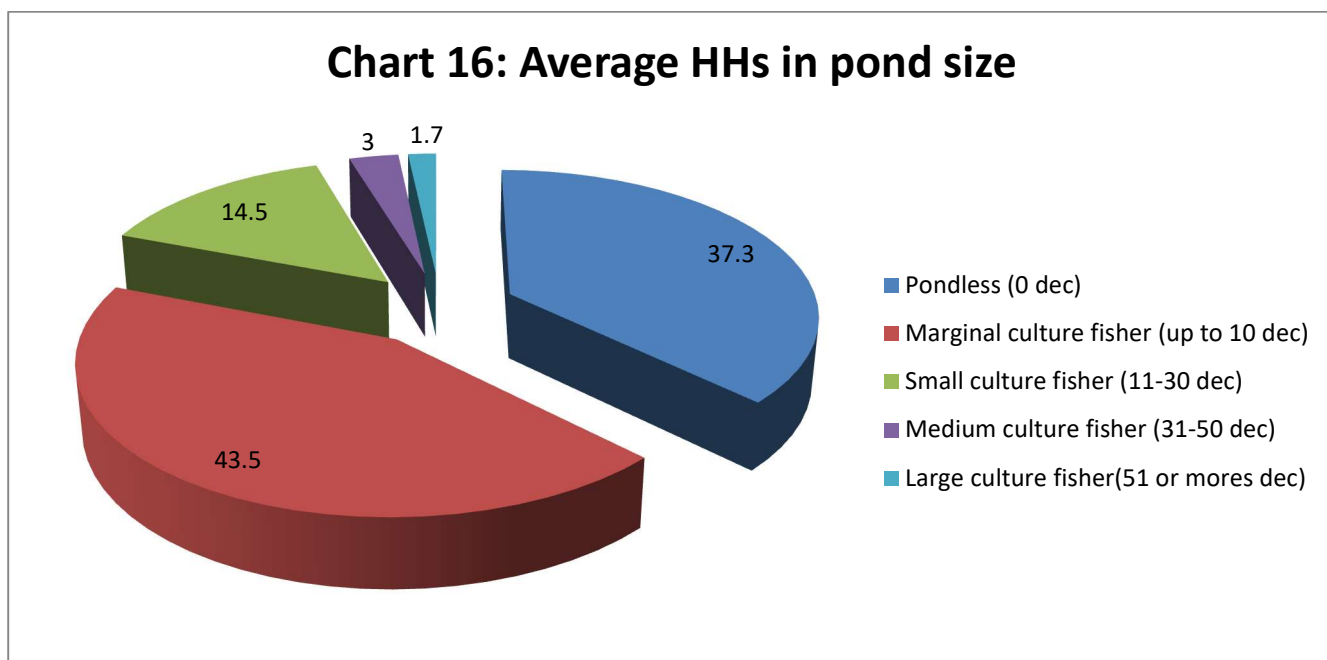


Table 51: Labor distribution in fish culture

	Own labor	Hired labor
Open water fisheries	100%	0%
Pond fish culture	75%	25%
Galda mixed with carp culture	40%	60%
Shrimp culture	5%	95%

Chart 17: Labor distribution in culture fish

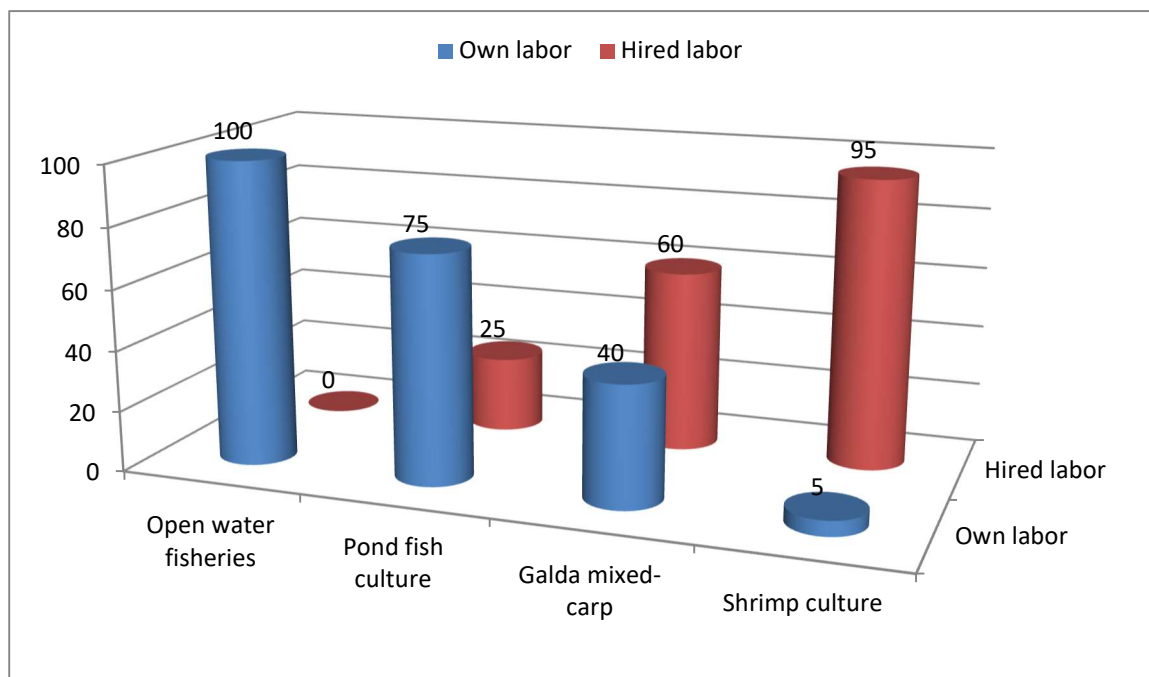
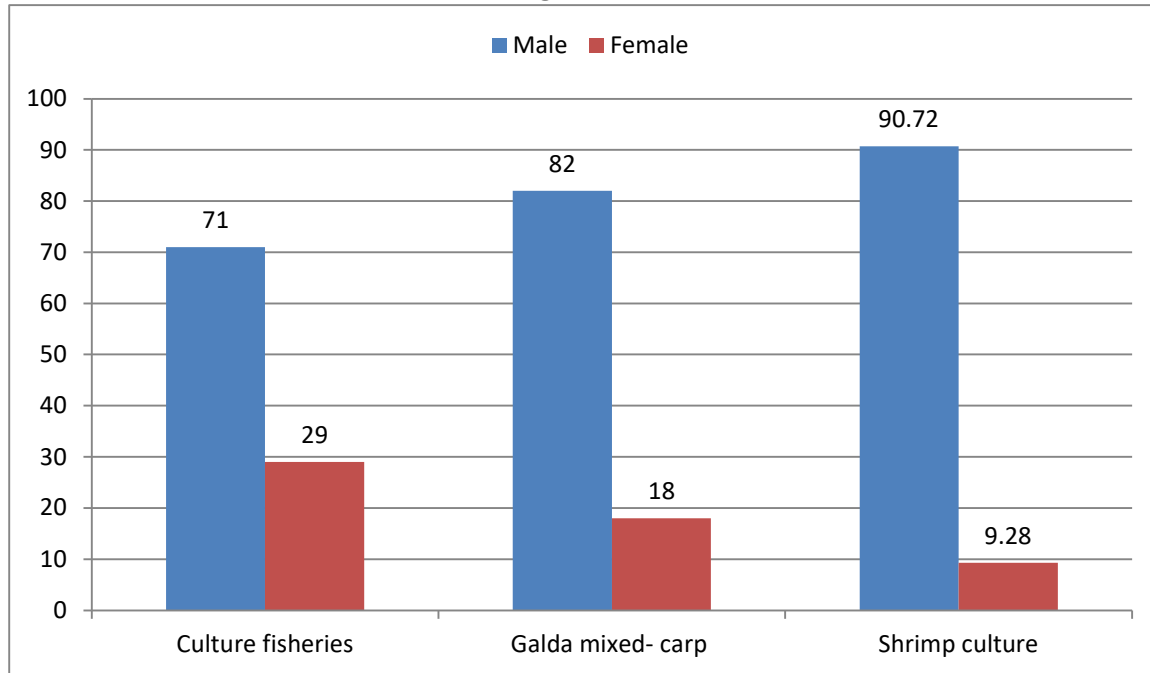


