



Water Governance and Community Based Water Management

Situation Analysis Report Polder: Bagachra-Badurgacha Sub Project DumuriaUpazila, Khulna district

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Table of Contents			Page No
1	INTRODUCTION		
	1.1.	Aim of the report	1
	1.2.	Methodology	1
	1.3.	Overview of Bagachra Badurgacha Sub Project Area	3
2.	FARMING SYSTEMS AND LIVELIHOODS		
	2.1.	Cropping pattern	8
	2.2.	Livestock	13
	2.3.	Livelihoods	13
	2.4.	Drinking water	14
3.	PHYSICAL CHARACTERISTICS OF THE POLDER		
	3.1.	Condition of the embankment	15
	3.2.	Condition of Sluice gates	16
	3.3.	Condition of Canals: siltation and private control	17
	3.4.	Main water-related problems	17
4.	LGED: ADDRESSING WATER INFRASTRUCTURE PROBLEMS		
	4.1.	LGED Pre-Project	18
	4.2.	LGED during project	18
	4.3.	LGED post-intervention	18
5.	LABOUR CONTRACTING SOCIETIES		
	5.1.	Formation and work with the WMCA	20
	5.2.	Payment	20
	5.3.	LCS livelihood and standard of living	20
6.	MAINTENANCE OF EMBANKMENTS, CANALS AND SLUICE GATES		
	6.1.	Maintenance by LGED	22
	6.2.	Maintenance by Union Parishad	22
	6.3.	Maintenance by Gher owners and landowners	23
	6.4.	Institutional arrangement	23
	6.5.	Emergency response	24
	6.6.	How does maintenance take place?	25
	6.7.	NGOs	26
	6.8.	Participation, Exclusion and Gender	26
7.	OPERATION OF SLUICE GATES		
	7.1.	Operation through WMCA and LGED	28
	7.2.	Operation through Union Parishad	28
	7.3.	Operating private gates.	28
	7.4.	How gate operation takes place	28
8.	CONFLICTS		
	8.1.	Conflicts regarding paddy and shrimp farming	29
	8.2.	Conflicts regarding high-low elevations	29
	8.3.	Conflicts regarding access to budget	29
	8.4.	Land issues	29
	8.5.	Conflict mitigation	29
9.	CONCLUSION		
	9.1.	Summary of findings	31
	9.2.	Concerns	33
	9.3.	Suggestions	34
A.	ANNEX 1: INSTITUTIONS IN WATER GOVERNANCE		35
B.	ANNEX 2: INSTITUTIONS		37

1. INTRODUCTION

1.1. Aim of the report

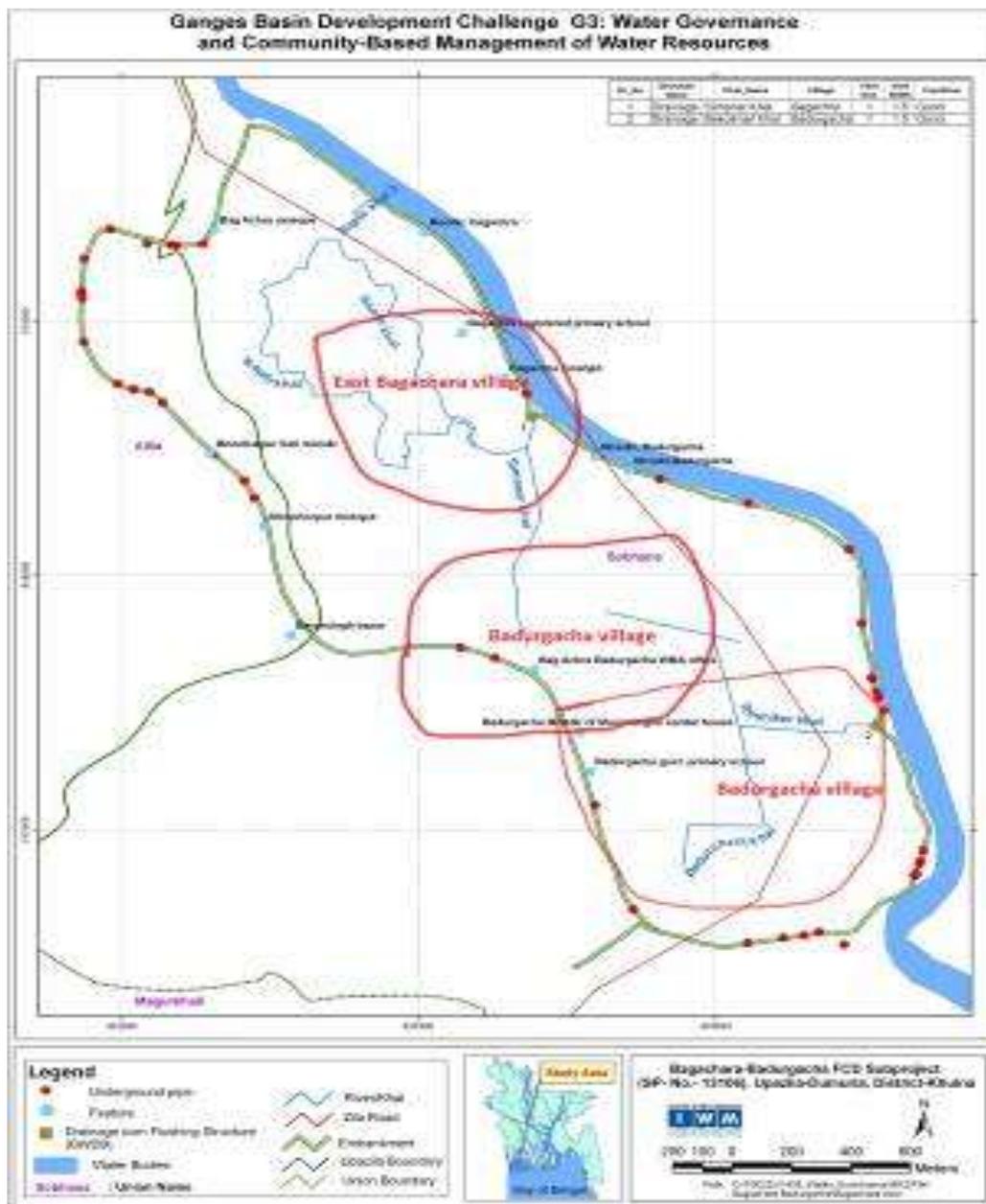
This report aspires to generate a detailed situation analysis report of Bagachra-Badurgacha sub-project in Dumuria Upazila of Khulna district based on Focus Group Discussions (FGD) and Key Informant Interviews (KII). It will do so by providing:

- i) A historical narrative of the polder from the time it was constructed to present;
- ii) Farming systems and livelihoods options;
- iii) Current state of the polder infrastructure;
- iv) Examining the results and process of the water management interventions of the LGED
- v) Reviewing how maintenance of water management infrastructure takes place;
- vi) Reviewing how operation of sluice gates take place; and
- vii) Discussing main conflicts.

It will then conclude by discussing the main findings and implementable policy recommendations that came from the respondents for improving water management in the Bagachra-Badurgacha sub-project.

1.2. Methodology

Four Focus Group Discussions and seven Key Informant Interviews (KIIs) were conducted by the Shushilan research team from 20th to 24th March, 2012. The FGDs were held in two villages of Sovana Union. The venue of the FGD locations were selected based on a glance look of the area in the IWM map, transect walk and consultation with the local people concerning various part of the polder, distance from main rivers and sluice gates, the situation of the rivers, canals, gates and concentration of various types of farming in particular shrimp farming, paddy cultivation with or without aquaculture. The KIIs were selected through snowball process and likely availability of the respondents. The KIIs with farmers, women headed households, woman LCS representative were held at their village home and the KIIs with UP and LGED officials were held at the respective offices in the UP and Sub-district headquarters. The map below describes where the FGDs have been conducted.



A glance look of the FGD venues and participants reveals the following:

- One of the four FGD groups was general FGD group met at Badargacha village (South-part of the polder), on the bank of Teleghati River. In the FGD group had 13 participants comprising 3 farmers, 4 businessmen, one salaries service holder, one teacher, one village doctor and 3 students. The participants owned 1.00 to 10.00 acres land. All of the respondents were Sanatan Hindu and age varied from 25 to 55 years. All of the respondents were the members of WMCA.
- The second FGD group was held with LCS male members at East Badargacha, situated beside the river Teligati. Land comparatively high, Gate number 01 is located here in the mouth of Simanar khal and several un-authorized cuts and dead canals found. There is high concentration of crops farming. Seven of the ten participants were day labourers, two were involved with agriculture with day labouring and one was engaged with patty shop keeping and day labouring. All of the participants were male and Sanatan Hindu by religion and aged between 25 to 40 years. All of them

- were members of WMCA. Three were functionally landless (owning 0.08-0.09 acres each) and others owned 0.75 to 3.00 acres land.
- The third FGD group was held with LCS female members near Badurgacha, situated by the East side of the polder along the river Teligati. The embankment is vulnerable to riverbank erosion. The canals are silted. There is concentration of aquaculture including shrimp farming. Ten of the eleven participants were involved with agriculture, gher and day labouring and one was all-season day labour. Ten of the eleven participants were Sanatan Hindu. Participants' age varied from 25 to 45 years. Two were WMCA members and six were beneficiaries of various NGOs and three had no involvement with NGO or WMCA. Two functionally landless (owning only 0-25 decimals land) and others owned 0.50 to 10.00 acres land.
 - The last FGD was held with eight WMCA EC members, in the middle part of the polder. Allowed land varying from 1.00 to 5.00 acres. Three out of eight participants were farmers, two were businessmen and there were housewife. Age of the respondents varied from 30 to 70 years and seven of the eight were Sanatan Hindu by religion.

The list of FGD and KII conducted is provided in Table 1 and 2.

Table 1: List of FGDs conducted in polder Bagachra-Badurgacha

SL #	FGD Type	Numbers of Participants (Female)	Village (para)	Union Parishad	Relevant Sluice Gate Numbers	Adjoining Canals
1	General	13 Male, no female	Badurgacha	Shobhana	1 & 2	Teligati & Ghengrail river. Badurgacha, Bisu. Katakali, Dakatia, Daiany, Simana, Risikar, Vetkimari & Chelabunia canals.
2	LCS Male	10 Male	East Badurgacha	Shobhana	1	Ghengrail river.
3	LCS Female	11 Female	Badurgacha	Shobhana	1	Teligati river. Naptir khal
4	WMC	9 Male, 2 female	Bagachra	Shobhana	1 & 2	Ghangrail river. Vakotmari khal, Kudaler khal, Chelabuniar Khal and Boroitola khal and Budorkhali silted up. Simanar khal, Risikar khal and Naptir khal existing

Table 2: List of KII conducted in Bagachra Badurgacha Sub Project Polder

Sl #	Respondent Type	Village/ Venue	Date
1	Dijendro Lal Sardar, President WMA	WMA Office	24/03/2012
2	Sardar Abdul Gani, Chairman, Shobhana	UP office	24/03/2012
3	Tarak Chandra Mondol, Member_ Ward No 9	Madartola Bazar	24/03/2012
4	Ritika Rani, female member_ward 7,8,9	House of member	24/03/2012
5	Tulshi Rani Mondol, Women headed	Bagachara	24/03/2012
6	Sujit Sardar, Mixed farmer (Bagda)	Bagchara	24/03/2012
7	Rabindra Nath Mondol, Paddy farmer	Bagchara	24/03/2012

1.3. Overview of the Polder Bagachra-Badurgacha Area

1.3.1. Location and accessibility

Location

The polder Bagachra-BadurgachaFCD sub-project of LGEDis located in Sovana Union Parishad ofDumuria Upazila in Khulna district. The polder area is surrounded by the Rivers Teligati and Ghengrail. Teligati River flows along the east side of the polder and Ghengrail in the north, west and south sides. Within this boundary, there are two mouzas # 64 and 78, Badurgacha and Bagachra. This polder is located 40 km south-west of Khulan city and only about 10 kms South of Dumuria Upazila town by existing road link.

