



Water Governance and Community Based Water Management

Situation Analysis Report Polder-31, Tildanga and Pankhali UP, Dacope Upazila, Khulna

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1. INTRODUCTION

1.1. Aim of the report

This report aims to generate a detailed situation analysis report of polder 31, Upazila (sub-district) of Khulna district based on Focus Group Discussions (FGD) and Key Informant Interviews (KII). It will do so by providing:

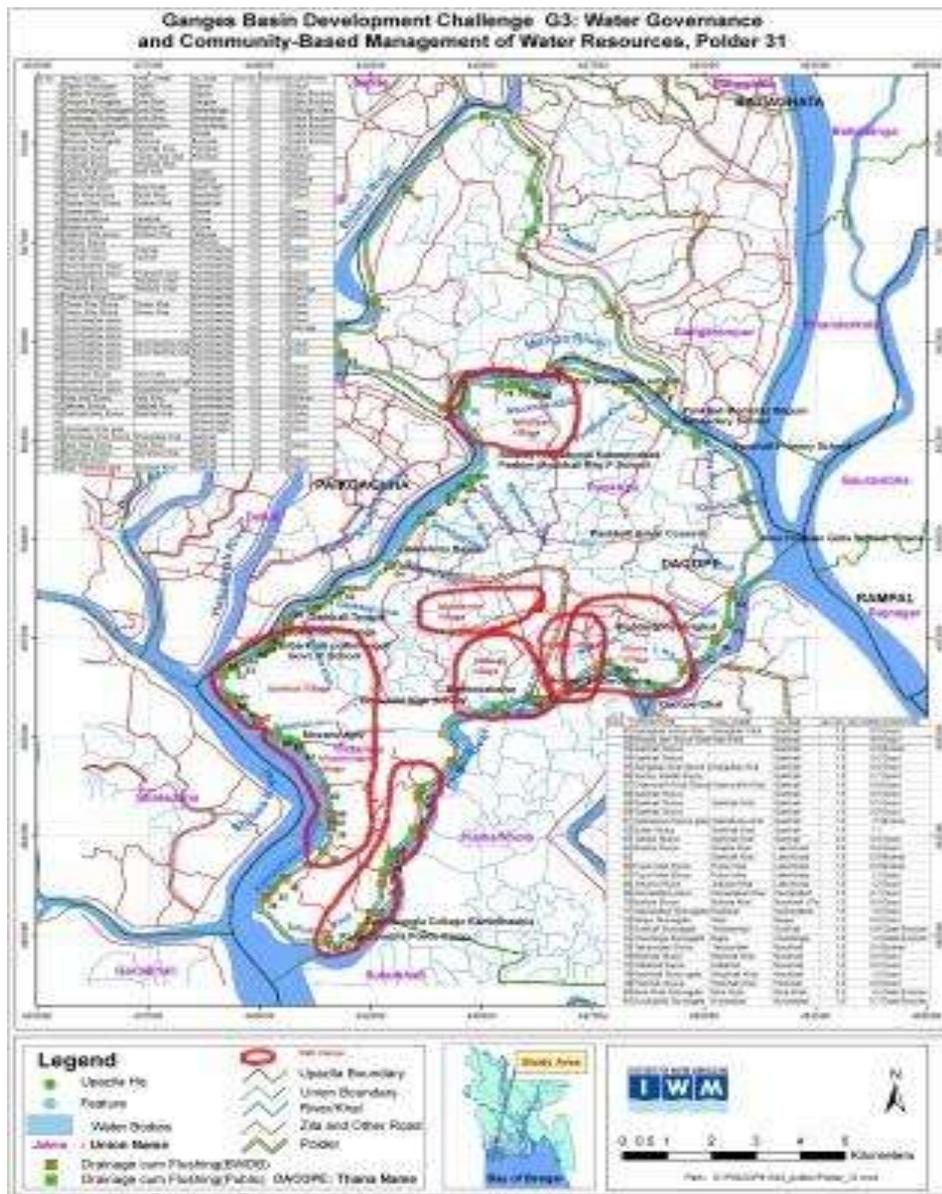
- i) A historical narrative of the polder from the time it was constructed to present;
- ii) Farming systems and livelihoods options;
- iii) Current state of the polder infrastructure;
- iv) Examining the results and process of the water management interventions of the BWDB
- v) Reviewing how maintenance 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 polder 31.

1.2. Methodology

Seven Focus Group Discussions and fourteen Key Informant Interviews (KIIs) were conducted by the Shushilan research team from 8th March to 12th March, 2012. Three FGDs out of seven were held in Pankhali Union and the remaining four were conducted in Tildanga Union. The venue of the FGDs were selected based on IWM map, transect walk and consultation with the local people by considering 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, particularly paddy cultivation with or without aquaculture. The KII participants were selected through snowball and opportunity process. The type of KII participants includes farmers, women headed households, UP Chairman, UP member, woman UP member and field level officers of BWDB and DAE. The map below shows where the FGDs have been conducted.

Sl	Respondent Type	Village/UP
1	General	Moukhali, Pankhali
2	General	Khona , Pankhali
3	LCS-female	Khatail, Tildanga
4	General Group	Moshamari Tildanga
5	LCS-female	Tildanga, Tildanga
6	General Group	Mozamnagar, Tildanga
7	WMA	Tildanga UP



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

- One of the four general FGD groups met at Moukhali village of Pankhali Union (North-west part of the Union). It is located in the Northern part of the polder and very near to the River Monga. The FGD covered canals include *Mou Khal, Dublar Khal, Duaniar Khal, Boilasher khal, Katakhal Khal, Kadomtlor Khal, Thakuron Bari Khal, Bain tala, and Bot tola khal. Dublar Khal and Boilasher khal* etc. Most of the canals are dosed and silted. In the proximity, there is a one-vent sluice gate and pipe inlets. In the FGD group, total 12 participants (11 male and 1 female) from various occupation groups including farmers, shrimp business men, teachers, UP member, day labour and salaried persons. Age of the participants varied from 27 to 50 years. One fourth of the participants attended from Hindu community. Two of the respondents were UP representatives.

- The second general FGD was held at Khona village of Pankhali Union, near Bhadra and Dhaki River. The main rivers are Bhadra & Dhaki River and the main canals are Baruikhali Canal, Baintola, Kalabogi, Dofadar, Khona, Katakali, Maitry, Basundia, Abul Hossain's. The sluice gates bearing number 12 to 19 are located in proximity. Most canals are silted and blocked and the gates closed. Farmers are engaged in the cultivation of paddy and fin fish. A total of eleven participants were present in the FGD. By occupation they are farmers, female UP member, businessman, retired government officials, NGO activist and teacher. Two of the eleven participants were female. The age of the respondents varied from 34 to 60.
- The third FGD was conducted with eight LCS members at Khatal village of Pankhali Union, near to Bhadra and Dhaki River. There is less concentration of canals and in the proximity there is just one sluice gate bearing number 19 and this is in good condition. All of the participants are day labours, two of them landless and others owned land from 0.05 to 0.40 acres.
- In the fourth FGD was conducted with seven male and a female participants at village Moshamari of Tildanga Union in the middle part of the polder near the Rivers Dhaki and Shibsha. There is high concentration of canals, some canals are active and some are silted and closed by land grabbers. The sluice gates bearing numbers 20 (Botbonia sluice), 22 (Arakhali sluice) and 64 (Badhra sluice) are located in the area. The sluice gates were in good condition except Botbonia sluice (no 20). Occupation of the respondents was agriculture, service, teaching, household chores and business. Age of the respondents varied from 37 to 70. One of the respondents was female.
- The fifth FGD was conducted with seven LCS women participants village Tildanga of Tildanga Union, near to the Rivers Dhaki and Bhadra and only one sluice gate bearing no 20 (Kalibari sluice gate) is located there. The link canal is silted and closed. All of the participants were Sonaton Hindu by religion and their age varied from 30 to 40 years.
- The sixth FGD was conducted at village Mozamnagar of Tildanga UP in the South-East side of the polder near to Sibsha and Dhaki River. Main canals in the area include Gorkhali, Tatkali, Nishankhali, Rashkhola, Kaminibasias, Sidarth Sekho, Gonibari & Sanabari etc. The canals are blocked and silted canals. The sluice gates number 31 to 46 are located in the area, constructed by the BWDB under the third fisheries project, later repaired under the fourth fisheries project. Occupations of the participants were paddy farming and shrimp culture and salaried service. Number of participants was nine, all were male and age varied from 31 to 60 years.
- The last FGD was conducted with ten WMA members at Botbonia Bazaar of Tildanga Union, very near Dhaki River. The jurisdiction of the WMA is Tildanga Union, souther half of the polder. There is high concentration canal but the canals are silted closed. Gorkhali canal was leased for long period to local influential person. Sluice gates condition was comparatively good. All of the participants were male and they were involved in different professions like agriculture, shrimp culture, business and village doctor. Age of the respondents was in the range of 39 to 62.

The study also conducted fourteen KIIs including women headed households, paddy farmer, shrimp gher owners, affected person, WMC representatives, UP representatives, Government officials. All of the KIIs were conducted at village level except UP and Government officials. KII with Government officials were conducted to the respective Upazila office.