Table 52: Labor distribution in culture fish

Activities	Labor distribution (%)					
	Culture fisheries		Galda mixed with carp culture		Shrimp culture	
	Male	female	Male	female	Male	female
Pond preparation	75%	25	88%	12%	100%	0%
Feed preparation & supply	60%	40%	70%	30%	85%	15%
Inter culture operation	72%	28%	90%	10%	100%	0%
Input collection	65%	35%	80%	20%	100%	0%
Harvesting	90%	10%	95%	5%	100%	0%
Grading & processing	50%	50%	60%	40%	50%	50%
Marketing	85%	15%	95%	5%	100%	0%
Average labor distribution	71%	29%	82%	18%	90.72	9.28

Sources;FGD with Fish farmers & WMG

Chart 18: Labor distribution based on gender



5.3.3 Input Market:

Normally fish input market are not expansion 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. 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. But it is also observed that the cohesion between dealer & retailer not not strong compare to the other input marketing channel. On the other hands mainly fish meal sold by grocery shopkeeper especially rice & wheat husk, oil cake and here absence the business relation with dealer and they collect inputs from different mill. So fish input market does not maintain the specific supply chain.

Table 53: Input & service market

Input market	In Upazila	In polder
Feed & Medicine retailer	200	36
Feed & Medicine Dealer	37	5
Fish nursery	56	12
Patilwala (mobile fingerlings seller)	120	26
Mono sex Telapia & carp hatchery (BRAC Hatchery)	01	0
Khulna north Galda hatchery	01	0
Company	11	
LEAF	14	4

5.3.3. Service provides:

Manpower of Department of Fisheries (DoF) is limited to provide the technical services to the farmer's level as the farmer's requirement. DoF trained some advance farmer who are responsible to provide technical services, information, improved technology dissemination through set up demonstration and also organized the different awareness raising event and training at union level. Total of 14 skilled persons are involved in this related service as called them LEAF (Local Extension Agent for Fisheries). DoF supply one Kit box to the worker so that they can provide qualitative services to the culture fishers, mainly the kit box & medicine use for testing the soil quality, soil pH, water quality, feed measurement and diagnosis of fish disease. In the polder area four LEAF worker have been continuing their services as taking the business mentality.

Table 54: List of LEAF at polder area.

Name	Union	Mobile no
Abu Syed Siddike	Sahos	01745648857
Sanjoy Bairagi	Bhandarpara	01729952359
Abdus Sattar	Dumuria	01915951493
Abdur Rahim Sarder	Sarafpur	01918876025

Table 55: List of Company at Upazila.

Company name	Product
Aftab Feed Ltd	Fish feed
Nourish Poultry & Fish feed Ltd	Fish feed
Kazi fish feed	Fish feed
Paragon fish feed	Fish feed
Quality fish feed	Fish feed
Mega feed	Fish feed
Niribili fish feed	Fish feed
Novertis	Medicine
organic	Medicine
Thailand	Feed & Medicine
Saudi Bangla fish feed	Fish feed

5.3.4. Major problem in open water fisheries:

- Indiscriminate the using destructive fishing gears like; estuarine set bag net, current net in the open water are decreasing the sustainability of open water fisheries.
- Depletion of wild fish population due to harvesting the fish fry (Renu pona) and brood fish (Mother fish) from the open water.
- Over exploitation of high valued and traditional species.
- 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.

5.3.5. Major problem in culture fisheries:

- Low quality and under size fingerlings are decrease the productivity.
- High price of fish feed discouraging the fish culture.
- Some time fingerlings mortality rate is high due to the traveling hassle.
- Frequently and in some cases depth flooding interrupt the culture practice and damage the farm productivity.
- Perennial water bodies are reducing due to down the existing ground water level and land conversion.
- 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.

5.3.6. The unfavorable 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.
- Shrimp cultivators use the outside and local muscle-men in order to cultivate shrimp safely, thus violence and lawlessness increase in the area.