Geographical characteristics

The polder covers the total area of 385 hectares. The TeligatiRiver is navigable round the year but tide flow is weakened. The Ghengrail River is silted and is about to die. The land profile of the polder is saucer shaped. The land along the riverbanks is slightly higher elevated than the land in the centre of the polder and along the inner canals. The land is relatively low-lying in the middle adjoining. The west part of the polder is comparatively high elevated compare to other side.

The polder area comprisesjust one beel and two villages. It looks like a small island surrounded by the riversGhengrailin the west side and Teligati is in the east. These two rivers are inter-connected to the South-East and North-East. The whole polder area is a low lying beel (wetland) and was affected by cyclone Aila in 2009. The polder is also affected by salinity.The land profile is saucer shaped, high along the riverbanks and low land in the beel. The canals are all silted and river bed above the level of beel land, hence the beel is water locked.

Accessibility

The polder Bagachra-Badurgachais connected tothe Dumuria Upazila from there Khulna city. Main transport from the polder to the Upazila town is rickshaw van, hired motorbike, battery operated tricycle called easy-bike and diesel-engine operated haulers. From Dumuria to Khulna city, Satkhira and Dhaka- regular bus service is available. Engine boats are used to

transport heavy goods (construction materials- bricks, raw materials for the brick field but not much for passenger transport).

1.3.2. Demographic features

Table 3 below provides demographic data of Sovana Union of polder Bagachra-Badurgacha as compared to Upazila Dumuria. Total population of the polder Bagachra-Badurgacha is 1,299 while comprising households 315 and household size 4.1. Compare to 10% Hindu and other minority population of the country, 84.8% of the people in Bagachra-Badurgacha are Santan Hindu. Literacy rate is 58% which is above national average (53%) but female literacy in the polder is much lower than male literacy.

Table- 3: Area and Population

SL	Particulars	Sovana UP	Badurgacha	Bagachra	Polder Total	Dumuria Upazila
1	Area (Sq km)	19.46	-	-	3.85	454.43
2	Household	4,806	187	128	315	71,909
3	Population Total	19,708	766	533	1,299	305,675
4	Density	1013	-	-	346	673
5	Household Size	4.1	4.1	4.2	4.1	4.3
6	Male Population	9,783	375	268	643	153,111
7	Female Population	9,925	391	265	656	152,564
8	Sex Ratio	99	96	101	98	100
9	Religion Muslim %	45.9	0.5	36.2	15.2	61.7
10	Hindu %	54.1	99.5	63.8	84.8	38.1
11	Christian and others %	0.0	0	0	0	0.2
12	Literacy All	52.7	59.6	56.4	58.0	52.6
13	Literacy M	58.4	67.6	65.0	66.3	57.4
14	Literacy F	47.0	51.8	47.9	49.9	47.7

Source: BBS, Population Census 2011, Community Series for Khulna District

Table 4: Employment Status of Polder Area People (age 7+ not in school)

SL	Particulars	Sovana UP	Badurgacha	Bagachra	Polder Total	Dumuria Upazila
1	Population age 7+ not in school	4,649	125	79	204	76,019
2	Male	1,848	28	29	57	31,608
3	Female	2,801	97	50	147	45,310
4	Employed Male	1,565	21	23	44	26,592
5	Employed Female	148	0	1	1	2,601
6	% employed Male	84.7	75.0	79.3	77.2	84.1
7	% employed Female	5.3	0.0	2.0	1.0	5.7
8	% Looking for Job Male	0.1	0	0	0	0.3
9	% Looking for Job Female	0.1	0	0	0	0.2
10	% in household work Male	0.7	0	0	0	1.0
11	% in household work Female	74.8	80.4	82.0	81.2	75.3
12	% not working Male	14.4	25.0	20.7	22.9	14.5
13	% not working Female	19.8	19.6	16.0	17.8	18.8

Source: BBS, Population Census 2011, Community Series for Khulna District

Table 4 above shows employment status of male and female population of age 7 and above not attending school. In the polder area 77.2% of the males (of age 7+ not attending school) are “employed” in various income earning activities and 22.9% are reported not working. Of the females of 7+ age group (not attending school), only 1.0% is reported to be working in various economic activities, 81.2 % reported to be engaged in household chores only and about 17.8 % non working. The data should however be read with caution that age 7+ not in school, is not a good definition of labour force and working women were grossly undercounted for a tendency of recording all women as “housewife”.

Table 5: Employment of Working Population by Broad Sectors

Particulars	Sobhana UP	Badurgacha	Bagachra	Polder Total	Dumuria Upazila
Agriculture % of male worker	100.0	100.0	95.7	97.9	80.2
Agriculture % of female worker		0	100.0	100	58.6
Industry % of male worker		0	0	2.1	5.9
Industry % of female worker		0	0	0	16.1
Services % of male worker		0	0	0	13.9
Services % of female worker	100.0	0	0.0	0	25.3

Source: BBS, Population Census 2011, Community Series for Khulna District

Table 5 shows distribution of male and female working population by broad economic sectors. In Bagachra-Badurgacha sub-project, about 98% of the male workers are engaged in the agriculture sector and 2% in the industry sector. The lone working woman (only one woman was reported working, all others non-working or doing household chores only!) was shown to be employed in the agriculture sector.

1.3.3. Basic Facilities Access

Table 6 below shows that nearly 100% people of the polder have access to safe drinking water and the main source is deep tube well. In the whole UP and the Upazila also, close to 100% household have access to safe drinking water although many have to fetch water from a distance of a few hundred meters.

UP has provided 60 tube-wells through government funded project (FGD-general). Fresh drinking water is found at the depth of 600 to 1000 feet usually or even deeper.

Table 6: Availability of or Access to Basic Facilities

SL	Facilities	Sovana UP	Badurgacha	Bagachra	Polder Tot	Dumuria Upazila
1	Sanitary Toilet water sealed %	38.8	43.0	10.9	26.95	50.4
2	Sanitary not water sealed %	39.2	37.1	81.3	59.2	31.4
3	Non sanitary%	13.2	4.8	7.0	5.9	13.6
4	No latrine %	8.9	15.1	0.8	7.95	4.70
5	water source: TW/Tape %	99.8	100	100.0	100	99.2
6	Electricity Connected %	35.7	22.6	18.0	20.3	58.6

Source: BBS, Population Census 2011, Community Series for Khulna District

In polder about 26.95 % households have water sealed latrines and about 59.2% have ring-slab latrine (sanitary but not water sealed). About 6% use non sanitary latrine and about 8% do not have latrine. Situation of sanitation is a bit inferior compared to Sovana UP and Dumuria Upazila. Only one fifth (20.3%) of the households of this polder have access to electricity (connected national grid) and another 5% have solar electricity.

1.3.3. History of the Bagachra-Badurgacha sub-project and Physical Interventions History of polder development

Information received from the FGD and KII participants varied to some extent regarding the time of constructing the embankment and the sluice gates. But it was clear that the embankment was constructed in 1998 and the sluice gates in 2000. After completing construction in 2000, the LGED has been supporting O&M.

The purpose of constructing the polder area was to better protect crops from tidal surge, flooding and salinity intrusion. The sub project also intended to stop fish and shrimp farming and to bring all land under crop production. The SP information showed a target of increase crop production from 346 MT to 869 MT yearly and intended to reduce fish production from 14 MT to zero MT. But the economic opportunities set a different farming system, one season shrimp and one season paddy cultivation.

Better protection of the polder area helped increasing crop production as well as increasing fish and shrimp production. This has also helped increased fruits and vegetables production in the homestead area and increased livestock rearing. Before construction of the polder livelihood of the people was harder. Now both agriculture and aquaculture are practiced. With polder development, road connectivity improved and the economy diversified.

After that, land was leased out to gher owners. Now people are engaged in agriculture, aquaculture, transport, business and services. Some respondents said that grasses do not grow well due to salinity and livestock rearing is difficult in this situation (FGD-WMCA). Most of the participants viewed that two sluice gates are not enough to manage water effectively. High land owners get less water, so they install pipe inlets into the embankment. They do it for crop cultivation and shrimp culture. These pipe inlets made the embankment weak. Before construction of the polder, outsider domination was a major problem in shrimp farming and most of the land owners used to lease out the land.

But the development was interrupted by cyclone AILA in 2009. During Aila, embankment broke at several places and sluice gates were partially damaged. Community and the LGED repaired embankment but not adequately. Besides, erosion of river Teligati affected the east side of the embankment which needed major repaired. Another shock was low rains in 2010 resulting increased salinity and reducing aman plantation to only 25% of the area from about 80-85 percent. Now it has increased again to 85 percent.

2. FARMING SYSTEM AND LIVELIHOODS

2.1. Cropping pattern and aquaculture

2.1.1 Crops and fish grown

Basically only one crop is produced in this polder area and the crop is aman paddy planted in August and harvested in December. Aman is planted in about 85% of the area. Of the remaining 15% area, about 2-3 percent is used for producing Boro HYV paddy followed by mixed Golda and Fish farming and 12-13 percent used for all season mixed bagda, golda and fish farming. Other crops are not important in this polder because salinity does not allow growing of other crops. Aman can be grown because salinity decreases in the middle of monsoon and remains low until the end of the year when aman is already harvested. Aquaculture comprising bagda shrimp from February to July, Golda from June-Dec, brackish water fish and Tilapia from February to December is expanding as land elevation and salinity condition is suitable to aquaculture than crop production.

Before construction of the polder in 1998-2000 local aman varieties of paddy were cultivated. The varieties include *balam*, *horko* and *bojramuri*. Now high yielding varieties are cultivated, mainly BR 11, 23, 28 and 41. Vegetables and fruits are cultivated mainly in the homestead land and recently on gher dykes.

Before construction embankment paddy yield was only four or five mounds (160 or 200 kg) per bigha or 480-600 kg per acre. This was equivalent to 800 to 1000 kg rice per ha. After construction polder yield tripled mainly due to replacing local varieties by the high yielding varieties and protecting the crops from flood, tidal surge etc.

It is however reported that salinity increased after constructing polder because after constructing polder brackish water aquaculture expanded. Before construction of the embankment making shrimp gher was risky as the low gher dykes were vulnerable to be damaged by tidal surge. This risk is now largely reduced for having outer embankment constructed by the LGED with strong sluice gates.

Planting of aman paddy and its yield is however dependent on weather. In 2010 aman paddy was planted in only about 25% of the land because monsoon rain was inadequate to wash out salinity and water of surrounding rivers was saline even in the middle of the monsoon. So, farmers could not plant aman paddy. From 2011 aman plantation and yield increased again.

Before embankment construction indigenous species of fish like *bain*, *soil*, *koi*, *boal* and various species of shrimp- *bagda*, *horina*, *khaka*, *chali* and prawn *golda* grew naturally in the beel, canals and rivers.