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

Table 1: List of FGDs conducted in polder 31

SL #	FGD Type	Numbers of Participants	Village	Union Parishad	Relevant Sluice Gate Numbers	Adjoining Canals
1	General Group	11 male, 1 female	Moukhali	Pankhali	75- 78	Moukhali Khal, Dublar Khal, Duaniar Khal, Boilasher khal, Katakhal Khal, Kadomtola Khal, Thakuronbari Khal, Baintala khal and Bottola khal.
2	General Group	9 male, 2 female	Khona	Pankhali	12-19	Bhadra & Dhaki River. Baruikhal Canal, Baintola, Kalabogi, Dofadar, Khona, Katakhal, Maitry, Basundia, Abul Hossain Canal.
3	LCS- female	8 female	Khatail	Pankhali	19	Bhadra & Dhaki River
4	General Group	7 male, 1 female	Moshamari	Tildanga	20, 21, 64	Dhaki, Shibsha. Mora Vadra khal, Chandibari, Moshamari (khas khal), Kamumari, Choto Charpara, Boro Charpara, Ghater khal, Konar khal, Orabunia khal, Gorhibunia, Botobunia gate khal, Guptakhali, Baintola, Banshtala and Kalibari khal
5	LCS- female	7 female	Tildanga	Tildanga	20	Bhadra & Dhaki River
6	General Group	9 male, no female	Mozamnagar	Tildanga	31-46	Sibsha & Dhaki river. Gorkhali, Tatkhal, Nishankhal, Rashkhola, Kamini basia, Sidarth Sekhor: Gonibari & Sanabari
7	WMC	10 male, no female	Dacope upazila	Dacope upazila	21-64	Chunkuri, Vodra, Dhaki, Shibsha, Manga & Poshur river. Khals : Batbunia, Vadra, Baintala, Kolatola, Gorkhali, Moshamari, Kamumari, Vayer khal, Tetultola, Datkhani and Bashtala khal

Table 2: List of KII conducted in the polder 31

SI #	Respondent Type	Village/ UP/ Venue	Date
1	WMA-chairman, Tildanga	Dacope Upazila	12 th March
2	Woman household head	Nissankhali, Tildanga	12 th March
3	Affected Shrimp farmer	Botbunia, Tildanga	12 th March
4	Paddy farmer	Tilganaga, Tildanga	13 th March
5	Paddy farmer	Gorkhali, Tildanga	12 March
6	Large shrimp farmer	Kaminibasia, Tildanga	12 th March
7	UP women member	Pankhali union	13 th March
8	UP Chairman	Pankhali union	14 th March
9	UP Male member	Tildanga union	12 th March
10	Case hanging person	Kaminibasia, Tildanga	12 th March
11	Affected person	Mozamnagar, Tildanga	12 th March
12	SO (BWDB-Dacope)	Khulna, BWDB Office	13 th March
13	Community Organizer-LGED	Dacope Upazila	14 th March
14	Upazila Agriculture Officer	Dacope Upazila	14 th March

1.3. An Overview of Polder 31

1.3.1. Location

The polder 31 of BWDB is located in Dacope Upazila of Khulna District, about 40 kms South of Khulna city. It is at 22031' to 22039' North latitude and 88024' to 88032' East longitude. The polder comprises two Union Parishads, Tildanga and Pankhali with an area of about 31.7 sq kms. It is surrounded by four rivers; Monga in the North, Badurgacha in the Northwest, Dhaki in the Southeast and Shibsha in the West.

3.1.2 Physical features

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. The land in the wetland (beel) area is comparatively low. The middle part of the beel area is often waterlogged due to siltation and closing of canals. In this polder, there are about 67 structures, 45 in Tildanga and 22 in Pankhali UP.

All of the four rivers surrounding the polder are still navigable round the year, although siltation is gradually reducing navigability. Mora Bhadra River (closed on both sides by the embankment but having BWDB and fourth fisheries sluice gates at two ends now became a canal) separates the polder in two parts, Pankhali and Tildanga. Another river in Tildanga UP, Gorkhali is also closed by the embankment and now turned in to a canal with a sluice gate.

The polder is crisscrossed by canals. The canals are all closed by the embankment, but 67 sluice gates, regulators and culverts were constructed to regulate water but most of the link canals are silted.

1.3.3 Accessibility

The polder 31 connected to Khulna city by an Upazila road via Botiaghata Upazila in the North side. Road communication is not good. Bus is available for limited time from Khulna city to Pankhali Ferry ghat. Internal roads are earthen and a few brick soling roads. Most of the roads are broken and damaged. Hired motorbike and rickshaw van are usual mode of transport. The embankment is also used as a road for the mobility of the local people. Road communication is harder during the rainy season. Country boat for passenger transport is not used but engine boat became a frequent transport. Still there is motor launch service to Khulna from Batbunua and Chalna Bazaar.

1.3.4. Demographic features

Table 3 below provides demographic data of Pankhali and Tildanga Unions of polder 31 and for comparison, data is provided for Dacope Upazila. Total population of the polder 31 is 32,576 and average household size is 4.2. Both population density and household size are similar in the two Union Parishads and the Upazila. Female population is higher than male population in the polder area. Percentage of Muslim and Sonaton Hindu are 51.2% and 48.6% of the population in the polder area compare to 10% Hindu population of the country. Literacy rate of the polder 31 is 58.3%, where male literacy is 66% and female literacy is 50.9%. The polder area has higher literacy than the country as a whole.

Table- 3: Area and Population

SL	Particulars	Pankhali	Tildanga UP	Polder 31 Total	Dacope Upazila
1	Area (Sq km)	15.12	16.58	31.70	148.31
2	Household	3,735	4,095	7,830	36,597
3	Population Total	15,570	17,006	32,576	152,316
4	Density	1,030	1,026	1,028	1,027
5	Household Size	4.2	4.2	4.2	4.2
6	Male	7,637	8,359	15,996	76,291
7	Female	7,933	8,647	16,580	76,025
8	Sex Ratio	96	97	96.5	100
9	Religion Muslim %	66.7	37.0	51.2	41.6
10	Hindu %	33.3	62.5	48.6	56.5
11	Christian and others		0.5	0.2	1.9
12	Literacy All	56.5	60.0	58.3	56.0
13	Literacy M	62.8	69.1	66.0	62.9
14	Literacy F	50.4	51.3	50.9	49.1
Source: BBS, Population Census 2011, Community Series for Khulna District					

Table 4 below shows employment status of male and female population of age 7 and above not attending school. In the polder 77.9% of the males (of age 7+ not attending school) are “employed” in various income earning activities and 21.2 % are reported not working. Of the female population of 7+ age (not attending school), 3.6 % are reported to be working in various economic activities, 74.25% reported to be engaged in household chores only and about 22.0% reported non working. This should however be read with caution as age 7+ not in school, is not a good definition of labor force.

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

SL	Particulars	Pankhali	Tildanga	Pol 31 Tot	Dacope Upazila
1	Population age 7+ not in school	3875	3548	7423	32306
2	Male	1502	1144	2646	11975
3	Female	2373	2406	4779	20331
4	Employed Male	1190	871	2061	9360
5	Employed Female	106	68	174	1280
6	% employed Male	79.2	76.1	77.9	78.2
7	% employed Female	4.5	2.8	3.6	6.3
8	% Looking for Job Male	0.6	0.2	0.4	0.7
9	% Looking for Job Female	0.3	0.1	0.2	0.3
10	% in household work Male	0.7	0.8	0.75	1.3
11	% in household work Female	73.6	74.9	74.25	69.8
10	% not working Male	19.4	22.9	21.2	19.8
11	% not working Female	21.7	22.2	22.0	23.7

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

Table 5 below shows distribution of male and female working population by broad economic sectors. In polder 31, about 80.1% of the male workers are engaged in the agriculture sector, only 1.5% in industries and 18.4% in the service sectors. Of the female workers, about 33.9% are engaged in the agriculture sector, about 2.3 % in industries sector and 63.8 in the service sectors. Compared to employment of working population by broad sectors in the polder 31, Pankhali, Tildanga Union and Dacope Upazila do not vary much. Interestingly more than sixty percent of the female workers are involved in the service sectors and this figure is almost three times higher than same for the male workers. The census data however did not reflect that the female workers are largely involved with shrimp gher, prawn fry collection etc.

Table 5: Employment of Working Population by Broad Sectors

SL	Particulars	Pankhali	Tildanga UP	Polder 31 Total	Dacope Upazila
1	Agriculture % of male worker	72.2	90.9	80.1	75.7
2	Agriculture % of female worker	19.8	55.9	33.9	28.5
3	Industry % of male worker	1.4	1.6	1.5	3.2
4	Industry % of female worker	2.8	1.5	2.3	3.7
5	Services % of male worker	26.4	7.5	18.4	21.1
6	Services % of female worker	77.4	42.6	63.8	67.8

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

1.3.5. Basic Facilities Access

Table 6 below shows that nearly three fourth of the population of the polder 31 have access to safe drinking water and the main source is deep tube well, still about one fourth lacking access or facing difficulty to collect drinking water. Overall drinking water situation in polder 31 is far better than that of the Dacope Upazila as a whole.

In the polder 31, about 48% of the population has water sealed sanitary toilets and about 34% have non-water sealed sanitary toilets. About 12% use non sanitary toilets and 6% have no toilet facility. This situation regarding toilet facilities does not vary widely between Pankhali and Tildanga. In polder 31, more than one fourth (28.3%) of the households have electricity facility and this percentage is almost same in Dacope Upazila. Surprisingly, Tildanga UP is not connected to national power grid but census report showed 37% households having electricity. Follow up discussion with respondents made the point clear that this is solar power on roof top each household having a couple of energy saving bulbs and a TV. In contrast Pankhali UP is connected to national power grid and 20% households showing electricity connection are those connected to power grid. Another 20% or so have solar system in the more interior villages. Despite not connected to power grid, so high percentage of households in Tildanga UP has electricity because of affordability for higher income from shrimp farming.