- Anti-social activities of different types (reign of terror, physical torture, rape etc.) increase in the shrimp cultivation areas, creating panic among the peace-loving common people, especially women. Children also become delinquent, as many of them cannot keep themselves from earning money by stealing shrimp.
- 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.
- Growing kitchen vegetables is affected by salinity intrusion caused by bagda cultivation.
- 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; IPSWAM planning study-2005)

6. Potential Value chain in Polder-29

6.1. Potential VC list in Polder

1. Boro Rice
2. T-Aman
3. Wheat
4. Maize
5. Til (Sesame)
6. Vegetable
7. Jute
8. Prawn (Galda)
9. Shrimp (Bagda)
10. Culture fish (Table fish)
11. Backyard Poultry
12. 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
Crop↓		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 season	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) green, yellow, red		
Weight →		7%	6%	6%	7%	6%	5%	5%	6%	5%	6%	5%	4%	4%	2%	9%	8%	4%		100%		
<i>Food</i>																						
Boro Rice	National	5	1	3	1	1	5	3	3	1	5	1	1	3	3	0	3	3	1	Yellow	2.54	7
T Aman	National	5	1	1	1	1	5	5	3	1	5	1	1	3	3	0	3	3	1	Yellow	2.52	8
Wheat	National	3	1	1	1	1	1	1	1	1	3	1	1	1	1	0	1	1	1	Yellow	1.24	10
Maize	National	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	0	Yellow	0.86	12
Til (Sesame)	National	3	3	5	3	3	1	1	1	1	1	1	1	0	1	1	1	1	1	Yellow	1.72	9
Vegetable	National	5	3	5	5	5	3	3	3	3	5	3	3	3	3	1	3	3	3	Yellow	3.60	2
<i>Non Food</i>																					0	
Jute	National/International	3	1	1	1	1	1	1	1	1	0	0	1	0	0	0	1	1	0	Yellow	0.89	11
<i>Aquaculture</i>																					0	
Golda	National/International	3	5	3	3	3	3	3	3	3	3	3	3	3	3	3	1	1	1	Red	2.70	5
Bagda	National/International	5	5	3	1	3	3	3	3	3	3	3	3	3	3	3	1	1	1	Red	2.70	6
Culture fish	National	5	3	3	3	5	3	3	3	3	3	3	3	3	3	3	1	1	3	Red	2.92	3
<i>Livestock</i>																					0	
Backyard Poultry (Egg)	District	3	5	3	5	5	3	5	3	5	3	3	3	5	3	3	5	1	3	Green	3.68	1
Milk	District	3	5	3	3	3	3	3	1	3	3	3	3	3	1	3	5	1	1	Green	2.86	4

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	Score-3	Score-1	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 Vegetable Shrimp Culture fish	Wheat Sesame Prawn Poultry Milk Jute	Maize	
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 Prawn Poultry milk	Vegetable Culture fish Sesame	Boro Rice T-Aman Wheat Maize Jute	
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	Sesame Vegetable	Culture fish Shrimp Prawn Poultry milk Boro Rice	T-Aman Wheat Maize Jute	
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	Vegetable Poultry	Sesame Prawn Milk Culture fish	Boro Rice T-Aman Wheat Maize Jute 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	Vegetable Poultry Culture fish	Prawn Milk Sesame Shrimp	Boro Rice T-Aman Wheat Maize Jute	
B. Impact (32)					

Criteria	Measuring criteria	Product gain score			
		Score-5	Score-3	Score-1	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 Poultry Culture fish Shrimp Prawn Milk	Wheat Maize Jute Sesame	
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	T-Aman Poultry	Boro rice Vegetable Culture fish Shrimp, Milk Prawn	Wheat Maize Jute Sesame	
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 T-Aman Poultry Vegetable Culture fish Shrimp Prawn		
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	Shrimp Prawn Vegetable Culture fish Milk	Boro rice T-Aman Wheat Maize Jute Sesame	
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 Vegetable	Wheat Shrimp Prawn Culture fish Milk Poultry	Maize Sesame	Jute
Nutrition - potential of increasing Nutrition intake (5):	some product which is needed to ensure proper nutritional food intake, e.g. some micro elements usually in shortage should score high; If no impact possible on nutritional intake (e.g. no food crop) , score =0, very		Shrimp Prawn Culture fish Milk Poultry	Boro rice T-Aman Vegetable Maize Sesame Wheat	Jute

	limited potential =1, Medium potential = 3, High potential =5 e.g. moringa with recognized high nutritional value.				
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C. Structure of the Industry (15)					
Criteria	Measuring criteria	Product gain score			
		Score-5	Score-3	Score-1	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		Shrimp Prawn Culture fish Milk Poultry Vegetable	Boro rice T-Aman Maize Sesame Wheat 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	Poultry	Shrimp Prawn Culture fish Milk Vegetable Boro rice T-Aman	Wheat	Maize Sesame 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.		Shrimp Prawn Culture fish Vegetable Boro rice T-Aman Poultry	Milk Sesame Wheat	Maize Jute
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		Shrimp Prawn Culture fish Poultry Milk	Sesame Vegetable	Boro rice T-Aman Maize Wheat Jute

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 women involvement potential, score =0, very limited potential =1, Medium potential = 3, High potential =5	Poultry Milk	Vegetable Boro rice T-Aman	Shrimp Prawn Culture fish Maize Wheat Jute	