Although aquaculture started in the 1970s, there was no need to stock fish or shrimp (until mid 1980s) fry as fries entered the gher from the nature and grew there a few months in natural condition and harvested before planting *aman* paddy. In the late 1980s to 2000 *bagda* and *golda* fries collected from the rivers were stocked in the gher to supplement natural stock and other species of shrimp and fish entered the gher from nature. Now, not only *bagda* and *golda*, but also *horina*, *parse*, *bhangan* are stocked.

2.1.2. Changes of Cropping Pattern with Polder Development

Bagachra Badurgacha area had traditional *austomasi bundh* until 1970 that began more than in 1893. Under this system, each farm household owning 30 bigha (10 acres) land engaged one kishan (agricultural labour) to construct and maintain the dyke. Those owning 15 bigha gave one labour every alternate day and those owning above 30 bigha engaged more labour proportionate to land holding. In the month of Magh (early February) people of the two villages met and decided when to make the dyke and how much should be contribution in cash and kind. The dyke constructed was (three-four feet above land surface and with three feet top width and 6-8 feet bottom width) to prevent entry of tide water. The community made small wooden box sluices to regulate water. Through these box sluices water was allowed to enter to a certain level from February to July and during this period fish fries entered the beel and grew naturally. The fishing right in the canals adjoining the wooden sluices was sold on yearly basis to individual fisher or fisher group. They could just fish but were not allowed to set fixed net, bamboo fence, mud dyke or otherwise block free flow of water. Inside of the canal and beel, people were free to fish anywhere both for own consumption and selling.

The dykes were constructed in February and water entry regulated up to August-September, about 8 months, until completing aman plantation. For eight months regulation of water the system was called *austomasi bundh* or eight-month dyke. In September-October water recedes after the end of monsoon. During October-December not much maintenance is needed but minor or emergency maintenance continued. After harvest of aman paddy in December and land was kept free for grazing animals.

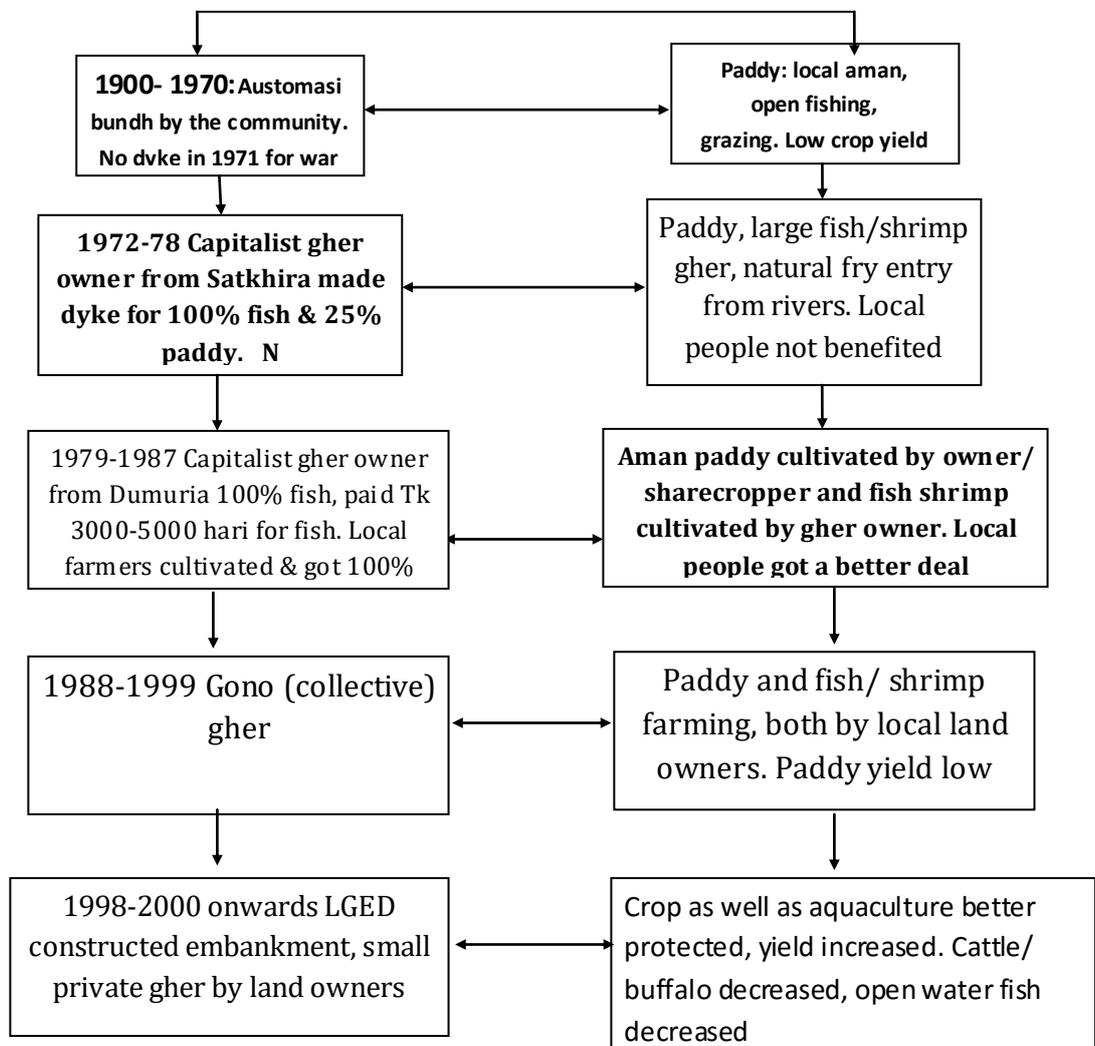
Austomasi gher system was functioning well until 1970. During the war of independence most people left the area and dyke construction could not be continued. In 1972, an entrepreneur from Kaliganj Upazila of Satkhira constructed small dyke on own expense local people on condition that he will get all fish and 1:3 ratio of paddy and 100% fish. Paddy cultivation cost was borne by the farmers and fish farming cost borne by dyke maker. This arrangement continued until 1978. Thereafter another entrepreneur from Dumuria constructed *bundh* and too lease of the whole area. It continued until 1987. The leaseholder

paid Tk. 3000-5000/bigha yearly rent and took all fish. The local farmers cultivated paddy and got 100% paddy. During 1988-99 local landowners made collective gher.

In 1980, Thana council constructed dyke and later Union Parishad constructed narrow dykes. From 1985 local elites lobbied with the government to construct the polder and succeeded in 1996 when they were able to convince the then Minister Mr. Salah Uddin. The Minister instructed the LGED to construct polder in this area and the polder was constructed during 1998-2000.

Figure – 1 below shows chronology of polder development and changes of agriculture in last one century, particularly since 1970s onwards.

Figure- 1: Polder Development and the Change of Agriculture



2.1.3. Irrigation

Cultivation of the main crop, aman is dependent on monsoon rain and if needed fresh water (during aman plantation salinity is reduced to very low level) is taken in from the rivers to the polder. This applies to about 85% area where paddy is planted in August after bagda

farming. For mixed bagda and fish farming, brackish water is taken in from the rivers to the gher area during Feb-July. In about 12-13 percent area growing of golda and fish is continued beyond June July and during this period fresh water is taken in from the rivers. Boro HYV cultivation is limited to 2-3 percent area and for this crop, STW water is used for irrigation. STW water is slightly saline but can be used for paddy cultivation. However, HYV Boro is limited as farmers prefer mixed farming of bagda, fish and shrimp in one season and paddy in another season for economic reasons.

2.1.4 Crop productivity and crop seasons

Table 7 below provides crop varieties, seasons, source of irrigation and yield etc.

Table - 7: Crop varieties, seasons, irrigation and yield.

Crop/ Fish	Variety	Season	Duration	Irrigation	Yield Kg/bigha	Remarks
Aman paddy: Local	Bojramuri, Balam etc.	Khharif-2. Aman	Aug-Dec	Fresh water: Rain & river	480-600 320-400	85% area
Aman Paddy: HYV	BR 11, 23, 28, 41	Khharif-2. Aman	Aug-Dec	Fresh water: Rain & river	480-600	
Boro	HYV	Boro	Jan/Feb- May	Shallow Tube Well	480-600	2-3% area
Mixed Bagda/ fish	Bagda, parse, tilapia etc.	Boro and Aus	Feb-July	Brackish water: river	Bagda 40 Fish 100	85% area
All season Bagda/Golda/Fish with extended period (no paddy)	Bagda, Golda, parse, tilapia etc.	All season	Feb-Dec	Brackish Feb-Jul, Fresh Aug- Dec: River	Bagda 60 Golda 30 Fish 200	12- 13% area

Figure 2 below graphically shows crop the crop calendar of various major crops and aquaculture.

Figure - 2: Cropping and aquaculture Seasons

Crop/ Fish	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Aman Paddy												
Bagda/ fish (one season)												
Bagda/ Golda/ Fish mixed all season												
Boro paddy												

Table 8: Cost of production and return to farmers (Tk/acre)

Items of Cost/ Return	Local Aman	HYV Aman
Land preparation	1,000	1,000
Seed/ Seedling	1,000	1,000
Sowing/ planting	2,500	3,000
Weeding/ crop care	1,000	2,000
Fertilizer/ pesticide	1,000	1,500
Irrigation	500	1,000
Harvesting	2,000	3,000
Total Cost ©	8,500	11,500
Yield (mound) or 40 kg paddy	24	36
Price Tk/unit	600	600
Total value of crop (P)	14,400	21,600
Gross return $G=(P-C)$	5,900	10,100
Imputed family lab (F)	2,000	3,000
Imputed land rent (R)	3,000	4,000
Net return to owner farmer (G-F)	3,900	7,100
Gross return to tenant farmer (G-R)	2,900	6,100
Net return to tenant farmer (G-F-R)	900	3,100

Source: Calculations based on FGD, KI and follow up interviews

Table 8 above shows that value of local and HYV aman produced is estimated Tk. 14,400 and Tk. 21,600 per season. Cost of production is estimated Tk. 8,500 and 11,500. Gross return to owner is Tk. 5,900 and 10,100. Gross return to tenant farmer was Tk. 2,900 and 6,100. Net return to tenant farmer is only Tk. 900 and Tk. 3,100.

Table 9 below shows estimates cost of production and return from one season mixed shrimp and fish farming assuming paddy farming in the monsoon after aquaculture (middle column) which is dominant in this polder. The last column shows cost and benefit of year round mixed fish and shrimp farming.

Table 9: Cost of Production and Profitability of mixed bagda and fish farming		
Items of Cost & Return	Value Tk per acre of land	
	One season shrimp & fish	Year round shrimp & fish
Shrimp fry	8,000	10,000
Dyke repair	2,000	3,000
Guard	2,000	3,000
Other Lab cost (hired)	2,000	3,000
Fish fries	1,000	3,000
Irrigation	1,000	2,000
Others Bamboo, fishing trap	1,000	2,000
Rent	18,000	24,000
Total	35,000	50,000
Sale of shrimp and golda	48,000	108,000
Sale of other fish	24,000	48,000
Total value of sale	72,000	156,000
Gross return	37,000	106,000
Family lab	15,000	30,000
Net return Tk.	22,000	70,000

Calculated on the basis of FGD, KII and follow up interviews

2.2. Livestock

Livestock rearing decreased over the decades continuously since 1970s as grazing area decreased. Since construction of polder in 1998-2000 it decreased further due to increased aquaculture. In the past, cattle and buffaloes grazed freely in the beel area after the harvest of aman paddy. Particularly, buffaloes could graze in the beel until the plantation aman paddy. Now there no grazing land and grazing period. Animals must survive on straw feeding only that does not keep them healthy. The result is massive decrease of livestock population and productivity.