Table 6: Availability of or Access to Basic Facilities

SL	Facilities	Pankhali	Tildanga UP	Polder 31 Total	Dacope Upazila
1	Sanitary Toilet water sealed %	37.9	57.6	47.75	45.0
2	Sanitary not water sealed %	40.3	27.6	33.95	22.3
3	Non sanitary%	16.7	8.2	12.45	18.9
4	No latrine %	5.0	6.6	5.80	13.7
5	water source : DTW &Tape %	69.6	79.5	74.55	31.3
6	Electricity Connected %	19.8	36.8	28.3	28.2
Source: BBS, Population Census 2011, Community Series for Khulna District					

1.3.6. History of the 31 polder and Physical Interventions

History of polder development

One or two hundred years ago polder 31 was part of Sundarbans. It was open wetland area with mangrove trees and bushes (UP member, Tildanga Union). Still, mangrove plants grow naturally along the riverbank and major canals. People deaned the forest to expand agricultural land and make houses. Open water fishing in the canals and rivers was the major livelihood in this area besides cultivation of mainly local aman paddy. Yield was low and crop failure was frequent. But because of low population density the traditional one crop agriculture, livestock rearing and fishing could support survival of people.

The former East Pakistan Water and Power Development Authority (WAPDA) now succeeded by the BWDB constructed embankment with limited number of sluice gates in 1960s. Information varied about exact year of construction. FGD participants at village Khona of Pankhali UP said that polder was constructed in 1962-63 but FGD participants at village Tildanga and Mosamari of Tidanga UP and at Moukhali of Pankhali UP said that polder was constructed in 1967-68. Some informants mentioned Ayub period (military government) without mentioning year which was ended in 1968. The WMA FGD participants at Tildanga UP also said that the polder was constructed in 1966-67. All these taken together, implies that the polder was constructed in 1960s and construction was completed by 1968. Initially the polder had only four sluice gates as stated by the WMA FGD participants, three still functional and one destroyed by river erosion. Third Fisheries Project constructed 7 structures. Three TFP gates repaired under FFP and are now functional. The FFP constructed 13 gates, one damaged and others functional.

Before constructing the embankment local people made austomashi bandh (temporary dyke constructed for 8 months by voluntary labour). But the narrow dyke and its low height was good enough to protect robi crops in the dry season. During the monsoon, the dykes got destroyed every year and after monsoon they were rebuilt. During those days canals were kept closed from December to July after the harvest of Aman paddy. Local variety *Aman kanchra*, *bojramuri* and fine rice *basmati*, *balam* etc. were produced. Tide carried silt that maintained soil fertility and elevated land. But some marshy lands would remain fallow where *Hogla* leaves grew abundantly which was used for mat making. Open water fish was abundant, like *Chingri*, *Tengra*, *Vetki*, *Hilsha*, *Ramsuch*, *Tapshi*, *Puma*, *Koral*, *Gulitangra*, *Koi*, *Gulisha*, *Taki*, *Bagda* etc. But people did not like to eat *bagda Chingri*, they considered it as worms or *poka*.

The embankment was constructed to prevent tidal surge and protect crops from salinity. After constructing the embankment, yield of aman paddy increased. Besides paddy, vegetables cultivation was possible. Pulses, Aus, sesame, watermelon and jute grew (FGD, Khona). Cattle rearing increased as grass grew in vast areas. It is assumed that crop farming and aquaculture remained the main livelihood activity. From late 1960s to mid 1980s crop yield was good as the embankment condition was good and it prevented tidal surge and salinity intrusion. At later stage silt deposits created internal drainage condition and crop production decreased. During this period commercial shrimp farming began and expanded.

During the second half of 1990s the Third Fisheries Project constructed seven smaller sluice gates in Tildanga UP which were of low standard and construction quality was rather poor. They became inoperative soon and captured by the power elite. The Fourth Fisheries Project repaired three of them and these are now functional. Other four are damaged and blocked by mud filling. During 2001-2005 the Fourth Fisheries Project constructed a total of 13 sluice gates and all are still functional. So, the total number functional gates in Tildanga UP is now 18 (13 FFP, three TFP renovated by FFP and three old gates of WAPDA).

2. FARMING SYSTEM AND LIVELIHOODS

2.1 Crops and Fisheries

Presently, two of the three mouza (village area as per land survey map prepared for administrative purpose during the British period, one mouza is often larger than one village) and part of another mouza of Tildanga UP have shrimp farming. The last mouza has elevated land area and that part is has no shrimp farming. The area with shrimp farming alternates cultivation of aman paddy with mixed farming of bagda shrimp and fish. Golda is not cultivated in Tildanga UP as bagda farming is more suitable and more profitable compared to golda farming. However, some farmers grow golda in the pond but not in the gher. In this area land is prepared for mixed farming of bagda and fish in January February after the harvest of aman paddy in December. Bagda fries, mainly produced in the hatcheries are stocked in February to April and harvested in May to July. With tide water various species of brackish water shrimp like harina, chaka and chali and brackish water fish species vetki, parse, tengra, bele, khorkone etc. enter the gher naturally. Tilapia has become wild fish in the gher area and enters gher from the rivers and canals. Crabs also enter from the rivers. To increase profitability many farmers release fries of fresh water fish ruhi, katla, mrigel and nilotica in the gher and some farmers release fries of parse and horina adding to usual stock.



This shrimp gher had paddy four months ago

Bagda fries are released in batches, the first batch in late February, second and third batches in March and last batch in April when salinity still rises. Bagda harvest starts in May and continues up to July. With bagda, small shrimp like horina, chaka and chali and fish like parse, vetki, bele, tengra, tilapia, nilotika and crabs are caught. Paddy is planted in August. Fresh water and brackish water fish, small shrimp and crabs stay on in the deeper part of the gher and harvesting of these fish and crabs continue until the harvest of paddy.

Presently, local variety aman paddy like hogla and morndisail are produced in the low land and modern high yielding varieties are produced in the remaining part of the beel. Paddy is harvested in Aman paddy. In Tiodanga UP, other crops are of little significance. Vegetables like cabbage, cauliflower, radish, beans, cucumber, brinjal etc. are cultivated in the homestead area mainly for own consumption.

In Pankhali UP, Cropping patten is different. Bagda farming is declined sharply after AILA and golda and fresh water fish farming increased. While sluice gates are kept open from January to July in most part of Tildanga UP for mixed Bagda and fish farming, in Pankali, the reverse is the practice. Farmers open the gates in the beginning of monsoon and close them in the dry season to prevent salt water entry. In this UP too, main crop is aman paddy but in substantial area HYV Boro is cultivated.

In Pankhali UP, the salt water prevention committee (pani committee or water committee) has been very active after AILA. The salt water prevention and closing of bagda farming gained popularity for two reasons. Spread of white spot disease of shrimp made shrimp farming unprofitable and the AILA caused damage to the polder for which common farmers became angry on shrimp farmers. To this was added court verdict preventing shrimp farming by forcible entry of salt water inside of the polder. The pani committee was supported by NGOs Such as AOSED, Uttaran), Upazila Chairman and MP. Chairman of Pankhali UP was also favored prevention of salt water entry to gher.

Bagda farming declined but did not stop totally because there is a long season from January to July when substantial area of land remains fallow and such land can be used for shrimp farming and price of shrimp is increasing while price of paddy decreasing. Some respondents (Sahabuddin of Moukhali) said that everybody is interested in shrimp (but publicly most speak against shrimp) but many are unable to invest in shrimp now because, canals are closed and irrigation must be provided by shallow tube well which is expensive (Zakir of Moukhali in FGD). Respondents at Moukhali (Zakir and Wahab) said that mixed farming of bagda, golda and fish goes on year round. In the same gher bagda fries are stocked in February to April and Golda and fresh water fish fries are stocked during April to June. Bagda harvesting starts in June while other fish harvested in mainly October to December. In the gher several species of brackish water fish like parse and fresh water species Rui, Katla and Nilotika are stocked. Before 2009 about 500 acres land in Moukhali had integrated paddy and shrimp farming (like southern and western Tildanga). This has been replaced by all season mixed farming of bagda, golda and fish.

Like Tildanga UP, vegetable cultivation is limited and found in the homestead area. LCS woman Kajol cultivated vegetable like pumpkin, sweet gourd, tomato, brinjal, potato and brinjal in the homestead land.

2.1.1. Irrigation sources

In Tildanga UP, water for shrimp farming (bagda) brackish water is taken from the rivers using the sluice gates (about 18 gates constructed by the BWDB, Third Fisheries Project and Fourth Fisheries Project). The water committee tried to stop bagda farming but owners of land are interested in integrated shrimp and paddy farming rather than paddy only. On one part of Tildanga UP however, shrimp farming has been stopped.

In Pankhali UP, although most canals are closed, mixed farming of bagda, golda and fish is practiced in limited area (10% of the area). Here underground water is used for aquaculture and for this purpose Shallow Tube Wells are installed. Water of the STW is slightly saline and good for aquaculture.

In both Tildanga and Pankhali, rain water as well as water of the rivers and canals used for cultivating aman paddy. In Tildanga, cultivation of HYV Boro is rare because salinity is higher in this area during the boro season (Feb-May). In Pankhali UP, HYV boro is quite popular and for irrigation, STWs are used. For cultivating vegetables, water comes from tube well, pond or nearby canals.

2.1.2. Productivity, yield and seasons

Major crops are local and HYV variety of aman in both UP followed by mixed farming of bagda and fish in Tildanga UP. Yield of local paddy per acre of land is 1000-1400 kg paddy per acre or 1.6 MT rice per ha. In addition, 120 kg shrimp and 500 kg other shrimp and fish are produced per acre of land from the same land in Tildanga where integrated bagda, fish and paddy cultivation is practiced.

In the case of round the year mixed bagda, golda and fish farming yields are 80 kg bagda, 200 kg golda and 500 kg other fish. Yield of HYV boro is 1600 kg paddy or 2.3 MT rice per ha.

Table 7 provides a brief description of crops fish grown with season, source of water for irrigation and yield per acre per season.