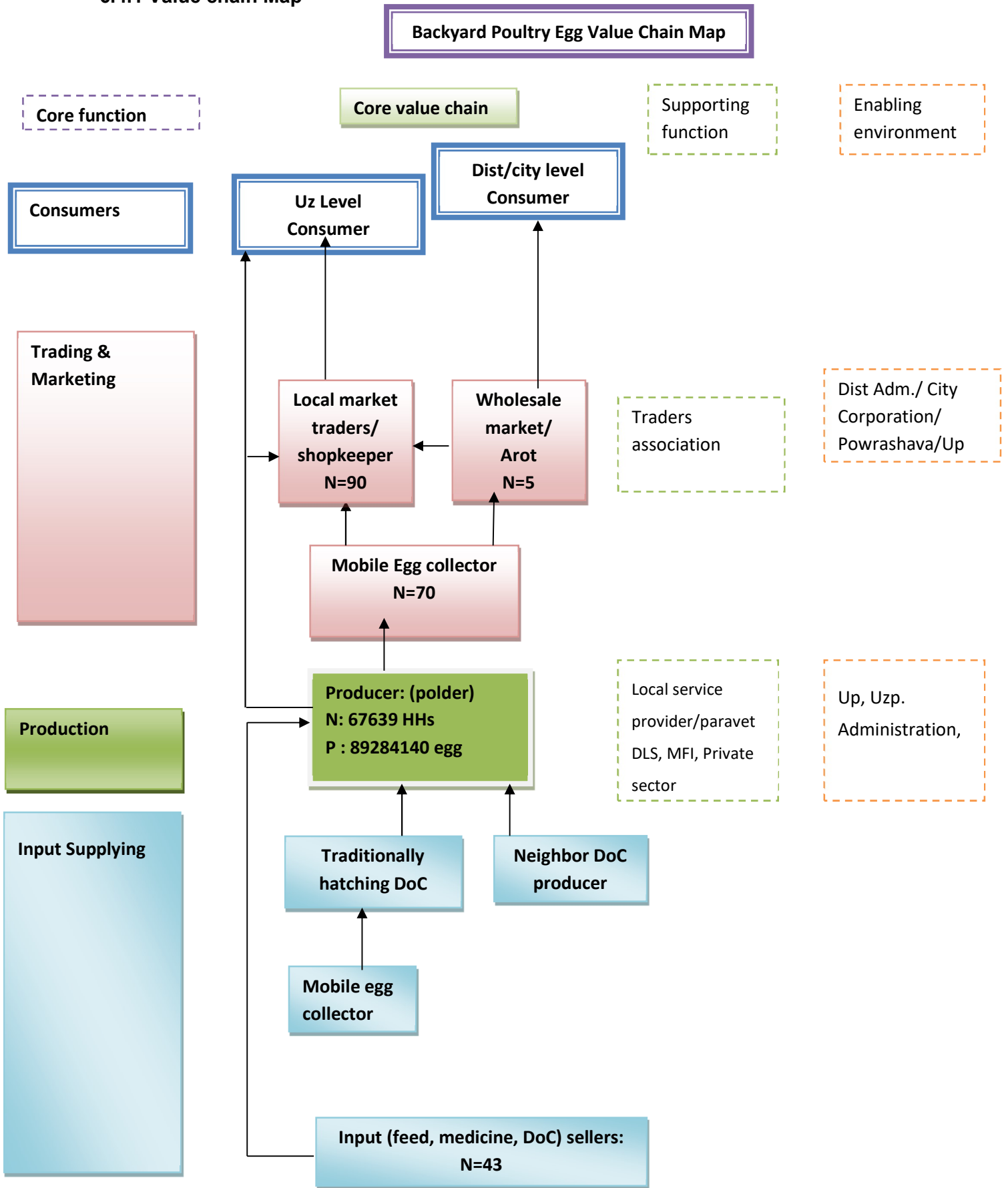
Employment Generation (8):	Labour intensity of the envisaged intervention (could be area expansion, adding value, productivity increase). Number of employment creation, the type (quality) of employment and opportune timing thereof. If no potential for employment generation, score =0, very limited potential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

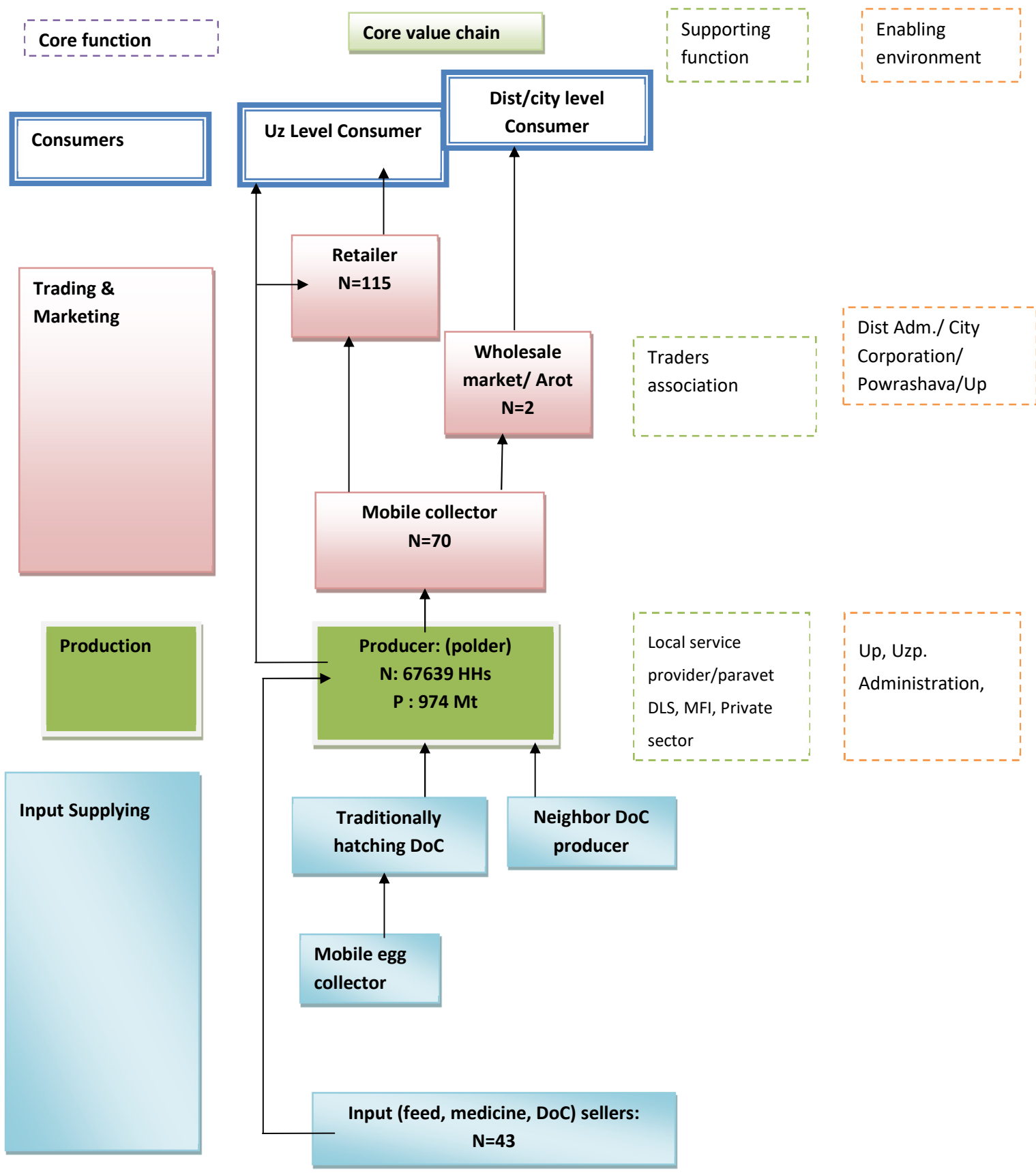
F. Risks					
Criteria	Measuring criteria	Product gain score			
		Green	Orange	Red	
	Consider major risks for this product (the absence of risks will score green, general prevalence of risks orange, but risks with high certainty of occurrence and extremely damaging to the produce should be given red.	Poultry Milk	Maize Wheat Jute Vegetable Boro rice T-Aman	Shrimp Prawn Culture fish	