In the WMA FGD the informant Sudhir Ranjan said that his family had 25 buffaloes in 1990s which has decreased to only four in 2012. The field team saw very ill-health cattle in the area because of scarcity of grass and other feed and fodder.

2.3. Livelihoods

People's livelihoods changed considerably in the area after constructing the polder in 1998-2000. Previously everyone was involved in agriculture, mainly crop farming. But after constructing paddy farming and aquaculture both expanded resulting increased income and employment opportunities. Also, business opportunities in and crops and aquaculture related activities, transport and housing etc. People's income increased and they can now send children to school.

The businesses include trading in fish and shrimp fry, shrimp and fish depot operation, clothes, grocery, transport materials etc. Previously there was no service holder in this area.

Now approximately most houses have a member with salaried services. As people have more money which is earned by shrimp culturing, they can invest in more business activities. Due to paddy and shrimp culturing, none is now unemployed here.

Women from this area did not step outside the door. Now they are working both in and out of the house. Now they are economically and socially better-off than previously. Before, they had occupations related to land, now we can earn some money by work outside, said female LCS member. Now local poor and poor women are engaged in earth cutting, harvesting paddy, excavating canals and working as wage labours in shrimp gher, crop agriculture, transport and alike, said male LCS labour.

2.4. Drinking water

It was seen earlier in Table 6 that nearly 100% people of the polder have access to safe drinking water and the main source is deep tube well. In the whole UP and the Upazila also, close to 100% household have access to safe drinking water although many have to fetch water from a distance of a few hundred meters. It is learnt that the UP has provided 60 tube-wells through government funded project (FGD-general). This means that only about 5 households should be sharing a Tube Well and nearly all homesteads should have a Tube Well, actually every three household is sharing a Tube Well (LCS Fem). Fresh drinking water is found at the depth of 500-600 feet and exceptionally at 1000 feet usually or deeper.

In the past, drinking water was collected from long distances. There was only one Deep Tube Well tube well was at Badurgacha village before 15 years. Two more DTWs were located in the adjoining Bazaar. That time many people had to drink pond water.

3. PHYSICAL CHARACTERISTICS OF THE POLDER

3.1. Condition of the embankment

The polder has been constructed only about 12 years ago. But the standard is below the BWDB polders. As a result it is damaged quicker. Moreover, the polder was affected by cyclone AILA in 2009 and its physical condition deteriorated. Particularly the east side of the polder is very vulnerable due to the erosion of the river Teligati. In addition, there are many pipe inlets to draw water from the rivers Teligati and Gangharil. Condition of the embankment from Bagachra funeral ground (Shoshyan ghat) to Bagachra Kheyaghat (boat station) is risky. However, the condition of the embankment in the west side of the polder along the river Ghengrail is quite good as there is no riverbank erosion in this part. Further to these, too many pipe inlets have made the embankment vulnerable.

Pictures showing condition of the polder embankment



3.2. Condition of the structures

The polder has only two sluice gates constructed by the LGED in 2000. When the team visited the area, one gate was in good condition and the other needed repair. Thereafter needed repair has been implemented and now both gates are in running condition.

The pictures below indicate that the condition of the gate number 1 at Simanar khal is partly damaged as the shutter joints are broken. The shutter was fastened by rope with the concrete structure and therefore it could not be opened and closed. Later, this has been repaired as learnt by follow up interview with the Vice President of the WMCA. Gate number 2 on Rishikar khal was in good condition.

Pictures showing condition of the structures



Condition of Gate no. 1



Gate no. 2 with Rishikar canal



Condition of Gate no. 1



Shutter of gate no. 1 is binded by rope

3. 3. Condition of the canals

Beside this polder there is only one flowing river, Teligati. Another main river Ghengrail is almost fully silted and nearly dead. However, the canals flowing into the river Teligati are silted. Names of a number of canals came up in the FGDs and KIIs. These are Badurgacha khal, Bisu khal, Katakhal khal, Dakatia khal, Daiany khal, Simanar khal, Risikar khal, Ghengrail khal & Chelabunia khal etc. All canals have been silted since mid 1980s. Presently, only three canals are flowing. These are Napatir khal in the north side of Baghachara village and Simanarkhal in the middle part of the polder and Rishikar khal in the southern part of Badurgacha village. These three canals were re-excavated under the project by the LGED. All other canals are silted and inactive.

Pictures in the next page shows condition of the rivers and canals, canal near gate number 2 (Rishikar khal), still flowing but reduced to a drain and flow disturbed by mud dam; Ghengrail river getting silted and depth reduced, Simanar khal near gate 1 flowing but width reduced; and a branch river of Ghengrail almost fully silted, boat stuck on mud and won't move until next tide comes six hours later.



Khal close to gate no 2



Ghangrail river getting silted, depth reduced



Khal close to gate no 1



Branch of Ghangrail River silted up

Canal lease

There is no khas (government owned) canals in this polder. All are private khal belonging to various individual families. The canals were recorded in private names in 1928-29 during the British rule. Hence no canal is leased by the government. The canals, despite being private property are managed by the WMCA. Even, the WMCA with the full cooperation of the canal owners and the adjoining landowners have excavated the canals, three under the project and others by own initiative.

However, three main canals have been leased to fishers. The WMCA says that they have sold fishing right by open tendering method to the highest bidder with the condition that the successful bidder will enjoy fishing right for one year but will not be allowed to block any part of the canal. Water flow will not be disturbed anyway. But to the community, it is lease to individuals who take fishers with them as shareholder. Presently, Simanar khal, Rishikar khal and Naptir khal are under such lease. The WMA says that the lease income is utilized for maintenance and every year they earn about Tk. 250,000 by lease of khal.

3.4. Main water related problem

Several problems came up prominently in the FGD and KII discussions. These are:

Riverbank erosion along the river Teligati, siltation of Ghengrail river, siltation of the canals, increased salinity of due to reduced upstream flow (all rivers lost connectivity to upstream flow from the main river system and only monsoon rain to wash away salinity), poor condition of the embankment (due to riverbank erosion), too many pipe inlets making the embankment vulnerable and poor drainage due to siltation of the canals.

Drinking water is not a great problem in this polder as only about 3 to 5 households share a deep tube well after the UP has distributed about 60 deep tube wells in a community having about 315 households only. NGOs also have distributed some DTWs and there are a few private DTWs.

4. LGED: ADDRESSING WATER INFRASTRUCTURE PROBLEMS

4.1. LGED: pre-project

Before implementing the sub project activities under the SSWRDP at Bagachra Badurgacha area, the LGED carried out Participatory Rural Appraisal Survey and Engineering Survey. Based on the surveys, the appraisal report was prepared and the salient features of the appraisal are available in the Sub Project Information of the LGED.

From the community, it was learnt that, in 1996, Mr. Sudir Ranjon (then President of WMCA) met the then Health Minister Mr. Salauddin. Mr. Sudhir Ranjan had access to the Minister as they belonged to the same political party. It was followed by a visit of Engr. Kamrul Islam Siddique, then Chief Engineer of the LGED.

At the beginning, the socio-economic department of LGED came and visited the area for feasibility study and then as per need of the project, the WMCA was formed in 1996. As a process to initiate the project, the LGED conducted door to door survey to form the WMCA. The LGED carried out motivational programme to pursue people participate in the project activities through the formation of the WMCA. Thus the LGED formed the WMCA within a short time.

4.2. LGED: during project

The LGED then included the area under the SSWRDP and the polder construction began in 1998. Under the Bagachra Badurgacha Sub-Project of the SSWRDP the implemented the following physical works.

Table- 10: Physical Works implemented by the LGED under the Sub Project

Physical Components		Budget in Tk
Embankment Re-sectioning(Sec. A)	9.83 km	4,379,840
Embankment Re-sectioning(Sec. B)	4.98 km	774,997
Simanar Khal Re-excavation	1 km	75,335
Reshiker Khal Re-excavation	1.97 km	332,049
Naptir Khal Re-excavation	1.5 km	254,971
Simanar Regulator at Ch.1+850m 1-V(1.5mX1.5m)		1,716,156
Bakotmari Regulator at Ch.8+670m 1-V(1.5mX1.5m)		2,064,776
O&M Shed		264,419
Total Investment by LGED		9,862,543

Under the Sub Project, the LGED constructed 14.81 kms embankment, two sluice gates and one O&M shed and re-excavated 4.47 kms canals. The works were executed during 1998-2000.

4.3. LGED: post-project

The LGED's main contribution in the sub project is the formation of the WMCA, registering them and helping them function to carry out O&M responsibility. While the physical works were completed by 2000, the LGED helped the WMCA to observe if some problems found in the embankment or the structures. The LGED and the WMCA signed an agreement in legal paper (150 taka stamp) specifying the responsibilities of each institution in the operation and maintenance of the polder infrastructure. The agreement requires that the minor repair and day to day operation are the responsibility of the WMCA and they will do it on own expense. The minor repair of sluice gates includes replacement of small things like screw,

nuts, bolts and greasing the shutter. However, the WMCAs do more than that, occasionally repairing breaches of embankment, minor re-excavation of canals.

To perform the O&M responsibility, several sub committees were formed under the WMCA. These included Gate Committee, Maintenance Committee and Micro Credit Committee. The WMCA keeps LGED informed of any problems and the LGED carries out a post monsoon survey of maintenance need in cooperation with the WMCA. Based on the need, the LGED prepares yearly O&M plan and allocates money to execute the plan.

When LGED allocates fund for any work under the O&M plan, LGED bears 97% of the cost and the WMCA bears 3% of the cost. To execute the work, the LGED engages LCS groups and the WMCA actively involved in planning, site selection, selection of LCS groups, overseeing the progress and certifies on the quality of work.

To contribute to repair and maintenance the WMCA collects fund from the members. The contributions include (i) share capital, (ii) monthly savings, and (iii) occasional donation for emergency work- usually Tk. 50 to 200 per bigha land- determined by immediate need. There is another source of fund- leasing of three khal on yearly basis from which about Tk. 250,000 is collected annually.

Table - 11 below shows that the LGED from prepared O&M plan in eight consecutive years from 2000 to 2007. During the period, O&M expenditure varied from Tk. 40,000 to Tk. 150,000. Interestingly, fund available with the WMCA was often higher than actual expenditure.

Table – 11: Operation and Maintenance support to the WMCA by the LGED

Year	O&M Plan Prepared	Budget	Fund at Hand	Actual Exp
2008	No	0	124,500	0
2007	Yes	1,192,360	124,500	40,050
2006	Yes	435,220	124,500	74,200
2005	Yes	1,840,356	109,650	136,396
2004	Yes	474,100	109,650	129,217
2003	Yes	563,701	10,800	57,000
2002	Yes	105,000	7,300	67,450
2001	Yes	47,549	111,240	112,040
2000	Yes	4,370	130,000	127,190
1999	No	0	152,200	150,000

The sub project information shows that the WMCA has 482 general members from 279 households. Of the 482 members, 152 are women members. The Sub Project information shows that all of the 279 households have at least one member in the WMCA. The Census Report 2011 shows 315 households, the difference should be due to population increase since 1996.

The WMCA seems financially sound as revealed from the Sub Project Information that they have share capital of Tk. 40,700 and savings accumulation of Tk. 457,860. The WMCA operates micro credit against which there is disbursement of Tk. 952,250 and total loan recovery of Tk. 782,700. A total of 459 loans were issued to male members and 191 loans to women members.