Table - 7: Crops and fish grown, source of irrigation and yield

Crop/ Fish	Variety	Season	Duration	Irrigation	Yield kg /acre	Remarks
Paddy	Aman Local	Kharif 2	July-Dec	Rain, gate/ canals	1000	Both UP
Paddy	Aman HYV	Kharif 2	Aug-Dec	Rain, gate/canals	1400	Both UP
Paddy	Boro HYV	Robi/Boro	Jan-Apr	STW	1600	Pankhali
Shrimp	Bagda	Robi	Feb-July	Gate & canals at Tildanga, STW at Pankhali	80-120	Tildanga
Prawn	Golda	Round the year	Whole year	STW at Pankhali, not cultivated in Tildanga	200	Pankhali
Fish	Parse, Tengra, Bele, Vetki, Tilapia, Nilotika, Ruhi, Katla, Mrigel	Round the year	4 month to one year	Gate & canals at Tildanga, STW at Pankhali	500	Both UP

Source: Follow up Discussion as well as FGD

Figure 1 below shows seasons of growing various crops and aquaculture in polder 31.

Fig. 1: Crop Seasons

Crop/ Fish	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Aman Local												
Aman HYV												
Boro HYV												
Bagda												
Golda												
Over wintering of last season golda fry												
Fish												
Vegetables												

Source: FGD/KII and follow up discussion

2.1.3. Cost of Cultivation and Profitability

Table 8 below provides calculation of cost of cultivation of three major crops along with gross and net return to owner farmer and sharecropper. Return to sharecropper is different for paying one third of Boro HYV and one half of other crops to the owner.

Table 8: Cost of Cultivation and Return to Farmer

SL	Items	HYV Boro	Local Aman	HYV Anan
1	Tillage by tractor	1800	1200	1200
2	Transplanting	1,500	1,200	1,200
3	Seed/sapling	600	600	600
4	Weeding	600	400	500
5	Harvesting	1,800	1,200	1,500
6	Irrigation	3,000		600
7	Fertilizer	2,400	800	1,800
8	Direct Cost	11,700	5,400	7,400
9	Rent (Crop share to owner)	9,067	8,500	11,900
10	Cost to Share Cropper	20,767	13,900	19,300
11	Yield kg/acre	1,600	1,000	1,400
12	Price/kg	17	17	17
13	Value of output	27,200	17,000	23,800
14	Gross income to Owner farmer	15,500	11,600	16,400
15	Gross income to Share Cropper	6,433	3,100	4,500
16	Imputed wage for family Labour	3,000	2,000	2,500
17	Net return to owner farmer	12,500	9,600	13,900
18	Net return to sharecropper	3,433	1,100	2,000

Source: FGD/KII and follow up discussion Tildanga and Pankhali UP

Table 9 below shows cost of production of bagda shrimp mixed with brackish water small shrimp, brackish water fish and fresh water fish including Tilapia and carp.

Table 9: Cost of Cultivation and Return to Farmer for Bagda farming with fish

SL	Particulars	Value Tk
1	Land preparation	3,000
2	Lime 90 kg	450
3	TSP 50 kg	1,400

4	Urea 50 kg	1,000
8	Feed	3,000
9	Hired Lab	5,000
10	Guard, harvester	6,000
11	Bamboo etc	1,500
12	Bagda fry	3,000
14	Other fry	3,000
15	Rent of land	12,000
16	Water Cost	6,000
17	Total cost	45,350
18	Total value of sale	102,000
19	Gross Profit	56,650
20	Management/ Family Lab	20,000
21	Net profit to gher owner	36,650

Source: FGD/KII and follow up discussion, applies to Tildanga UP

Table 10: Cost of Cultivation and Return to Farmer for mixed Golda, Bagda, fish farming

SL	Particulars	Value Tk
1	Land preparation	3,000
2	Lime 150 kg	750
3	TSP 100 kg	2,800
4	Urea 100 kg	2,000
5	Cow dung	2,000
6	Oil cake 150 kg	6,000
7	Rice bran	10,000
8	Other feed	6,000
9	Hired Lab	6,000
10	Guard, harvester	6,000
11	Bamboo etc	2,500
12	Bagda fry	3,000
13	Golda fry	5,000
14	Other fry	3,000
15	Rent of land	24,000
16	Water Cost	12,000
17	Total cost	94,050
18	Total value of sale	188,000
19	Gross Profit	93,950
20	Management/ Family Lab	40,000
21	Net profit to gher owner	53,950

Source: FGD/KII and follow up discussion, applies to Pankhsli UP

2.1.4. Change of agriculture with polder development

The cropping pattern as well as fishing, aquaculture, horticulture and livestock all changed in the course of time over the last four and half decades. Figure 2 below provides a glance look of the change of agriculture since 1968 when the polder was constructed.

Before constructing polder in 1968 the entire polder area was open and everyday tide water entered twice and drained twice during the ebb tides. Before this time, farmers constructed temporary earthen dykes to protect crops, enhance fishing opportunity and cattle rearing. Such dykes were constructed in the lower elevated sections of the riverbanks and temporary closures were made on minor canals. To regulate water entry and drainage, small wooden boxes were placed at suitable locations. The community thus regulated tidal inundation to some extent. The dykes were narrow and low, good enough to prevent entry of tide water during the dry season, November-December to May-June. In June such dykes got damaged by excess pressure of tide accompanied with monsoon rain and higher discharge of water from the upstream. These dykes protected aman paddy before the harvest and enhanced opportunity to cultivate *robi* crops in the relatively elevated areas near the riverbank and canals. It also helped making seedbeds for aman paddy. The canals during this season became reservoir of fresh water and served the purpose of both irrigation and growing of fish. Most houses were located on the river and canal banks and therefore the canals supplied water for domestic uses and irrigation for cultivating minor crops like vegetable. For drinking purpose there were reserve ponds in every village or large *paara* (sub villages or hamlet).

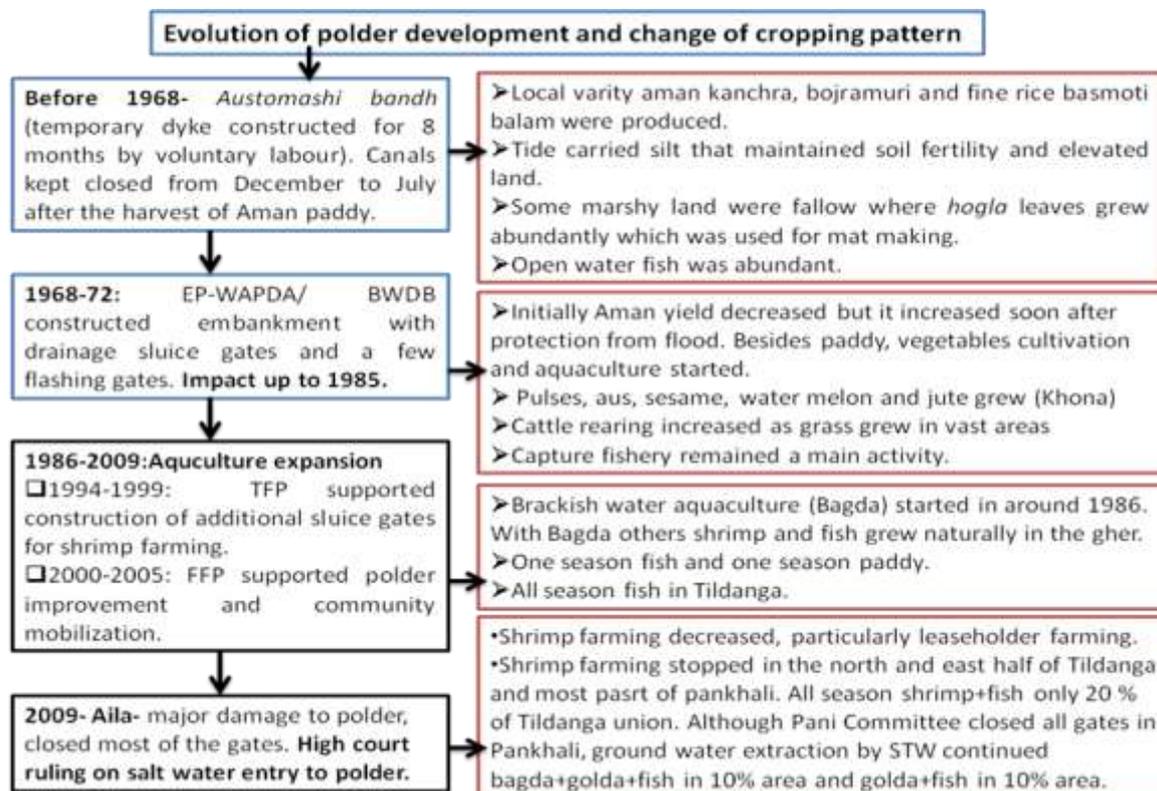
The crops grown were local variety aman paddy in Kharif 2 season and including kanchra, rajasail, bojramuri, hoogla, and fine rice basmati and balam. Fine rice varieties were planted in the relatively elevated land less vulnerable to flood while coarse varieties were planted in the beel area as they were flood resistant and salinity tolerant. Yield of local variety paddy was low about 480 to 600 kg paddy per bigha (33 decimals) which is equivalent to 2.3 to 2.9 MT per ha. Because of flood, only one crop, aman paddy was grown. Other crops grown were sesame and pulses in limited area and vegetables and fruits in the homestead area.

Besides crop agriculture, one dominant occupation was fishing in the rivers, canals and the beel area. Various species of brackish water shrimps- bagda, chali, chaka and harinpa and brackish water fish species like parse, tengra, bele, toposi, khorkone, datina, vetki, vangan etc. were available abundantly. Besides brackish water fish and shrimp, prawn as well as a wide variety of fresh water fishes like soil, koi and boal were available abundantly. Also hilsha were caught abundantly in the adjoining rivers, which has fallen drastically in the recent years. Besides open water fishing, there was a natural way of growing fish, shrimp and prawn in the beel area. Inside of the *austamasi* gher, various species of brackish as well as fresh water fish and shrimp fries entered the beel area before the canals were closed. Also they entered through narrow holes and inlets as there were some leakage of water anyway for narrow dykes.