6.4. Potential Value chain Analysis:

6.4.1 Value chain Map



Backyard Poultry Meat Value Chain Map



6.4.2. Value Chain actor

Core function	Name of actor	Numbers	
		In Upazila	In Polder
Input Supply	Feed and medicine seller	270	43
	Feed & medicine Company	16	0
Producers	Producers	55935 HHs	13521 HHs
	Mobile egg & meat collector		70
Trading	Shopkeeper (for egg)		95
	Wholesaler		12
	Retailer (for meat)		115
Service provider	DLS	1	
	Local service provider (paravet)		37
	Vaccinator		14
Supporting function	Market place/Hat	45	16
	Arot	5	2
	Company/private sector	16	

6.4.3. An overview of Backyard poultry:

- In generally 90% households in rural as well as polder area are directly involve in backyard poultry rearing activities.
- In polder area approximately 33 local service provider (Paravet), 13 vaccinator, and 4 Artificial Inseminator have been continuing their business by providing the technical services
- More the 16 company and 43 input sellers have been continuing the technical and business related service to the stakeholder.
- Approximately 95 shopkeepers, 115 retailers have been working to effective the output market system.
- Yearly production of egg is 87532720 from local breed by the productivity rate is 110 eggs per year, 198957110 eggs from improved breed by the productivity rate is 290 per year and meat production is 4881337 kg from broiler.
- All are rearing backyard poultry by traditionally specially the poor housing facilities and not use the supplementary feeding system.

6.4.4. 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.

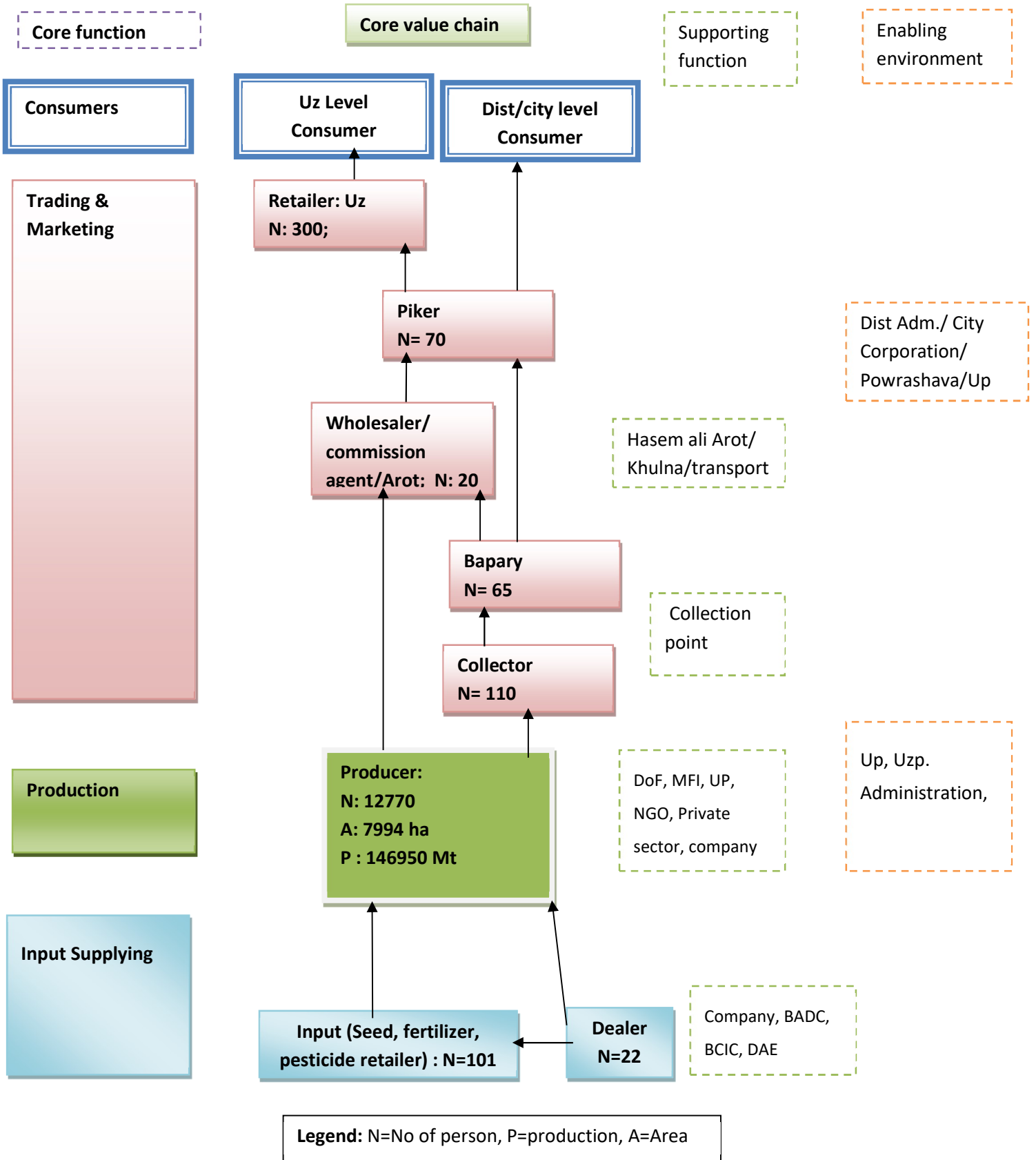
6.4.5. Constraint:

- 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.