5. LABOUR CONTRACTING SOCIETIES

5.1. Formation and work with the WMCA

The field team met two LCS groups, one female LCS group and one male LCS group. In the female group 11 respondents attended the FGD of age 24 to 45. All respondents except one belong to households owning 0.16 acre to 6.67 acres (0.5 to 20 bigha). The landless one is also homeless (she made a hut on other relative's land) and she is not a member of the WMCA. She said that she is too poor to be included in the WMCA but works in the LCS. Two others are also not member of WMCA (possibly there are WMCA male members from these two households as all households are included as per Sub Project information). These two households own one and five bigha land. The LCS comprises a total of 25 women earth cutting labourers and it was formed 5-7 years ago when rice price was high and the households had food insecurity. This should be in 2008 after cyclone SIDR and flood of 2007.

The respondents said that LCS members were selected by lottery at LGED. The group works with the WMCA to repair embankment or re-excavate canal. Since formation of the LCS, the group is getting some work every year but such works do not provide year-round employment. Sometimes the group works with the UP if there is work. In March 2012 the group had no work.

The second LCS group met was a gang of 17 earthwork labourers. Ten of them attended the FGD. Of the ten respondents, nine are WMCA members and they own 0.08 to 2.00 acres land. One who is not WMCA member owns one bigha or 0.33 acre land. The respondents' age varied from 25 to 48. This group is not linked to any project but works with the WMCA and the UP when some work is available. Otherwise they work under private contractors or private gher owners etc.

The polder has five or six labour groups. Each group has a sarder (gang leader). When the contractors have some work, they call the sarder and negotiate with the sarder and assign the task to the group based on the negotiation. This applies to work executed by the contractor. Thus, when the Sarder can find some work, we do it together.

The group said that the LCS work began in this polder when LGED started constructing the polder in late 1990s but this group was formed in 2006. This group has 17 workers now but some larger group comprises 40 member and smaller ones may have only 10-15 members. All depends on the size of the contract. Nine out of the ten respondents are WMCA members. One not included as WMCA member owns one bigha land. The WMCA was formed by the LGED.

5.2. Payment

It seems that the LGED actually engages LCS groups temporarily when there is work. It is evident from the statement of female LCS member Basonti that "when any work ended, official persons come to pay". They call everyone in a specific place and distribute the payment among us through the local persons who are responsible like our Abul Hossain. Mentioning of name "Mr. Abul Hossain" means that the WMCA is involved as Mr. Hossain is the Vice President of the WMCA.

The procedure is that the Cheque is issued by the LGED in favour of the LCS group having a bank account and two signatories (LCS group president and secretary) draw the money and then the money is distributed among the workers. The WMCA is supposed to certify on quality and work completion. Effectively it may happen that the WMCA and LGED representatives distribute money at the local level and this helps workers getting the wage "properly" and the two top leaders in the LCS cannot cheat other workers. This LCS group said that they get wage "properly" in the case of LCS work and also in the case of private work such as for gher owners. About the rate the woman group said that they get Tk. 100 per day per worker. This is however for five hours work 8 am to 2 pm with some rest.

The woman group mentioned of toilet problem. They do not have any other problem. Another mention was that if someone comes late, others compensate by extra effort. This is

done mutually. Interestingly, the male group respondents said that women paid hourly wage of Tk. 20 while men paid Tk. 30. But it is not correct that women work less. However, the WMCA executives said that women cannot carry as much weight as men. Therefore the payment made in piece rate, male workers earn higher daily wage.

Usually, men and women work in different groups. So, problems like sexual harassment or eve-teasing does not occur or is rare. But the female LCS group mentioned of toile problem.

5.3. Livelihoods and changes in standard of living

Since the LCS groups in this polder are not engaged on full time basis, they work with the institutions like LGED and UP when they can provide some work, three to four months annually. In other times the women LCS members work as gher labour or crop-agriculture labour. Sometimes they catch fish (after bulk harvest) on contract basis and gets wage of Tk. 20-30 per kg of fish caught. Sometimes they are engaged in stitching or handicraft work. In other times they are engaged in household chores and rear livestock. The woman group said that they are better off than before and their food security improved. They particularly appreciated that their work opportunity diversified. In the past they did not work outside of the house. Now they work both inside and outside of the house. However, they did not receive any training from the LGED.

The male group respondents also said that they are engaged in earthwork only about three to four months annually. They do earthwork when the Sardar calls them. In other times they are engaged in a variety of activities. Seven out of the ten male LCS members have land one bigha and above and they are engaged in crop farming and aquaculture. This keeps them busy a few months. If work is not found in the village the male workers go outside of the area for seasonal employment.

In private work, payment comes from the contractor through the Sardar. The Sardar keeps some part of the bill as his fee and pays the workers on daily basis or on piece rate basis after keeping his share. But the workers get wage timely and has no problem in getting wage. The UP however engages extreme poor in work like 40-days employment support (It means that the labour gang members are not extreme poor, majority of them own some land).

A few years ago, the WMCA arranged training on aquaculture. Fisheries officers came to train. But the advice given was not appropriate and needed investment beyond the capacity of the smallholder farmers. So, it was not fruitful.

The male group respondents said that they do not get much work from the WMCA or UP. In any case, most of the time they work under the contractor and that too through the Sardar. So, the project work had little impact on their livelihoods. The small crop farm and gher is a livelihood for them but it is not very profitable as paddy price gone down and shrimp affected by virus.

6. MAINTENANCE OF EMBANKMENT, SLUICE GATES AND CANALS

6.1 Maintenance by LGED and WMCA

Bagachra Badurgacha is a Sub Project of LGED hence its maintenance is the responsibility of the LGED. The Sub Project is outside of BWDB polder. The general FGD participants said that the LGD engineers make a post monsoon assessment of damages, cost estimates and prepare Operation and Maintenance Plan once a year. For doing this, they come to the polder and visit various sections of the embankment and sluice gates to observe physical condition. They consult local people including the WMCA executives. Based on the O&M plan, the LGED allocates fund subject to availability of fund from the government.

However, it happens that the fund allocated is often below the requirement and fund is not always available. Sometimes fund allocated is about two thirds of the estimated cost. Then the WMCA has to manage resources from other sources. The other sources are selling fishing right of three canals, share capital, monthly savings and interest from micro credit. The WMCA contributes 3% if the cost against allocation by the LGED. But in the case of emergency repair and maintenance, the WMCA uses own fund and also collect special subscription of Tk. 50 to 200 per bigha of land. Besides financial contribution, farmers and gher owners contribute materials like bamboo and work voluntarily. The poor people work and the rich ones engage labour to work on behalf of them or contribute money. The respondent said, in such case, "We all work together". The WMCA plays important role to mobilize people, money and materials.

The WMCA respondents said that after completing the first phase in 2000 when the polder infrastructure was built, the LGED extended its activities to subsequent phase, one up to 2006 and another upto 2011. The LGED is now working with the third extended phase since 2011. The WMCA executives said that there are many things to complete and these will be done by the LGED. LGED support continued and it was learnt later that damaged part of the embankment and the sluice gate have been repaired. In 2012 LGED repaired 4.5 kms embankment and repaired two sluice gates spending a total of Tk. 3,700,000 against which the WMCA deposited Tk. Tk. 220,000 to the O&M fund.

Although the O&M responsibility has been handed over to the WMCA by the LGED in 2002, effectively, the LGED and the WMCA are working together. The WMCA is doing a lot, far beyond the replacement of nuts, bolts and greasing – particularly in emergency repair, and the LGED has been supporting continuously since 1996.

Besides repairing embankment, the LGED assisted WMCA to plant trees along 10 kms of the embankment but all trees died but the all trees died because of "salinity".

6.2. Maintenance by the Union Parishad

The respondents are aware that the UP has limited financial capacity and administrative authority. Within this limitation, the UP plays important role to maintain road and embankment. When the embankment broke due to cyclone AILA, the UP member and Chairman worked hard to repair it. General FGD respondents said that people worked whole night to repair the embankment. It is important to note that the UP Chairman belongs to another village but spent whole night with people to repair the embankment. It happens that getting fund from the LGED takes time and the WMCA has to repair the embankment, then the UP Chairman and Members contribute money or engage labour to repair the

embankment. Sometimes the UP Chairman and Members contribute personally and in other times provide grants from the UP fund.

Besides the above help, the UP Chairman lobbied to collect some donation and on his initiative a donation of Tk. 100,000 was collected from the MP. It was noted from the FGDs that the UP could not excavate canals partly because there is no public canal inside of the polder and the UP did not receive fund from the government for this work.

6.3. Maintenance by Gher Owners and Land Owners

Gher owners and landowners are all members of the WMCA. They contribute to the share capital, deposits monthly savings and pay occasional contributions per bigha of land for emergency repair. In addition, the landowners and gher owners contribute bamboo and other materials. Sometimes collection of cash subscription is not needed as the landowners, gher owners and other local people work voluntarily. The richer ones engage hired labour to do the manual work. In Bagachra Badurgacha, most households own some land and on own interest they work voluntarily.

6.4. Institutional arrangement

The WMCA appeared to acknowledge the responsibility in maintenance. They acknowledged that there is an agreement on the handing over of O&M responsibility to the WMCA. In fact this is an agreement on shared responsibility that the LGED will help for major “repair” and the WMCA will be responsible for “minor” repair. Thus the polder infrastructure will be maintained.

The partnership seems to be working well and LGED has almost continuously assisted for major repair and rehabilitation although allocating fund and executing the works required time. But in this time lag, the WMCA, UP and the land owners responded promptly to repair the damages at least temporarily. The UP has constraints as they do not get fund for water management type activity as the area is receiving such support from the LGED under special project. But the UP maintained good relation with the WMCA instead of treating them a rival organization and the WMCA always seek help of the UP to carry out the responsibility of water management, particularly emergency repair and the UP helps to the greatest extent that we have seen in the sub sections above.

The local people including landowners contribute money, materials and voluntary labour to repair the embankment, sluice gates and to some extent excavate small inner canals.

The WMCA is to a great extent inclusive. All inhabitants owning homestead land and cultivable land are members of the WMCA members. A few homeless, female headed households not owning land are however excluded. Possibly they are not important for inclusion or such extreme poor considers themselves ineligible to participate in the WMCA but do participate in the LCS. Many respondents said that the WMCA is all inclusive but said that, “Those who have land are the members of this WMCA and nobody is excluded”. This means that the landless could be excluded. When some WMCA executive was asked about cases of landless women excluded it was agreed that there might be some exceptional cases and the gap between 279 out of 315 households with WMCA members could be that those forming new households after 1996 may not be the members and some could be newcomers particularly in the new charland.

When the WMCA was formed, the LGED made door to door list of households and all of the 279 listed households were WMCA members and in about 15 days the WMCA was registered. Since no new member recruited after that the number falls short of 315 which is the number of household as per population census 2011.

Total number member is 482 (as per SP information) and 486 (as per verbal statement of FGD respondents) and some said that two members died indicate that the respondents have good idea of the number of members. These 486 or 482 members belong to 279 original households (may be original households) as some households had more than one members.

Each member has at least one share of Tk. 50. Many have more than one share as indicated by total share deposit of Tk. 40,700 and most members should hold two or more shares. The WMCA has current balance of about Tk. 500,000 and savings deposit of exceeding Tk. 600,000 current loan to members of about Tk. 300,000. The WMCA gives loan to members and the loan is recovered with interest in 12 monthly instalments with 20% interest at flat rate. The WMCA recovers about 85-90 percent of the loan with interest in time and almost all loans with some delays. A year ago, the WMCA was able to mobilize resources of Tk. 160,000 to repair embankment.