After 1968 to mid 1980s the embankment and structure condition was good and the canals drained water and this was appropriate to protect crops and as a result crop yield was higher during this period compared to the pre-embankment period. Besides aman paddy, cultivation of a number of other crops increased. The non-rice crops grown include sesame, pulses, vegetables, water melon and even jute. Cattle rearing increased as grass grew and availability of straw was high. This condition prevailed until mid 1980s when canals and river side land silted and water logging was increasing. This was followed by the start of commercial farming of shrimp. Two factors were responsible for the start and rapid

expansion of commercial shrimp farming- shrimp became a major export commodity and water logging made land more suitable for aquaculture than paddy farming.

Fig. 2: Polder Development and Agriculture



From mid 1980s to mid 1990s shrimp farming expanded but the limited number of sluice gates was inadequate to support growing shrimp farming. Also the design of the polder in 1960s was made considering protecting crops and therefore to prevent salt water entry while shrimp farming needed entry of brackish water. To serve this need, the Third Fisheries project (TFP) constructed some new structures during 1994-99 which was funded by the World Bank and DFID and implemented by the BWDB and the Department of Fisheries. The TFP could not achieve its objectives mainly for poor construction and failure to ensure proper community participation. With this learning, the FFP was implemented with the support of the same development partners and by the same implementing agencies but with a stronger community management component. Tildanga Union now has 18 public structures managed by a polder committee registered as a WMA and 13 Block Committees functioning as WMG. The organization is less active now than 2005 when the FFP closed but are still working while in many areas the WMAs have become inactive.

Water management infrastructure improved considerably after implementing the FFP and therefore shrimp farming also improved and well integrated with paddy farming. At one stage, mid 1980s to 2000 paddy farming was decreasing with the increase of shrimp farming but after 2001 it became more integrated with paddy farming and local smallholder farmer became investors in paddy cum shrimp farming, largely displacing outsider gher owners. The result is increase both of paddy and shrimp production and other brackish water as well as fresh water fish. Still part of Tildanga UP had all season shrimp farming while in other parts of Tildanga and Pankhali UP had integrated farming of paddy, shrimp and fish farming.

Everything was going well but cyclone AILA changed the situation again. Embankment was damaged in both the UPs . Saltwater flooded the whole area, shrimp gher destroyed, all fish and shrimp lost to the river, pond water contaminated by salt water and salinity intrusion not damaged crops but also the farmers could not cultivate crops in the aftermath of AILA. The pipe inlets and polder cuts were responsible for heavier loss and damage to embankment. The NGO activists, paddy farmers and landless joined anti shrimp movement under the banner of salt water entry prevention committee popularly known as pani committee, and closed many gates and canals hence shrimp farming restricted. As a result shrimp farming declined sharply in Pankhali UP and in one of the three mouza of Tildanga UP.

2.2. Livelihoods

Livelihoods in polder 31 are dependent on two main farming activities of two sub sectors, crop farming- mainly paddy and aquaculture, mainly bagda in Tildanga and golda and fish in Pankhali. In Maukhali UP, respondents said that 60-70 percent people are engaged in agriculture comprising mainly paddy farming and mixed aquaculture of bagda, golda and fish. Most of the remaining 40% are day labor, again in these two sub sectors. Many are engaged in business (majority related to aquaculture) and transport operation and some in the service sectors.

Cattle and buffalo rearing was a very important livelihood in the past. Informants said that each farm household in the past had 20 or so cattle and buffaloes, it declined to two or less after mid 1980s until recently but increased again in the recent years. Informants at Moukhali UP said that reduced shrimp farming contributed to improving environment and increased availability of straw and green grass. Informants of Tildanga on the other hand said that reduced poverty and increased purchasing power contributed to increased livestock rearing, particularly cow and sheep increased. Also, rearing of geese increased in the gher area, as they survive in such environment.



Shrimp fry collection, still a livelihood. Hundreds of fries of other species killed for catching one shrimp fry.



Less destructive way of shrimp fry catching

Open water fishing was an important economic activity until mid 1980s and after this period it declined continuously. The reasons are increased population pressure pushed most poor people to fishing as last source of livelihood. It caused over fishing and use of destructive gears leading to depletion of resource base. The next blow was shrimp and prawn fry collection from the rivers by destructive methods killing hundreds of fries of other species to catch each shrimp fry. Shrimp fry collection now declined as availability declined. Still destructive methods of fishing and shrimp fry collection continued. Respondents at Tildanga UP near the river Sibsha said that if destructive fishing could be stopped, the rivers, canals and beel would be full of fish again.

2.3. Drinking Water

After cyclone Aila, scarcity of drinking water increased due to salinity. In some areas of the polder 31 installation of deep tube-well is not successful as fresh water layer is 1200 feet or even deeper. Besides, many ponds have been destroyed due to seepage of salt water from the gher and during AILA the ponds were over-flown and the salt water could not be drained out. Local people have shallow tube wells installed for irrigation as well as domestic use but the STW water is salty.

UP Chair Pankhali said that there was no allocation for installation new drinking water tube well in Dacope Upazilas in 2011-12. Shallow tube wells are suitable in limited area of Pankhali UP including the villages Moukhali, Pankhali, Hoglabunia and Katabunia in the north part of the polder. In other villages STW water has arsenic problem. But arsenic free area has salinity problem. It was informed that water of nine out of 10 STW at Maukhali discharge salty water. There only one DTW in the premise of Moukhali School and people from 4 kms distance come to this tube well to collect drinking water and for carrying rickshaw vans are used, it costs Tk. 20 per big bottle or about Tk. 0.50 per liter. NGO World Vision has provided water tank to store rain water and some rich families have own tanks.

3. PHYSICAL CHARACTERISTICS OF THE POLDER

3.1. Condition of the embankment

Condition of the embankment is poor in most part of the polder for several reasons. The reasons are riverbank erosion, absence of maintenance and unlawful cuts and pipe inlets. The respondents said that the height and width of the embankment reduced substantially, some have said that compared to 1960s, width reduced to about one half. So, the embankment cannot take pressure of high tides and upstream flows in the monsoon, fortnightly cycles of stronger tides and tidal surges caused by the cyclone like AILA. In several locations of both UPs, the embankment had to be realigned for the main embankment eroded to river. The main embankment constructed in the 1960s had 60 feet bottom width but now bottom width reduced to 30-40 feet (a former president of WMA). As a result the embankment during the AILA collapsed in such weak sections.

The FGD respondents at village Moukhali, Pankhali UP said that the gap between the top of the embankment and the plain land on the river side is decreasing gradually and therefore the rise of water level over-flow and cause breaches of embankment. The same group said that the strength of the embankment reduced due to lack of proper repair and maintenance. Hence the embankment is at risk. One respondent, Wahab (Ohab is wrong spelling) of Moukhali said that when the embankment was strong and rivers not silted, water pressure was low, so was erosion. In those days the community could repair small breaches, which is not possible now. LCS woman Kishori of Pankhali UP embankment breaks more often beside the sluice gate. The reasons are poor condition of structure for lack of maintenance, leakages loosen soil and when water pressure increase, the embankment breaks. Another LCS woman blamed opening of Farakka gate in the monsoon for the damage of embankment which is correct but not a direct cause. Another LCS woman of Pankhali said that old embankment is under threat of riverbank erosion hence a new ring embankment will be constructed in the area by the BWDB.



FGD Respondents at village Khona said that polder cuts and pipe inlets of the shrimp gher caused damage to embankment during the AILA in 2009. BWDB was blamed for giving permission or overlooking (as they are bribed!). This group specifically said that the embankment width is reduced to one half of 1960s.

FGD participants at Mozamnagar, Tildanga UP said that the embankment was damaged by river erosion and in AILA. After repair, this is in good condition now. WMA participants of Tildanga UP said that 15 Kms of the embankment was damaged during AILA and it was repaired by the WMA (block committee and polder committee) with the contributions of the gher owners. FGD participants at village Mosamari, said that the riverbed is rising and embankment height low.



Embankment under repair by BWDB

A woman household head of Nissankhali, Tildanga UP said river erosion (actually tide) makes some damage to embankment every year at Kaminibasia. Respondent's daughter, with other poor women works to repair embankment.

3.2. Condition of sluice gates

Sluice Gates

Generally, the condition of sluice gates is reasonably good in Tildanga UP than in Pankhali UP because the sluice gates the former area were newly constructed or renovated under the Fourth Fisheries Project in 2005 while Pankhali UP did not receive such support and maintenance were carried out under normal O&M programme of the BWDB with inadequate funding.

FGD respondents at village Mosamari, Tidanga UP said that the gate structures are OK but the wooden shutter broken. Also, the FGD participants at Mozamagar, UP Tildanga said that the gates are in good condition as they were newly constructed (13 gates) and repaired or renovated (3 old gates of 1960s and three third fisheries gates). WMA participants at follow up discussion over cell phone said that twelve of the 13 FFP gates are in good condition as they are newly constructed. Only four of the seven TFP gates are damaged and blocked. This means that most of the BWDB gates, particularly those newly constructed or renovated by the FFP are in good condition.



Some informants said that, in Tildanga UP, about one half of all gates, including private gates are in good condition. The gates in poor condition must be private gates including pipe inlets. The IWM map however shows that 33 out of 45 gates in Tildanga UP are in good condition. This means that of the 12 gates in poor condition four are old TFP gates and one is a FFP gate. The remaining seven gates in poor condition must be private gates.

FGD participants at village Mosamari, Tilganga UP said they have two in proximity both are active but the wooden shutters broken. They demanded iron shutter but the FFP provided wooden shutter (considering the capacity of the community to replace when broken but denying community suggestions). Regarding silt deposition near the structure, the BWDB SO said that it happens because of design fault and the private owners do not follow design while gates constructed.