6.4.6. Potentiality for VC selection:

- Almost every family of this polder is involved with poultry rearing (90%),
- 100% women are involved this activities 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 a 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.
- As a data 55% HHs reared at least 1-5 birds, 15% HHs reared 6-10 birds, so it is called that major percentage (70%) HHs reared up to 10 birds and it is possible to increasing the production by expansion of farm size (by rearing more birds).
- The producers have been got long time return within the very short time after investment.
- Have a scope to create another business as women vaccinator to support this sector.

Vegetable Value Chain Map



Value Chain actor

Core function	Name of actor	Numbers	
		In Upazila	In Polder
Input Supply	Fertilizer retailer	120	36
	BCIC fertilizer dealer	13	5
	BADC fertilizer dealer	14	8
	BADC seed dealer	22	9
	Seed & pesticide Dealer	37	12
	Seed & pesticide retailer	200	65
Production	Producers		12770
Trading	Arotder	20	20
	Piker (Vegetable)	70	25
	Retailer	300	70
	Bapary (vegetable)	65	20
	Collector (vegetable)	110	110
Service provider	DLS	1	
	Local service provider (paravet)		37
	Vaccinator		14
Supporting function	Market place/Hat	45	16
	Arot	12	2
	Collection point (vegetable)	15	15
	Company/private sector	65	

An overview of Vegetable production:

- In polder most of the area is focused in vegetable cultivation area and so many businesses have been continuing to addressing the agriculture sector.
- Three major areas are covered in vegetable cultivation like; field vegetable, homestead vegetable and pond dike vegetable.
- In generally 85% HHs are directly involve in vegetable cultivation out of total agril HHs.
- More the 65 company and 135 input sellers have been providing inputs and technical & business related service to the farmers.
- Yearly harvested 145950 Metric ton vegetable and major species in winter season is Tomato, cauliflower, cabbage, country bean and brinjal, and summer season is Bottle gourd, bitter gourd, and brinjal.

Opportunity:

- Hasem Ali Arot always helps to strengthening the vegetable supply chain in polder area.
- In peak season 15 collection points provided the business support to the farmers.
- Some time Piker/Bapary directly communicates to the large farmers for collecting the vegetables.
- Well developed physical infrastructure makes an easier for vegetable transportation facilities

- 2 Arot, 20 Arotder, 70 piker, 65 Bapary, 110 collector and 300 retailer involved in this sub sector.
- In polder area 3 type Agro machineries (50-power tiller, 50-LLP and 25-pedal thresher) was received from FAO which used and managed by WMG.

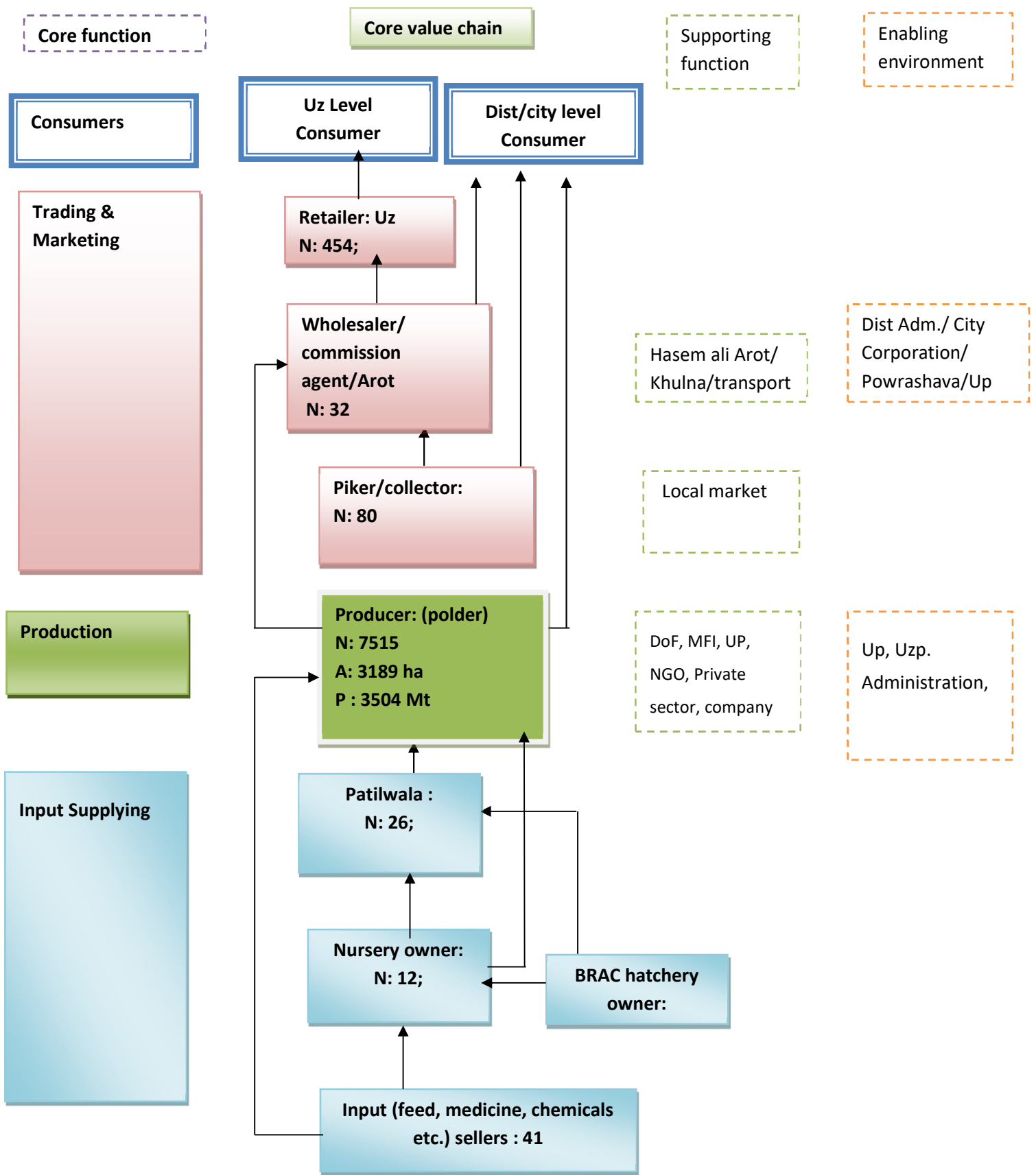
Constraint:

- Poor drainage and irrigation facilities.
- Inadequate knowledge on improve production technology on vegetables.
- Lack of knowledge on identifying and processing the quality seeds.
- Frequently and in some cases depth flooding interrupt the vegetable production cycle.
- 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 vegetable crop field.
- Different manmade and naturally created factors like; rainfall, drought, salinity, water logging tidal surge are affecting the vegetable cultivation
- Saline water intrusion, over doses of chemical fertilizer, over use of pesticide and insecticide, scarcity of surface water for irrigation, inadequate drainage system, and siltation reduced the soil fertility as well as decline the soil productivity.
- Financial requirement is one of the problems to start the crop cultivation in timely. Some of Bank provides the crop loan but it is not easily accessible for farmers due to the long procedure system of bank and farmers do not get this type of loan in timely.
- Crisis of fertilizer and pesticides during the peak season due to inadequate supply (Though DD, DAE don't agree with farmers complain). Quality of pesticide is not good enough and sometimes does not work as standard one. There are some company's produces less quality pesticides and promoting their market at remote area (as people are not aware with the quality).
- The valuable agriculture land is reducing rapidly in every year due to unplanned construction of houses and settlements, industries, markets, river erosion and for different infrastructural development.
- The farmers of polder area face scarcity of irrigation water in the dry seasons and shortage of necessary agricultural inputs, which are hampering intensive vegetable cultivation in timely.
- Scarcity of surface water for irrigation, higher price of agricultural machineries/equipment in the local markets is the major problem for intensive irrigation in the area.
- In some cases lack of market information happening the price fluctuation especially for vegetable marketing. Most of the cases farmers did not know the actual demand of the local market and everybody storage the vegetable for selling into the same market at same time and ultimately market are over saturated by surplus vegetable. Here buyer gets an extra opportunity to hike the illegal price and farmers are loss the profit.

Potentiality for VC selection:

- It has a great scope to ensure women participation especially in homestead vegetable cultivation.
- Most of the farmers are not able to identify the quality seed and seedling so here have a scope to improve the farmer's knowledge on this issue.
- In many cases farmers used none-recognized seed which collect from the neighbor. For the productivity concern it is required the quality seed and have a scope to establish the business relation with the good quality input provider.
- It has scope to increase the productivity by introducing and adopting the improve technology.
- Have a scope to strengthening the vegetable supply chain by establish the cohesion and coordination among the different actor like; Piker, Bapary, Arotder, collector and producers.
- It is easier to dissemination of improved technology through set up the demonstration by the supervision of FFS.
- It has a scope to increase maximum utilization of homestead area under vegetable cultivation.
- It is possible to increase women income and asset by ensure the women participation in homestead vegetable cultivation.
- Female are physically less capable of work than the male and never done comparatively hard work in the field. So here a great scope to employment creation in different flexible work like; vegetable harvesting, grading, cleaning and any other packaging activities.
- By the food security concern, vegetable supply the different nutritional value especially for women and child.
- Have scope to start collective action opportunity through establish the collection point where women can easily access the marketing facilities by selling their very small amount of products.

Culture fish Value Chain Map



Value Chain actor

Core function	Name of actor	Numbers	
		In Upazila	In Polder
Input Supply	Feed and medicine retailer	200	36
	Feed and medicine Dealer	37	5
	Fish nursery owner	56	12
	Patilwala (mobile fingerlings seller)	120	26
	Mono sex Telapia & carp hatchery (BRAC Hatchery)	1	0
	Feed & medicine Company	11	0
Production	Producers	30764	7515
Trading	Piker and collector		80
	Arotder		32
	Retailer		454
Service provider	DoF	1	
	LEAF	14	4
Supporting function	Market place/Hat	45	16
	Arot	3	1
	Ice mill	4	0
	Transport		

An overview of culture fish in polder

- In our polder area 297 ha area under fish culture, 416 ha for open water fisheries and 2478 ha carp mixed culture with prawn (galda)
- Total of 3504 metric ton fish production among this area
- In polder area 37.3% HHs are pond less, 43.5% are Marginal culture fisher (Up to 10 dec), 14.5% are small culture fisher (11- 30 dec), 3% are medium culture fisher (31- 50 dec) and 1.7% are large culture fishers (51 or more dec)
- In the area very good practice by culturing Galda (prawn) and carp fish as mixed culture.
- Most of the ponds are cultivated by followed mixed culture technology (carp fish).
- Maximum ponds are seasonal and water remains up to 7 months.
- Most of the culture fisher maintains the traditional culture practice.
- Pond's productivity is not more good it is approximately 2.22 Mt/ ha

Opportunity:

- The area is focused as fish culture zone so marketing channel is more develop.
- Very big and nationally recognized wholesale market (Hasem Ali Arot) are situated in Polder area,
- Market size is very big and demand is always high. Local, regional, national and international level market is defined and established very good supply chain.