As per perception of the local informants; the main function of the WMCA is maintain the infrastructure including embankment and gates and keep the canals flowing by de-silting. The WMCA has three sub committees- the gate committee, maintenance committee and savings committee. The participants said that the sub committees are functioning well and the main committee provides good supervision.

Initially, the general members were recruited by door to door survey and the executive committee was formed by election. Later, the committee has always formed by consensus and selection but there has been no conflict on it.

The WMCA executives as well as the General FGD participants appeared very confident to say that, "the LGED is likely to work with us continuously as we work together".

Complaints

LCS woman group member Anwara said that if farmers need water they approach the gateman (house owner next to gate who holds the sluice gate rotator) and the concerned people open the gate. Birangana and Ashalota of the same group said that if they find any problem concerning drinking water (need deep tube well or repair old one) they complain to the UP Chairman and that work. Now the polder area has many DTWs.

LCS male members said that many of the gher owners are outsiders. The outsider gher owners and owners of large holding culture shrimp and for that they take salt water into the polder. Small and marginal farmers complain to the UP Chairman who tries to stop bagda farming but unsuccessfully. Another male LCS member said that they have small pieces of land. Such small plots cannot be operated economically to make golda cum paddy farm as salt water from the adjoining gher brings salt water and they too have to join bagda farming or lease out the land to gher owners.

6.5. Emergency Response

After AILA the WMCA with the help of local people repaired the damaged part of the embankment and increased the height by 1.5 feet. The landowners and gher owners contributed money for it at the rate of Tk. 50 per bigha. The UP Chairman engaged some

labour and paid their wage. This was needed as government help or LGED fund was not available immediately.

The LCS female respondents said that the UP distributed relief (rice, lentils, edible oil etc.). Some NGOs provided assistance for housing. Philanthropic people distributed rice, dry food (biscuits) and clothes (lungi, saree, blankets).

The LCS male members said in the FGD that local people make bamboo piling to prevent damage or to repair damaged part of the embankment. With bamboo piling, the damaged part is earth-filled. The work goes on day-night. Otherwise tide flow can break the embankment fully. Part of the embankment was damaged for pipe inlet. The concerned gher owner gave a few pieces of bamboo and local people worked voluntarily to protect everybody's land. All worked voluntarily and payment of wage was not needed.

UP Chairman Sarder Abdul Gani was present during the repair work. When embankment broke near funeral ground, the UP Chairman mobilized a grant of Tk. 100,000 from the MP. It was learnt that Government usually do not allocate fund in the areas having special LGED project. Therefore, the Chairman lobbied with the MP and was able to get a grant of Tk. 100,000.

LCS male members said, when fee is charged Tk. 50 per bigha, they can collect about Tk. 50,000. The polder has net cropped area of about 2500 bigha hence should be Tk. 125,000. Collection of lower amount implies that all do not pay, possibly the owners of the vulnerable areas pay and there are always some people who do not pay unless it can be imposed. Still, about 50% collection is quite high in Bangladesh standard. Local collection remains inadequate in cash. But this is compensated by voluntary work and donation from UP Chairman and grants such as from MP.

6.6. How maintenance take place

Table – 12: Roles of various institutions in maintenance

Tasks	Who does	Whose mandate	Comment
Minor maintenance	WMCA	WMCA	WMCA doing it nicely and promptly
Major maintenance	LGED	LGED	Work delayed for lengthy process of getting fund from the government
Emergency maintenance	WMCA/ UP/ Landowner/ gher owner	LGED	WMCA, UP and land owners doing it together with local resource mobilization and voluntary labour.
Excavation of canals	LGED/ WMCA/ landowners/ gher owners	LGED	Larger canals by the LGED and small inner canals by WMCA and landowners

6.7. NGOs

Several NGOs are working in Bagachra Badurgacha Sub Project area. But they are not much involved in water management. The NGOs and MFIs are mainly involved in micro credit and several other activities noted here. ASA, BRAC, Proshika, Caritas, Grameen Bank, Uttaran, Rupantar and Grameen Shokti are currently active. All NGOs provide loan, BRAC, Caritas, Rupantar and Uttaran provide disaster relief, and Grameen Shokti provides Solar Panel for household level electricity supply. The rehabilitation support of the NGOs included housing

and several NGOs like Uttaran and Rupantar distributed rickshaw van, Corrugated Iron Sheet for housing and livestock (lamb).

6.8. Participation, Exclusion and Gender

Participation and exclusion

Participation of people in the Bagachra Badurgacha means participation in the WMCA activities. Except a few exceptions all households have at least one member in the WMCA, and through the WMCA, the community contributes 3% of the cost for any interventions in water management by the LGED.

The poor and landless are not only members of LCS groups most of them are also members of the WMCA. The field team found a few cases of exclusion, a landless woman member of LCS a couple of landless male and a marginal farmer who attended FGD as male LCS member.

Participation also meant that all are involved, included and they work together. It was stated that the WMCA and LGED value opinion of the members, including opinion of the poor and woman. One of the KII participants was a widow who is a bit educated and owns five bighas land. She is an Executive Committee member of the WMCA and says that she is able to give opinion and her opinion valued in the WMCA. Some of the WMCA participants said that all members do not go to the LGED office but the President and Secretary visit LGED quite often and when the LGED Engineers come to the village they consult all members, whoever attends the meetings.

People's representatives like the MP and high official like the DC visited the polder many times. It is important that the MPs during both BNP and Awami League rule visited the polder and extended necessary help. It did not turn important that local people support one party or the other. The WMCA and UP leadership played quite neutral role and did not politicize the organization.

The respondents also said that the WMCA and the UP have good cooperation with the UNO and "high officials". It is interesting that the UP keeps the WMCA informed if UP have some funds such as to improve road etc. The UP assisted to improve road cum embankment using allocation of the 40 days employment support fund. The UP did it in consultation with the WMCA.

The LCS women members said that the WMCA works through the sub committees and the sub committees consult people and value people's opinion such as on opening and closing of gates. The decisions are taken based on people's opinion. One landless woman was however not included as member. The Women LCS members however felt that the some elite people are leaders because they are better educated, "wise" and carry on the responsibility. The poor and other local people honour them and they work for the whole area. The leaders however "value our opinion". When some problem arises like breaches in the embankment, "we inform the committee" and then they take initiative to repair.

Male LCS members said in the FGD that WMCA leaders are rich and educated people because they can command others. If we need 50 workers to repair an embankment in a day or overnight, they can mobilize people. They have resources and respect in the society. First president was Sudhir Ranjan Sarder. He is old and Dijendranath replaced

him after two terms. Present secretary is Mr. Subash Dotta, Principal of Pollishree College. They are all rich and educated. If poor people like LCS members call, nobody will come. In their assessment ensuring participation requires leadership. The participants' opinion reveals that the WMCA is lead by the educated and rich elites but it is not elite-captured.

Gender

Women outnumbered men in polder Bagachra Badurgacha with Sex Ratio (M/F*100) 98 but women are still behind the race in terms of literacy. In the polder literacy rate of female population is 50% compared to 58% of male population (population census 2011). The census report was however unfair to women as it enumerated only one percent women engaged in income earning employment, 18% unemployed and all others (79%) engaged in household chores only.

Not one percent, substantial number of women engaged in LCS, agricultural wage employment including shrimp gher labour, fishing, shrimp and fry collection, stitching, and handicraft. In the LCS payment is made on contract basis to male or female groups. Women work from 10 am to 6 pm with an hour rest/lunch time and in 2011 they earned average 150/day (some said 5 hours work and wage 100, flexibility because of piece rate). Women come to LCS work after cooking at 10 am. But men come at 9 am and both stop day's work at about 6 pm (sunset time). Some informants said that the same work women do in 8 days and men do in five days as they carry more load. Therefore men earned Tk. 200-250 in 2011. In 2012 women earned Tk. 150-200 and men earned Tk. 250-300 from LCS work.

In crop agriculture and private sector earth cutting male workers get Tk. 300 per day and female worker get Tk. 200 per day for work from 8 am to 5 pm with an hour lunch time and rest. Cleaning of grass in the gher is done by women labour and wage rate is Tk. 150. Both men and women are engaged in catching fish in the gher. Men use jhaki net and women catch by hand. Payment is made per kg of catch, Tk. 20-30 per Kg. Women earn about Tk. 150/day and men earn Tk. 300/day.

The field team interviewed a woman household head (45), a widow, has eight years of schooling, works in an NGO, owns five bighas land and mother of three children, all grown up. By the standard of rural Bangladesh, she is a bit educated and affluent, although a widow. Her family reflects how girls are valued in the society. Her son is a college student but two daughters could not complete secondary education, they completed only seven and eight years of schooling after that both daughters were married out but both are now with mother. This woman is an Executive Committee member of the WMCA. She said that she participates well in the WMCA and her opinions are valued.

The woman is interested culture mixed golda, fish and paddy but nearby landowners bring salt water and therefore she is forced to culture bagda, golda, fish and paddy. Gher owners prefer to cultivate bagda in one season because it can be marketed within two and half months while golda cannot be harvested below nine-ten months.

In the past, women from this area did not step outside the door. Now they are working both in and out of the house. Now they are economically and socially better-off than previously. Before, they had occupations related to land, now we can earn some money by work outside, said female LCS member. Now local poor and poor women are engaged in earth cutting,

harvesting paddy, excavating canals and working as wage labours in shrimp ghers, crop agriculture, transport and alike, said male LCS labour.

7. OPERATION OF SLUICE GATES

7.1. Operation through WMCA and LGED

Operating the gate is the responsibility of the WMCA. The WMCA delegates the responsibility to the gate committees to decide on the operation of gates including opening and closing. The president of the gate committee decides regarding opening and closing after consulting “all the people in a meeting” said president of Badurgacha gate committee. The general FGD participants said that the gates are kept closed during December-January and opened in February. Then the gates are opened and closed depending on the need for aquaculture during February to mid August and for paddy farming from August to November.

There is no gateman and the responsibility of operating gate rotates among the members. No remuneration is given to gate operators as the responsibility is shared and rotated. The LCS male members said that gate committee assigns the responsibility to the owners of nearby house. When opening of gate is needed, people approach the gateman (nearby house owner) and he opens the gate, if needed with the permission of the gate committee president.

7.2. Operation through Union Parishad

The Union Parishad is not involved in deciding opening and closing of gate. But the UP Chairman intervenes if some problems arise such as some area flooded by water from the adjoining gher or drainage delayed while paddy planting time approaching. In 2011 when embankment broke due to pipe inlet, the Chairman ensured repair of the embankment.

7.3. Operating private gate

There is no private gate in this polder. But there are plenty of private pipe inlets. The IWM map shows as many as 41 pipe inlets. The WMCA participants confirmed that there are pipe inlets and number should be around 40. Most pipes are of 4 to 9 inch diameter and only 7 are of 12 inch or above diameter. In the past most pipes were made of cement but now they are almost entirely (those up to nine inch) are replaced by PVC pipes.

One problem of pipe was short size that reduced width of the embankment causing damage. By now the WMCA and UP forced the gher owners to increase the length of the pipes. Opening or closing pipes of small diameter is rather simple. The gher owners insert straw in the river end of the pipe and close it temporarily with mud. When they need opening the pipe, the straw is just pulled out. Such opening and closing is decided by individual gher owner.