FGD participants at Moukhali said that the gate located at Bottola is good but the embankment near the gate is at risk. Some participants in the same group said that another gate located at Moukhali is at risk along with the embankment.

As for the reason FGD participants at village Khona of the same UP said that unlawful cuts in the embankment were made by the gher owners and the BWDB local staff overlooked it allegedly for bribe. They remarked that if the WAPDA (meaning BWDB) worked properly, embankment

strength could be maintained and in that case damage caused by AILA would be less. This group added that, in the past in the past (12 to 15 years ago) embankment was repaired regularly. Every year embankment was elevated one or one and half feet to compensate for top soil removed by rain or otherwise. So, the needed height was maintained. This type of maintenance is stopped.



Embankment getting eroded for poor condition of gate Timber and ropes good local resource to prevent further damage

It is generally said that most gates are broken or damaged for lack of maintenance and these are silted and closed. Chairman, Pankhali UP gave specific example that:

- gate number 10 (Omar gate) is in good condition
- gate number 78 on Duaniar khal at Moukhali is broken and closed
- gate number 9 at Chalna is broken
- gate number 12 at Khalisakhali is closed and silted although re-excavated a year ago
- gate 6 on Mora Bhodra now closed but has a plan to be opened
- gate 79 on Dasbamoner khal closed

Unauthorized cuts, pipe inlets

Two conflicting information came regarding unauthorized cuts. One was from the community by UP Member Tildanga and the other from Upazila Agriculture Officer. The UP member said that plenty of cuts and pipe inlets were located in South Tildanga (Kaminibasias) but all pipes removed and cuts closed by mud filling after AILA. The UAO however made insipid remark that there are many illegal pipes set by influential people and he mentioned name of a top politician of the country allowing such pipe inlets and establishment of shrimp gher without where such pipes are seen in large numbers and what measures taken to remove them particularly after AILA.

UP Chairman Pankhali said that there are pipe inlets at Pankhali, Khona, Hoglabunia, Moukhali, Laxmikhola and Baroikhali villages of the UP. In his view, pipes are found in large number in Tildanga rather than in Pankhali UP which is true as Tildanga has more gher. The problem is less acute now than before AIA possibly because of the movement of the pani committee as well as of administrative action.

The Chairman added that the BWDB has given notice to remove unauthorized pipes and better maintain the (authorized) private gates. He informed that bring pipe by hiding (at night and also set pipes at night, hence setting remains weak and soil not compacted). This makes polder vulnerable. There are cases against some people under the article 15 and 75 (b) for cutting embankment and setting pipe. Besides cuts and pipes, people now use STW for bagda farming

although say that they cultivate fresh water fish and golda. It is interesting, while lots of information came about polder cuts and pipes; the SO BWDB said that “there is no illegal pipes”.

3.3. Condition of Canals

It is generally said that most canals are silted and closed because of damaged structures, siltation and lease or recording of khal as private property. Chairman, Pankhali UP gave some example of the condition of canals. The examples include:

- Thakrun bari khal – silted & closed
- Khalisakhali khal – silted & closed
- Dashbamoner khal – silted & closed
- Maukhali khal – silted & closed
- Dublir khal – silted & closed
- Haldiakhali khal – silted
- Sharokkata khal – silted

SO, BWDB reported that the following canals are silted in the two UPs

- Chanla khal, Pankhali
- Katakhal khal, Pankhali
- Loxmikhola khal, Pankhali
- Satgoria khal, Pankhali
- Bhadra khal, Pankhali
- Nissankhal khal, Tildanga
- Kaminibasaria khal, Tildanga
- Gorkhali khal, Tildanga



Whole canal blocked for fishing

UP Member of Tildanga also gave several examples of canal condition. These include:

- Kamumari, closed/ gate broken
- Charkhali, closed/ gate broken
- Kochabari, closed/ gate broken
- Mosamari, closed/ gate broken
- Borachora, silted
- Banstola. silted

Canal Lease

Canal lease is a common problem in both UP causing private control of the public property. In Pankhali UP all canals are recorded as private property and this is learnt to have happened from the British period when zamindar of the area gave control of the canals to private individuals. Their successors are now occupying the canals. The UP Chairman said that the canals are shown open as public easement (in the SA record) but actually their use right is sold by the record holders and the canals closed by mud filling. This has been the main cause of water logging in the monsoon and it blocks path for irrigation. The UP Chairman, Pankhali said that government has a plan to open Madarbunia, Moukhali, Gorla and Brinal khal.



Canal close in Pankhali UP and houses built on canal

It was also learnt that earlier lease was given for 15 years but now lease is given for 99 years. To get lease, name of poor and landless are used in the application. Before that the canals are officially reported as silted up plain land suitable for lease. But actually the canals are still flowing and particularly with re-excavation the canals can play important to reduce drainage and irrigation problems.

In Tildanga UP Gorkhali canal (which was a river before construction embankment) was claimed to be private property of an influential person now it is reported that he got lease of the canal for 99 years. Botbunia, Nissankhali and Tatkhal khal leased to fake/non local fishers society who subleased to others. Kakrabunia khal leased to mosque committee which is however open and mosque committee gets some rent from local fishers. Upper part of Batbunia khal and Kakrabunia khal has been permanently leased to the “landless” or to adjoining land owners.

3.4. Main water-related problems

In all four general respondent FGDs, common problem highlighted is water-logging. The stated reason is siltation and closing of canals. Scarcity of drinking water was identified as one of the top three problems in two of the four general FGDs (Moukhali and Khona of Pankhali). This problem is caused by absence of fresh water at shallow aquifer and therefore installation of STW is not successful and DTW is too expensive. In the past, the villages had big reserve ponds for drinking water but now gher captured all and for scarcity of land reserve ponds are not maintained privately while there is no public effort to excavate and maintain such ponds.



Children fetching water from kms away

Riverbank erosion was identified as one of the top three problems (Moukhali of Pankhali and Mozamnagar of Tildanga). This problem is acute at near Kaminibasias of Tildana UP since it is located in the bend of river Shibsas and Dhaki. Scarcity of water for irrigation was identified as one of the three top problems by two FGD groups (Mosamari of Tildaga and Khona of Pankhali). Interestingly, salinity was mentioned as one of the three top problems in one FGD (Mosamari of Tildanga). Actually polder 31 is a moderate saline area where salinity affects crop production only in the dry season from March April to May June). Although the village Mosamari has shrimp farming in this season, farmers interested in HYV boro find no fresh water for irrigation as the canal water is salty.

Main Problems highlighted in the KII

- All seven individual KII respondents identified water logging and siltation as one of the three top problems.
- Five of the seven individual KII respondents identified riverbank erosion as one of the three main problems.
- Four Individual KII respondents identified drinking water scarcity as one of the three main problems.
- Salinity and scarcity of water for irrigation was identified by 3 and 2 respondents as one of the three top problems.
- The local government and WMA leaders identified recording khas khal in private name or leasing khas khal to influential people as a main problem. They also indicated drinking water scarcity, scarcity of water for irrigation, and increasing salinity as main problems.

Combining the FGD and KII responses, it is evident that water-logging caused by siltation or closing of canals is the most severe problem followed by scarcity of drinking water. While the former is main concern of the landowners and farmers, the latter is the concern of the poor and women. The third problem is riverbank erosion and the fourth and fifth problems are scarcity of fresh water for irrigation and salinity.

Finally, the UP Chair Pankhali and UP members identified recording of canals as private property and leasing of canals as major problem. This problem causes other problems like water logging as well as scarcity of fresh water for irrigation. This also constrains re-excavation of canals which could address three problems- drainage, irrigation and storage of fresh water for the dry season, both for irrigation and drinking (by filtration facility).

4. BWDB: ADDRESSING WATER INFRASTRUCTURE PROBLEMS

4.1. BWDB: Pre-project

The polder was constructed long ago in the 1960s and after that BWDB maintained the polder. When constructed, the design was made based on the need of that time- preventing entry of salt water to protect crops- mainly aman paddy. In the course of time, aquaculture became main activity and bagda shrimp became main crop. Bagda farming required entry of brackish water in the polder. It required construction of more sluice gates for both flushing and drainage. To serve this need, the Third Fisheries Project and the second half of 1990s followed by the Fourth Fisheries Project in 2005 constructed more sluice gates, repaired damaged sections of the embankment and re-excavation of several canals in Tildanga UP. The Pankhali UP was outside of the TFP and the FFP.



Gateman's house built in late 1960s

Before implementing the TFP NGO CARITAS was engaged by the executing agencies, the BWDB and the Department of Fisheries to facilitate formation of Block and Polder Committees, carry out community consultation and assist participation of local stakeholder in the implementation process. The community consultation was however weak and the block committees and polder committees organized simply to satisfy donor conditionality. The result was poor selection of sites influence by the elite, poor quality of works and all structures were damaged within a few years. The broken structures have to be closed and main purpose of the project, improved water management could not be achieved.

Form the above learning of the TFP, the FFP incorporated a more comprehensive community consultation process. NGOs having strong base in the concerned the concerned polder was contracted for reorganizing the block and polder committees, the implementing agencies were reoriented to enhance community participation and own the process rather than doing it half heartedly. For this purpose, strong community management unit was established in the project headquarters in Dhaka and in the field level partner NGOs worked full time with the community.

Designing of each project intervention had to be agreed in writing by the concerned Block Committee and the Polder Committee. The Polder Committee approved priority of the interventions proposed by the Block Committees. In addition, the Block and Polder Committees designated members to regularly monitor progress of implementation and quality of works. The Block and Polder Committees included representatives from all social strata and occupation groups. Specifically, each Block Committee and Polder Committee included landless, women, fisher, farmer as well as land owners, teachers, UP Members and UP Chairman. So, the committees were inclusive and the partner NGO assisted ensuring participation of all categories of members. Meetings of the Block Committees and Polder Committee held regularly and it was closely monitored from the project level community management unit.