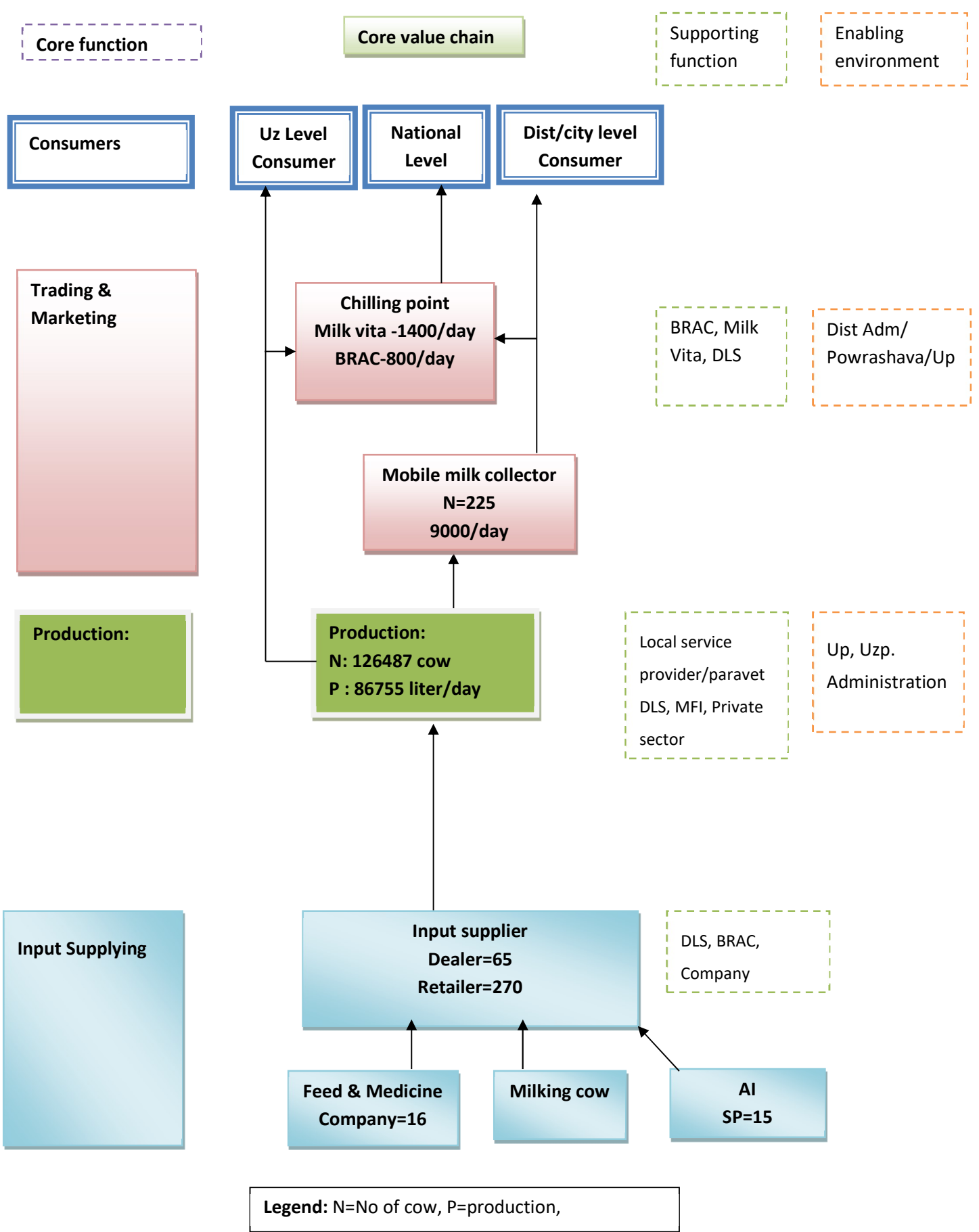
Constraint:

- Low quality and under size fingerlings are decrease the productivity.
- High price of fish feed discouraging the fish culture.
- Some time fingerlings mortality rate is high due to the traveling hassle.
- Frequently and in some cases depth flooding interrupt the culture practice and damage the farm productivity.
- Perennial water bodies are reducing due to down the existing ground water level and land conversion.
- 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.
- People do not invest much time or planning, and therefore do not practice proper pond management.
- There is very limited number of nurseries
- Weak backward linkage is the result of low demand of inputs
- Technical service are not easy accessible and available in the locality

Potentiality for value chain selection:

- Have scope to expansion of nursery business for ensure and availability of quality fingerlings at the polder area.
- It has an opportunity to take collective action by establish collection center in different place for collect the big volume of culture and capture fish.
- Have scope for women employment in fish culture fish activities (still now 29% women are involved)
- Have scope to improve the culture practice also improve the pond productivity. Marginal culture fisher pond's productivity is 1.23 Mt/ha where as large culture fisher and carp farm productivity is 2.47 and 2.75 Mt/ha respectively.
- There are many community water bodies, like canal and Dighi which can come under aquaculture.
- Water logged area can be come under fish culture activities for short duration species, like grass carp, Silver carp and Telapia
- 85% farmers have been culturing their pond as traditional practice on the other hands FFS has module for improve the Aquaculture.
- In this area have one BRAC hatchery for providing quality fingerlings, here project will take initiative to establish business relation among the producers, nursery owner and hatchery owner.
- Have scope to jointly work with DoF for new and improved technology transferring.

Milk Value Chain Map



Value Chain actor

Core function	Name of actor	Numbers In Upazila
Input Supply	Feed and medicine Retailer	270
	Feed & medicine Dealer	65
	AI center	15
Production	HHs	34182 HHs
	Cow	126487
Trading	Milk Vita	1
	BRAC	1
	Mobile milk collector	225
	Hat	45
Service provider	DLS	1
	Local service provider (paravet)	37
	AI inseminator	15
Supporting function	Milk vita	1
	BRAC	1
	Company/private sector	16
Enabling Environment	Union parishad, Upazila parishad, Powrashava	

An overview of Milk value chain:

- In generally 55% households (34182) in rural as well as polder area are directly involve in milking cow rearing activities.
- Approximately 37 local service provider (Paravet), and 15 Artificial Inseminator have been continuing their business by providing the technical services.
- Every day 225 mobile milk collector have collected milk from producer's house, Milk vita & BRAC Arong chilling point collect milk through collector and local consumer purchase milk from the nearest hat/bazer.
- More the 16 company and 43 input sellers have been continuing the technical and business related service to the stakeholder.
- Total of 126487 milking cow reared and yearly production is 31665900 liter milk.

Opportunity:

- In the Upazila, two chilling point are establish where 2200 liter milk consume per day.
- Total of 15 Artificial insemination center have been working for improve the cow breed in the area.
- 55% HHs (34182) are reared at least 1-2 local breed milking cow.
- 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 liter/local breed and 3.2 liter/cross breed).
- Lack of knowledge of improves variety grass cultivation or no any commercial grass cultivation farmers in the area.
- 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.
- 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 collector.
- Farmers are not aware about the nutritional feed which increase the fate rate as well as milk productivity.

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.
- Have scope to establish the collection point after forming the milk cooperative group.
- Have a scope to establish the business linkage with chilling point.
- Have a scope to employment creation as milk collector from the group and supply to the chilling point.
- 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 byproduct 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.