7.4. How gate operation takes place

Table – 13 below shows different types of gates are operated. The polder has only two LGED gates and 41 or so private pipes and no private gate.

Table 13: Operation of sluice gates in BagachraBadurgacha Sub Project Area

Type of Gate	Formal authority as stated by respondent	Effective control	Gateman	Gateman's pay/ Cost & how paid	Operator's interest stated vs real
LGED gate	WMCA	Gate committee under the WMCA	Owner of nearby house	Rotational responsibility	Voluntary.
Pipe (private)	No authority	Individual gher owner or landowner	Individual owner, labour	Owner or hired labour	Own gher

8. CONFLICTS

8.1. Paddy-Shrimp conflict

The whole area of Bagachra Badurgacha has similar cropping pattern hence there is apparently less conflict but conflicts do exist. During paddy cultivation season (monsoon season), all of our villagers cultivate paddy with fresh water and when water becomes saline (during dry season), all culture shrimp, said WMCA executive Mr. Ranjit. The LCS male members however said that many of the gher owners are outsiders. The outsider gher owners and owners of large holding culture shrimp and for that they take salt water into the polder. Another male LCS member said that they have small pieces of land. Such small plots cannot be operated economically to make golda cum paddy farm as salt water from the adjoining gher brings salt water and they too have to join bagda farming or lease out the land to gher owners. The woman household head who owns five bighas land said that she is producing bagda in one season and paddy in another season because of “compulsion”. Salt water from the adjoining gher gets into her land and she makes bagda gher.

8.2. High land - low land conflict

WMCA executive Mr. Ranjit said that land topography is uneven. If tide water does not reach to the high land from the main sluice gates and the canals, the owners of high land bring in water from the river to the gher by installing pipes. It sometimes floods the low land and conflict arises. The CO of LGED mentioned of the same problem.

The UP Chairman said in the KII that he tries to stop bringing in of salt water by pipe but the landowners install pipe on their land hence cannot be stopped. However, if some other farmer complains that his land is flooded then the Chairman intervenes.

8.3. Conflict over access to budget

It was noted earlier that the UP and the WMCA work in cooperation with each other but still there is some conflict. Due to the presence of the LGED project, the UP cannot access resources for embankment repair and canal re-excavation type activities. The CO of LGED mentioned of this conflict but it is not very serious in this polder. The UP Chairman told in the KII that the LGED could engage LCS with the involvement of the UP and that would ensure better implementation.

8.4. Land issues

The CO of LGED indicated that the WMCA faces problem on land related conflicts. Land issues have to be considered during repairing the embankment, maintenance and construction of embankment. Since the LGED has no budget to acquire land to constructing or re-sectioning of the embankment, they rely on vacating land voluntarily by the owners. Some owners agree to give land for public benefit and some others do not agree. The CO said, “We have to consider problems and obstacles like whose land will be affected, whose land will be benefited more, and how to arrange mutual compensation or whether to acquire land, which is time consuming”.

8.5. Conflict mitigation

WMCA executive Mr. Ranjit said that flushing and drainage of water is done based on consensus after consultation with the concerned people. The WMCA executives also said that pipes can be installed only after taking written permission from the WMCA and the LGED and the two LGED gates are used mainly for drainage purpose.

If conflict arises, small and marginal farmers complain to the UP Chairman who tries to stop bagda farming but unsuccessfully.

High land owners try to flush in water at night. The UP tried to solve the problem through discussion and decided that high land owners will take water in five days later and by this time low-land shrimp farmers will complete another cycle of harvest.

Sometimes the Chairman gets information at night that some shrimp farmers are taking in salt water into the gher flooding some others' land. Then the Chairman stops the gher owners. This is done by personal influence rather than official village court judgement in the UP. Sometimes such issues are resolved by *salish* (arbitration) by the UP.

The CO of LGED said that the WMCA takes decision by consulting local people to avoid conflicts. The WMCA discusses with the different members during implementation of any activity. Often there is understanding between two groups and sometimes not. Conflict arises on land issue. In that situation we along with the WMCA try to convince the land owners and solve the problem.

9. CONCLUSION

9.1. Summary of findings

Location

The polder Bagachra-Badurgacha FCD sub-project of LGED is located 40 kms south-west of Khulan city in Sovana Union Parishad of Dumuria Upazila in Khulna district. It is surrounded by the rivers Teligati and Ghangail and is only about 10 kms South of Dumuria Upazila town. The polder covers total area of 385 hectares. The polder area comprises just one beel and two villages. It looks like a small island surrounded by the rivers Ghengrail in the west side and Teligati is in the east. These two rivers are inter-connected to the South-East and North-East. The whole polder area is a low lying beel (wetland) and was affected by cyclone Aila in 2009. The polder is also affected by salinity. The land profile is saucer shaped, high along the riverbanks and low land in the beel. The canals are all silted and river bed above the level of beel land, hence the beel is water locked.

Demography

Total population of the polder Bagachra-Badurgacha is 1,299 with average household size of 4.1. Compare to 10% Hindu and other minority population of the country, 84.8% of the people in Bagachra-Badurgacha are Santan Hindu. Literacy rate is 58% which is above national average (53%) but female literacy (49.9%) in the polder is much lower than male literacy. One hundred percent households have access to deep tube well for drinking water, 86% have sanitary latrines and 20% have electricity as per population census 2011.

Polder history and change of agriculture

Bagachra Badurgacha polder area had long tradition of constructing austomasi bundh (eight-month duration narrow dyke) to protect crop and natural trapping and growing of fish in the beel area. Each farm household owning 30 bigha land engaged one kishan (agricultural labour) to construct and maintain dyke. This tradition continued from Bangla year 1300 (1893) to 1970. Dyke could not be constructed in 1971 because of the war of independence. From 1972 to 1978 the entire area was leased to capitalist gher owner who constructed dyke by a contract with local landowners. The gher owner received 100% fish and 25% paddy while the landowners received 75% paddy. From 1979 to 1987 it was leased to another capitalist owner for yearly fixed rent in cash and from 1988 to 1999 local landowners made collective gher. In 2000 the LGED completed construction of embankment and thereafter farmers made own individual gher and paddy farm. Before constructing embankment in 1998-2000 paddy yield was only about 480 to 600 kg per acre which has now increased by 200 percent. In addition farmers are now producing shrimp, fish and paddy in the same land in two different seasons. This has increased employment and income of local people to a significant extent. The project appraisal projected increased crop production by 151 percent but decrease of fish cultivation. But, crop yield increased by 200 percent and fish and shrimp production increased by 1000 percent.

Condition of polder infrastructure

The polder has been constructed only about 12 years ago. But the standard was below the BWDB polders and there are many pipe inlets. As a result it damaged quicker and was affected by cyclone AILA in 2009. Particularly the east side of the polder was very vulnerable

due to the erosion of the river Teligati. However, the condition of the embankment in the west side along the river Ghengrail was quite good. The LGED repaired the embankment and the sluice gates in 2012 and condition improved. But the canals remain silted.

The LGED interventions

The LGED assisted formation and registration of the WMCA in 1996; constructed 15 kms embankment, two sluice gates and 4.5 kms canals in 1998-2000 and have been providing maintenance support since 2000. In 2012, the LGED maintenance support of Tk. 3.7 million against which the WMCA contributed Tk. 220,000.

The Landless Contracting Society

Two LCS groups were consulted in the FGD during the fieldwork, a male LCS group and a female LCS group. The LCS groups in this polder are engaged by the LGED for earthwork type activities in polder infrastructure repair. The groups are engaged when there is some work and they can be provided employment for 3 to 4 months in a year. In other times they work in other projects, with contractor or in shrimp gher or crop agriculture. Women groups are sometimes engaged in stitching and handicraft. The male groups sometimes go outside of the village for seasonal employment and they are also engaged part time in own agriculture and aquaculture.

The female LCS group members reported substantial improvement in livelihood, food security and social status but the male group felt that they did not improve much for LCS work as it is only a short duration employment to them.

Operation of the sluice gates

Operating the gate is the responsibility of the WMCA. The WMCA delegates the responsibility to the gate committees to decide on the operation of gates. The president of the gate committee decides regarding opening and closing after consulting the people. There is no gateman and the responsibility of operating gate rotates among the members but the nearby landowner is assigned the task real control, in needed in consultation with the president of the gate committee.

Maintenance

Bagachra Badurgacha is a Sub Project of LGED hence its maintenance is the responsibility of the LGED. The LGD engineers make a post monsoon assessment of damages and prepare Operation and Maintenance Plan once a year and allocates budget subject to availability of fund from the government.

However, it happens that the fund allocated is often below the requirement and fund is not available in time. Then the WMCA has to manage resources from other sources. The other sources are selling fishing right of three canals, share capital, monthly savings and interest from micro credit. The WMCA contributes 3% if the cost against allocation by the LGED. But in the case of emergency repair and maintenance, the WMCA uses own fund and also collect special subscription of Tk. 50 to 200 per bigha of land.

It happens that getting fund from the LGED takes time and the WMCA has to repair the embankment, then the UP Chairman and Members contribute money or engage labour to repair the embankment. Sometimes the UP Chairman and Members contribute personally and in other times provide grants from the UP fund.

Besides the above help, the UP Chairman lobbied to collect some donation and on his initiative a donation of Tk. 100,000 was collected from the MP. It was noted from the FGDs that the UP could not excavate canals partly because there is no public canal inside of the polder and the UP did not receive fund from the government for this work.

Participation Participation of people in the Bagachra Badurgacha means participation in the WMCA activities. Participation also meant that all are involved, included and they work together. It was stated that the WMCA and LGED value opinion of the members, including opinion of the poor and woman.

The WMCA works through the sub committees and the sub committees consult people and value people's opinion such as on opening and closing of gates. It was felt that some elite people are leaders because they are better educated, "wise" and carry on the responsibility. In the assessment of the local participants; ensuring participation requires leadership and it revealed that the WMCA is lead by the educated and rich elites but it is not elite-captured.

Gender

Women outnumbered men in polder Bagachra Badurgacha with Sex Ratio (M/F*100) 98 but women are still behind the race in terms of literacy. Substantial numbers of women are engaged in LCS, agricultural wage employment including shrimp gher labour, fishing, shrimp and fry collection, stitching, and handicraft. Men earn 50% higher than women. This is because of piece rate work. It was said that five men can do eight women's work in earth filing. So, men earn more although piece rate wage is same for men and women. Women earn average T. 150-200/day while men earn Tk. 250-300/day in LCS work.

The field team interviewed a woman household head (45), a widow, has eight years of schooling, works in an NGO, owns five bighas land and mother of three children, all grown up. By the standard of rural Bangladesh, she is a bit educated and affluent, although a widow. Her family reflects how girls are valued in the society. Her son is a college student but two daughters could not complete secondary education, they completed only seven and eight years of schooling after that both daughters were married out but both are now with mother. This woman is an Executive Committee member of the WMCA. She said that she participates well in the WMCA and her opinions are valued.

The woman is interested culture mixed golda, fish and paddy but nearby landowners bring salt water and therefore she is forced to culture bagda, golda, fish and paddy. Gher owners prefer to cultivate bagda in one season because it can be marketed within two and half months while golda cannot be harvested below nine-ten months.

In the past, women from this area did not step outside the door. Now they are working both in and out of the house. Now they are economically and socially better-off than previously. Before, they had occupations related to land, now we can earn some money by work outside, said female LCS member. Now local poor and poor women are engaged in earth cutting, harvesting paddy, excavating canals and working as wage labours in shrimp gher, crop agriculture, transport and alike, said male LCS labour.