As a result of all these, the community was in a strong position not just to give opinion or influence but actually decided the design, location and monitored quality of works. They were in a position to stop work of the contractor if quality was lower and reschedule work depending on timing of rain, tide cycle, crop season etc. The result was better quality of works and prevention of elite capture. The success is now seen after six years of project closing that the WMA (polder committee) and the 13 Block Committees still functional and most gates (except two eroded to river) are working, despite devastating AILA and pro and anti shrimp conflicts.

The above description is substantiated by the following statements of the FGD and KII participants:

- The Fourth Fisheries Project established a polder committee comprising representatives of 13 village level Block Committees.
- One NGO was engaged to facilitate formation of the WMO.
- Within the FFP life time ended in 2005, it was registered as a Water Management Cooperative Association to operate in the FFP area, Tildanga UP.
- The main function of the WMA was to liaise with the BWDB, DOF, UP and NGO. Discuss problems, resolve conflicts and arrange minor repair.
- The partner NGO and the Department of Fisheries both told us in meetings about the good effects water management.
- In the For FFP, all classes of people were included into the water management committee by meeting & discussion. Chairman, member, owner of big Gher are also included to the committee.
- The committee was well organized and the project assisted by the funding of World Bank
- Committee members deposited monthly Tk. 10 as savings.
- Everybody of this area benefited. The FFP changed our living condition. We can provide our children's to Dhaka & Khulna.

4.2. BWDB: During Project

BWDB constructed the embankment with four sluice gated in Tildanga and similar number of gates in Pankhali UP 1960s. During that time the contractors constructed the embankment and structures under the supervision of the BWDB. Community participation was not incorporated in the project design in those days. During the TFP, the BWDB constructed seven structures in Tildanga UP and to it community participation was involved but superficially. During the FFP 13 new structures were constructed and three TFP structures renovated and this work incorporated community participation more seriously. In Pankhali UP no new project was implemented but the embankment and structures maintained under regular O&M programme of the BWDB.

A number of statements of the FGD and KII participants are noted below:

- The contractors engaged by the BWDB execute the works based on tender and specifications
- The FFP implemented works in cooperation with the community
- Presently the BWDB do not take people's opinion
- Presently, the government people misuse (power) and (neglect) duties.
- Besides constructing and repairing structures and embankment, the FFP in Tildanga UP re-excavated several canals like Batbunia khal, Kolatala khal, Gorkhali khal.
- Many improvements achieved in this area by fish and shrimp farming
- All class of people consulted during the FFP taking views like where the embankment to repair, where the structures be located, which gates are broken and deserve priority to renovate, which khal needs to be re-excavation etc.

In Pankhali UP, no new project was implemented but considerable amount of work was implemented under rehabilitation programme of AILA affected infrastructure. SO of BWDB told Pankhali UP Chairman that in last fiscal year (2010-2011) Tk. 680 million was spent to repair AILA affected infrastructure in Dacope and there is budget of Tk. 500 million. But the BWDB is working haphazardly without proper plan.

In the past the BWDB paid compensation for any land taken for infrastructure construction but now no compensation is paid. This affects quality of construction as substitute dyke has to be constructed on land voluntarily (under pressure of local administration, UP and local politicians) and dykes are narrower than needed.

4.3. BWDB: Post-project

As an institution, BWDB is responsible for all work in the polder including repair, operation and maintenance but effectively they have very little real involvement in the improvement and O&M of polder. As reported by the participants in Panlkali UP including its Chairman; the UP keeps BWDB informed of any problem in the polder, but often without any result. In the case of Tildanga, the WMA keeps the BWDB informed but without any project or special allocation, the BWDB has too little resources to respond adequately.

The participants remarked that the SO of BWDB visits occasionally but can do little. Also, the BWDB has little involvement in operating sluice gates. Since BWDB is unable to construct new gates but the shrimp gher owners demand new gates, the BWDB allows construction of private gate on condition that design has to be approved by the BWDB and such design followed while the gate constructed. Respondents in Tildanga UP said, if such design has to be followed, cost of construction will be Tk. 50 lac for one gate which is too high for private gher owner. So, that is not followed.

Some respondents said that when private gates were constructed, BWDB did not put any pressure to get an approved design (possibly it was overlooked) but now pressure is created (possibly, after AILA, BWDB is more serious about design).

In Tildanga UP WMA was registered under the cooperatives law in 2005 and after that election was held to fill up the position of 6 executives. In the initial polder committee of 21 members approved by the BWDB and the Department of Fisheries, the landless, fisher and women had representatives. But in the six members EC, formed after closing the project, there was no landless and woman as "they were not elected". Therefore, the landless and women lost their influence in the EC and gradually became inactive. However, they are still members in the general body.

Chairman of Pankhali UP informed that there nothing like a WMA and WMG in Pankhali but they have gate committee formed with the instruction of the BWDB. The committee is not registered as in Tildanga UP. The Chairman felt that the gate committee should have better legal status and institutionalized. The Chairman stated that the SO visits polder if there is any problem and informed by the UP. The UP tries to solve the problems by discussion with him.

5. LABOUR CONTRACTING SOCIETIES

Two women LCS groups were met during the study, one in Pankhali UP and another in Tildanga UP. Salient features of the discussion are described below.

5.1. Formation and work with the WMA

The LCS group met at Pankhali comprised nine women workers. Seven of the nine belonged to landless households and the remaining two owned one acre to 1.50 acres land. In Tildanga UP five of the seven women LCS workers met belonged to landless households and other two owned below half acre land. Both groups work with LGED under RREMP and the workers were selected by lottery from a list of potential women landless labour proposed by the UP. None of the 16 LCS members are involved in any water management association or group.



The LCS members are selected for 3 years. One third of the nine members of each group retire replaced by new ones. Wage paid by the LGED is Tk. 120/day for 8 hours work compared to wage rate for agricultural work of Tk. 75 for 5 hours.

5.2. LCS livelihood

Although the LCS members are employed for full three years, they do work in other sectors. Besides LCS work, the women LCS members are fully engaged in household chores and do other work like sewing and other members of the household work as agricultural labour, shrimp farm labour and some keep themselves busy in own agriculture and aquaculture. A number of LCS workers have small aquaculture pond producing bagda, golda and fish and the group members have enhanced vegetables cultivation in the homestead land. In Tildanga, most people work within village as the area has both paddy and shrimp farming. In Pankhali, landless labour go for work far away from the village, even in other districts like Sylhet in the extreme northeast of the country. From Pankhali, men go for paddy harvest and women accompany to work as cook in the worker groups.

LCS workers in Tildanga said that they improved economically, standard of living improved and they can afford enrolling children to school. Further, they said that their food security improved. The LCS respondents in Pankhali said that their standard of living did not improve much. It may have happened so because of low income from agriculture in Pankhali for shrinkage of shrimp farming.

It was observed that some LCS members held relief mentality. Despite being LCS worker and having regular income from this source, some approached the UP Chairman for relief which was denied as limited relief materials were distributed among the extreme poor who had no secure income source.

The LCS members in Tildanga did not receive any training but those of Pankhali UP received training from the NGO World Vision on sanitation. Besides training the World Vision provided pipe inlets for small-scale aquaculture and BRAC provided livestock loan.

6. MAINTENANCE OF EMBANKMENTS, CANALS AND SLUICE GATES

6.1. Maintenance by BWDB

Maintenance of Polder 31 in both Tildanga and Pankhali UP is the responsibility of the BWDB the polder belongs to them. The BWDB has a special wing called Operation and Maintenance of the polders and in each district there is an O&M office headed by Executive Engineer. But the maintenance activity remains weak as reported by the respondents and observed by the field team.

The WMA members met at village that the BWDB is not maintaining the embankment while BWDB is doing some repair work to maintain road connectivity. The same group of respondents informed that the BWDB re-excavated several canals like Batbunia khal, Kolatala khal and Gorkhali khal under the FFP and under the same project the gates and embankment were repaired . Thereafter both maintenance and re-excavation work weakened.

The WMA respondents at Moukhali said that the BWDB gates very old. The gates were repaired several times, particularly the shutters were changed but not of the same type of the original ones. This affected strength of the structures. As a result the structures are cannot drain in and drain out water regularly. To do with incompetent contractors the gates are not so strong now.

This statement is somehow misleading. There was clear information that the old BWDB structures are of high standard but this information is different. The fact is that, the old BWDB gates were designed only to drain. But after the start of shrimp farming the gates started flushing in of sea water. For this reason the structures damaged, particularly the shutters broke and embankment became weaker near the gates. What should have been done is keeping the old structures unchanged and new flushing and drainage structures built. This was constrained not only by budget allocation but more importantly by land for new link canals new structure sites.

It was stated by the WMA participants that backlog maintenance and major repair work was done under the FFP in 2005. The FGD participants at village Mosamari, Tildanga that maintenance by the WMG can be better than by contractor. This group said that in case of any damage to polder, the BWDB engineers inspect, make cost estimate (and executes maintenance when fund is available). The research team observed some earthwork on the embankment during the study in Mozamnagar, Tildanga UP .

FGD participants at village Khona, Pankhali said that maintenance is the job of BWDB but no real maintenance work is done. They remarked that if the polder was maintained, AILA damage could be much lower.

6.2. Maintenance by Union Parishad

Union Parishad helped finding land for constructing sluice gate and realigning embankment when some section of the embankment breaks or become vulnerable. In the assessment of KII participants the UP knows the area, the people and local problems and this strength must be utilized for development.

Some participants saw UP chairman as an institution having vast knowledge of the local problems and holds authority to resolve them (UP Member, Tildanga). The UP is largely involved in “repair work” and often spends from own resource and tries to get fund from the government (UNO). The UP cooperates with the BWDB to repair embankment and sometimes allocate fund from UP budget for repair. It is currently low, only about Tk. 20-50 thousand but

this is an indication that the UP can do better if they can get more resources. Therefore the participants desired empowerment of the UP.