9.2, Concerns

Due to siltation of the rivers and canals, all sources of water will dry and no water source will be available for surface water irrigation. In another extreme, there will no passage to drain out monsoon water. So, crop area will decrease. Embankment will damage quicker for loose soil, extra pressure of water as rivers drying, roads will get damaged, road communication disrupted. Some LCS women respondents said “we have to die as paddy cultivation will decrease”. LCS male respondents said that not only crop area, the houses too will be flooded. There has been crop failure last three years since AILA. This year good harvest gave some hopes but this is because of good weather.

The main water related problems include:

- Riverbank erosion along the river Teligati,
- Siltation of Ghengrail river,
- Siltation of the canals,
- Increased salinity due to reduced upstream flow (all rivers lost connectivity to upstream flow from the main river system and only monsoon rain to wash away salinity), poor condition of the embankment (due to riverbank erosion),
- Too many pipe inlets making the embankment vulnerable.

Drinking water is not a great problem in this polder as only about 3 to 5 households share a deep tube well after the UP has distributed about 60 deep tube wells in a community having about 312 households only. NGOs also have distributed some DTWs and there are a few private DTWs.

9.3. Suggestions

Quite consistent to the problems and concerns noted above, the respondents gave a number of suggestions as under:

1. Make embankment wider, stronger and higher
2. Make parallel inner dyke to provide double protection if one dyke breaks, another will protect the area
3. Provide riverbank protection along the river Teligati
4. Re-excavate river Ghengrail by dredging
5. Re-excavate canals
6. Stop entry of saline water (LCS Women, LCS men)
7. Stop inserting pipes in the polder
8. Repair sluice gates
9. Construct another sluice gate at Naptir khal

Responsible Organizations

A number of views were available but the dominant view was that the LGED to be responsible for polder development and maintenance while the WMCA to be responsible for operation and minor repair while re-excavation of interior canals, inner roads etc. to be the responsibility of the Union Parishad.

One minority view was that the BEDB should come forward to build strong embankment as per BWDB design. This was said with the perception that BWDB builds wide and high embankment while LGED builds small ones, then why not we get big one.

A. ANNEX 1: INSTITUTIONS IN WATER GOVERNANCE

This section introduces the main actors in the polder relevant to the multiple uses of water and the polder infrastructure. Water management in this report meant mainly for agriculture, including aquaculture, through operation, i.e. the opening and closing of sluice gates, and maintenance of the infrastructure (polder, gates and canals).

i) Government Agencies

Bangladesh Water Development Board (BWDB)

The Bangladesh Water Development Board (BWDB) is the main implementing agency of water infrastructure projects in Bangladesh. As per the National Water Policy (Ministry of Water Resources, 1999) it is responsible for polders larger than 1000 ha. For this purpose, BWDB has special wing in the district level headed by senior engineer called Executive Engineer (Operation and Maintenance).

Bagachra Badurgacha sub project is however outside of BWDB polder hence BWDB has no responsibility to maintain its infrastructures. It belongs to the LGED.

Local Government Engineering Department (LGED)

Local Government Engineering Department (LGED) is a public sector organization responsible for planning, implementation and O&M of local level rural (as well as urban) infrastructure development programs. LGED works closely with the local stakeholders to ensure people's participation and bottom-up development.

The organizational background of the LGED can be traced back to early sixties when implementation of works program (WP) was started. To administer WP nationwide, the Works Program Wing (WPW) of the Ministry of Local Government was created in 1982. It was reformed into the Local Government Engineering Bureau (LGEB) in October 1984. LGEB was upgraded as the Local Government Engineering Department (LGED) in August, 1992.

Concerning polder areas, LGED's role is taking up of small scale participatory projects in sub-polders not exceeding 1,000 ha area. The Bagachra Badurgacha is a Sub Project of the LGED. The LGED constructed infrastructure in this area during 1998-2000 and is responsible for its maintenance.

Union Parishad: Grassroots Local Government Institution

Rural governance in Bangladesh comprises of a three tier local government system of which Union Parishad is the grassroots local government institution and its immediate upper tier is Upazila Parishad. Zila Parishad is practically non-existent. The LGED Sub Project Bagachra Badurgacha belongs to Sovana Union Parishad of Dumuria Upazila, district Khulna. The UP is moderately involved in water management in this polder, particularly in emergency repair of embankment mitigation of conflicts. UP is strongly involved in providing tube wells for drinking water and ring slab latrines for sanitation. UP has good involvement in disaster response.

Role of Upazila Nirbahi Officer and District Committee

The role of the upper level local government institutions of Upazilas and Districts is to coordinate between different government agencies and projects active in their areas. They assist the Union Parishad for issues they cannot handle alone, as for instance funding required for various development activities (drinking water, emergency, road maintenance) and coordination at the higher levels. Since the polder comprises only one UP, inter-UP

coordination is not very important here. The role of UNO came-up in the FGD and KII discussions. Their role seemed important to enhance better implementation of projects and particularly to allocation of resources for maintenance work. DC's role appeared prominently in major repair work after the disasters like AILA.

Department of Agricultural Extension (DAE)

The Department of Agricultural Extension (DAE) is responsible for the dissemination of agricultural technology, information and relevant services to farmers and other stakeholders down to village level. It is the largest department under the Ministry of Agriculture having their extension officer down to village level (one extension officer called Sub Assistant Agriculture Officer for a cluster of villages called Block). In the polder area, the participants did not mention much about the DAE and there is little interaction of the farmers with the DAE as the officers tend to stay in the Upazila rather than coming to the village.

Department of Fisheries (DoF)

The Department of Fisheries (DoF) is responsible for the dissemination of fisheries resource conservation and aquaculture technology and is placed under the Ministry of Fisheries and Livestock. DoF provides training on fisheries and teaches how to do combined cultivation of paddy and fish. They provide support to fish cultivators in the area and assist them if there are any problems. The DoF has no field staff and therefore has little interaction with the farmers.

Department of Public Health Engineering (DPHE)

The Department of Public Health Engineering (DPHE) is the national lead agency for provision of drinking water supply and waste management throughout the rural areas. Drinking water was identified as the most important use of water, yet respondents were not able to give any information of interactions with the DPHE. Rather, they would contact the Union Parishad and request for deep tube wells or piped water supply systems to access safe drinking water.

ii) NGOs

Several NGOs are working in Bagachra Badurgacha Sub Project area. But they are not much involved in water management. The NGOs and MFIs are mainly involved in micro credit and several other activities noted here. ASA, BRAC, Proshika, Caritas, Grameen Bank, Uttaran, Rupantar and Grameen Shokti are currently active. All NGOs provide loan, BRAC, Caritas, Rupantar and Uttaran provide disaster relief, and Grameen Shokti provides Solar Panel for household level electricity supply. The rehabilitation support of the NGOs included housing and several NGOs like Uttaran and Rupantar distributed rickshaw van, Corrugated Iron Sheet for housing and livestock (lamb).

iii) Private actors:

Not active in this polder.

B. ANNEX 2: INSTITUTIONS

Authority/ Organization	Concerned Ministry	Field Presence	Relevant Functions	Constraints	Suggested remedial measures
Upazila Bureaucracy: UNO office headed by the UNO	Ministry of Establishmen t	Up to Upazila level.	* General administration * Development coordination * Conflict resolution	* Inadequate manpower * Low skills of staff * Bureaucratic orientation *Lacks public accountability * Political interference	* Reorientation * Freedom to act professionally, neutrally, guided by law *Enhanced public accountability
Bangladesh Water Development Board (BWDB) BWD is not working in Bagachra Badurgacha	Ministry of Water Resources	Effectively up to district level	*Develop and maintain polder infrastructure * Implement national water policy in the field level	* Upazila level office non- functional * Gateman recruitment stopped but alternative measure to O&M by communities not yet functioning effectively	* Repair, reconstruct polder * Transform BWDB from just line ministry control to a people oriented institution
Local Government Engineering Department (LGED)	Ministry of Local Government Rural Development and Cooperatives	Up to Upazila level.	* Plan, implement and maintain rural infrastructure (rural roads, bridge, culvert market, ghat etc) * Plan and implement small water sector projects up to 1000 ha in cooperation with local bodies and communities * Provide technical support (design, supervision, accounting) to local government bodies to develop, operate and maintain local infrastructure)	* Inadequate manpower if no project on-going * Political interference	* Freedom to act professionally, neutrally, guided by law *Enhanced public accountability * Local government strengthening
Upazila Land Office headed by the Assistant Commissioner, Land	Ministry of Land	Up to Upazila and Union level.	* Khas land and khas water bodies management * Leasing out of khas land, khas water bodies	* Inadequate manpower * Low skills of staff * Bureaucratic orientation *Lacks public accountability * Political interference	* Reorientation * Freedom to act professionally, neutrally, guided by law *Enhanced public accountability
Department of Agriculture Extension (DAE)	Ministry of Agriculture	Effectively up to Upazila level. Officially multi village block level below UP	* Provide technical advice * Assist distribution of input subsidies, agr loan etc.	* Sub Assistant Agriculture Officer rarely seen in the village/ UP * Low skills of employees * Political interference	* Establish Union based farmers information and service centre (FIAC) * Ensure presence of SAAOs at least in the UP on a regular basis * Ensure public accountability through

Authority/ Organization	Concerned Ministry	Field Presence	Relevant Functions	Constraints	Suggested remedial measures
				* Assigned many work by the government which are not related to agriculture sector	reporting to UP and Upazila Chairmen & UNO
Department of Fisheries (DoF)	Ministry of Fisheries and Livestock	Up to Upazila level	<ul style="list-style-type: none"> * Provide technical advice to fish/ shrimp farmers * Conserve fisheries resources * Inspect quality of shrimp fry supplied to farmers, * Promote hygienic condition of fish/shrimp landing centre/depots, quality of shrimp going to processing centre * Regulate shrimp farming so that it is not damaging environment * Khasjalmohal lease, management. * Report on fisheries/shrimp area production etc 	<ul style="list-style-type: none"> * Lack of manpower * Political interference * Lack transparency and public accountability 	<ul style="list-style-type: none"> * Introduce local extension agent in fisheries (LEAF) as recommended by the Fourth Fisheries Project (as a community managed but government supported extension system) * Ensure public accountability where UFO must report to Upazila chairman
Department of Public Health Engineering (DPHE)	Ministry of Local Government Rural Development and Cooperatives	Up to Upazila level.	Support water supply and sanitation <ul style="list-style-type: none"> - Tube Well - Pond sand filters - Rain water harvest - Ring slab latrine - piped water supply 	<ul style="list-style-type: none"> * Political interference * Lack transparency and public accountability * Low coordination with other departments 	<ul style="list-style-type: none"> * Inter agency coordination * Better interaction with the communities
Union Parishad (UP)	Ministry of Local Government	Nearest to people	38 functions <ul style="list-style-type: none"> - provision and maintenance of rural infrastructure include roads, canals, dykes, small scale water management) - provision and maintenance of water supply sources - prevent contamination of water sources - village police - village court, salish 	<ul style="list-style-type: none"> - Bureaucratic and political interference by DC/UNO and MP/minister -Lacks support of the government (financial & logistic) -Inability to mobilize financial resources internally - Elite domination 	<ul style="list-style-type: none"> - Local government strengthening by the government - Government to support not control local government. - Involve civil society organizations/NGOs to buildup capacity of the UP and raise public awareness