UP Member Pankhali remarked that UP has strong role in mobilizing people for the repair work. In his view, the BWDB repairs the embankment but LGED makes brick paved roads using the embankment and for that purpose they raise embankment height where such pavement is provided. In his assessment, UP has limited role in maintenance but its fund must be increased so that UP role can be enhanced.

FGD participants at village Mosamari, Tildanga UP that the UP keeps BWDB informed where the embankment is damaged, which khal need re-excavation and which gate to repair. But BWDB often fails to respond and the UP do some work like re-excavation of canals using the allocation of Food for Works or 40 days employment programme. The BWDB says that their responsibility regarding canals is one 200 feet river side and 200 feet village side. Rest of the canal is whether flowing or silted is not their responsibility. But they did re-excavate canals with the funding of FFP. The participants desired stronger role of UP to re-excavate canals. UP gave responsibility to concerned members to deal polder related work in respective area.

FGD participants at village Mozamnagar, Tildanga UP said that the UP holds meeting if there is any problem in polder water management and in such meeting the SO is invited to attend. Besides this type of coordinating role, the UP re-excavates canals. The WMA participants at Tildanga said that the UP and NGO work together to re-excavate canals. Fund comes from NGO and the UP utilizes allocation of 40 days employment fund. In Pankhali UP the UP re-excavated pond to retain drinking water and utilized allocation of the 40-days employment support program for such work.

6.3. Maintenance by WMA

FGD participants at village Mosamari, Tildanga said the WMA informs SO of BWDB if there is any damage to embankment or sluice gates. The SO comes and meets the concerned Block Committee. In case minor repair, the Block Committee or Block Committee (WMG) repairs and bears the cost. Major repair is the responsibility of the BWDB and such repair is always delayed for allocation of fund. WMA/BC also re-excavates canals and maintains embankment and gate with minor repair, said the FGD participants at Mozamnagar (Kaminibasias), Tildanga UP.

In Pankhali UP, there is no registered WMA. Each gate however has a gate committee formed by the UP with the instruction of the BWDB. The UP Chair acts as the President of the Gate Committee if a Ward Member is designated the role of President, the Chairman acts as the advisor to the committee. The gate committee is more involved in operation of the gates rather than maintenance. However, the Union Parishad plays strong role in repair of gate and embankment and re-excavation of canals.

6.4. Maintenance by gher owners and landowners

In Tildanga UP, the gher owners are involved in maintenance or repair as the main stakeholder group in the WMA and WMG. In the case of BWDB gates (including FFP and TFP gates), the landowners and gher owners contribute money for repair work or re-excavation when it becomes essential and in the case of private gates the gher owner bears sole responsibility as benefits of repair or loss due to damage accrue to him directly.

In Pankhali UP the gher owners and landowners are not much involved in the repair of gate as the gates have been closed by the pani committee. Here, the UP is more active in the repair work and re-excavation of canals.

6.5. Emergency response

Respondents in both UP said that they repaired vulnerable part of the embankment during AILA, Sidr and in other natural disasters. There was announcement from the mosque in loud speaker and people from all class, men & women, rich & poor took part in mud filling. The UP Chairman took leadership role and respected people like him joined the work with the common people. This is the tradition and thus emergency situation is faced. Poor people like the LCS labour expect payment or some sort of benefits when government or NGO allocates fund for the repair work. They expect that they are given food support and employment support when such opportunities come. The landowners and gher owners do not expect such relief type support but expects that forthcoming project will benefit their land and the current response will save their crops.

LCS group at Pankhali said, "Loud speaker announcement was made from mosque when embankment was broken during disaster. At that time everybody went together. Men, women, and elite persons everybody worked together. At that time, we felt it as our personal work. Chairman and Member came and provided us dry food like *Chira-flattened rice*, *Muri- Fried rice*. Later, they also provided us money. This is how people work together in emergency situation.

In Kaminibasias village of Tildanga local people voluntarily repaired the embankment. The Block committee and UP had organized people. No GoB funding was available and NGOs provided relief materials and drinking water after AILA. Men and women worked together. UP and Block Committee dry food (chira) and water chira.

At village Moukhali, Pankhali UP, the embankment was damage by AILA. Local people repaired it instantly by voluntary work. Local people came even before the UP approached them. But government help to repair came two years after AILA. BWDB was requested to repair but before they respond the AILA damaged it and people repaired although not very strongly. Local response can be so prompt that they repaired damaged part of the embankment in one night when Sidr was about to hit. The Imam of the mosque assembled people together by loud speaker announcement during the calamity to participate in embankment repairing. The MP provided relief (rice) and the UP Chairman was able get financial allocation from the Upazila. Several NGOs like BRAC, Proddipan and Shushilan distributed relief materials including food and clothes.

In Tildanga UP also the members and chairman announced by loud speaker inviting people to repair the embankment. Men came to repair the embankment and women were taking care of household. Repair was done instantly. Later on the UP provided money to repair it properly. The NGOs also for provided money for the repair work. They increased the height of the embankment by putting earth on it.

At village Khona of Pankhali UP, embankment was damaged a year ago. UP member Sahabuddin Mollah organized people to repair the embankment. He announce at night by mike of mosque. In Kaminibasias of Tildanga, local people repaired damaged sections of about 15 kms embankment. All worked while the Block Committees and the UP had leading role.

Chairman, Pankhali UP said that he was in one cloth from dawn to dusk to repair the embankment during AILA. Local people worked whole day to complete it. The shutter of Thakrunbari sluice gate was damage. People tied it so that it is not fully displaced. If that happened large area of polder 31 would be flooded like nearby Kamarkhola and Sutarkhal UP of the same Upazila.

6.6. Institutional responsibilities in maintenance

6.6.1. Accessible local institutions

In polder 31 the institutions involved in water management are BWDB, Union Parishad, WMA & WMG established by the Fourth Fisheries Project (in Tildanga UP) and the Gate Committee (Pankhali UP). In Tildanga UP the respondents approach the FFP created WMA & WMGs and the Union Parishad Chairman and members. For drainage or irrigation need in Tildanga UP, farmers approach the WMA/WMG and if any conflict arises the farmers “try to solve” ourselves (meaning the farmers and the WMA/WMG) or seek help of UP Member or Chairman.

In Pankhali UP, the gate committee and the UP Member/ Chairman are approached for help. In both UP, the BWDB SO appeared next to UP and WMA/WMG/Gate Committee. Interestingly, respondents seem to not seeking help of the Upazilila or district administration for such assistance because they find UP and WMA/WMG or Gate Committee very close.

In Tildanga UP, the WMA was formed in 2001-05 under with the support of the FFP and in full cooperation with the BWDB and the Department of Fisheries. The organization comprised a Polder Committee and 13 Block Committees. Each BC and the PC initially had 20-22 members which included representatives of the landless, women, fishers, shrimp farmers, paddy farmers, landowners, teachers, UP Members and UP Chairman. Before closing of the project in 2005 the Polder Committee (renamed Water Management Association) was registered under Cooperatives law to work in the whole Tildanga UP along with 13 Block Committees or WMGs. Until 2006 the 13 BCs and the PC comprised members selected by the community members in open meeting and in 2006 the EC members including President, Secretary and Treasurer were elected.

When formed, the 13 BC and the PC had around 20 to 22 members each and it increased to 3,000 in 2005 about the end of FFP. Each member held minimum two shares of Tk 50 each and deposited monthly savings of Tk. 10. In 2005, the committee was solvent with liquid asset of over Tk. 300,000.

The activity of the WMA and WMGs weakened but they are still functional. They are operating about 18 gated in Tildanga UP and occasionally repairing the gates, embankment and have re-excavated canals. They are doing so to continue integrated paddy and shrimp farming, paddy in one season and shrimp with fish in another season.

In Pankhali UP, the gate committee and the UP together are taking care of repair and some re-excavation of canals minimally but not much of maintenance. Since the NGO supported Pani Committee has closed most gates and canals, the shrimp farming by taking in of salt water is discontinued. But the shrimp farmers in limited area have continued mixed farming of bagda, golda and fish by ground water extraction using Shallow Tube Well. This practice is likely to expand in the near future as paddy farming is far less profitable economically.

6.6.2 NGOs

Several NGOs and MFIs including BRAC, ASA, Shushilan, Prodipan, Rupantar, Addin, AESOD, Nijera Kori, BELA, World vision, Adams, Ashroy, Heed Banglades, DSK , Grameen Bank, HEED Bangladesh are active in polder 31.

NGO Nijera Kori, Prodipan, Rupantal, AESOD and BELA are actively involved in anti shrimp movement while ASA and Grameen Bank are active mainly in micro-finance while others including BRAC and Shushilan are engaged in micro-finance as well as various local level development and disaster mitigation programme. BRAC is active also in the water supply and sanitation.

Table – 11 : Institutional responsibilities or roles played by various actors in maintenance, Polder 31

Tasks	Who does	Whose mandate	Comment
Minor maintenance	WMA/WMG in Tildanga Gate Committee in Pankhali UP in both	WMA/ WMG in Tildanga Gate Committee in Pankhali	Not really maintenance. What is done by the UP/WMA/WMG is minor repair work and re-excavation
Major maintenance	BWDB	BWDB	Response inadequate: Implementation delayed, quality unsatisfactory, low allocation of fund. No regular maintenance
Emergency maintenance	UP/ NGO/ Gher owner/ Land owner,	UP/ WMA/ Gate Committee	Begins by voluntary work. Government support. Govt/ NGO support comes later.
Excavation of canals	UP/WMA/ BWDB	BWDB	BWDB denies regular excavation but executes it only if there is project fund such as under FFP

6.7. Participation and Gender

6.7.1. Discourse on participation

To the respondents participation meant involving people, that all classes of people are included in the committee, the concerned government agencies value opinion of local people, that the participation is voluntary and inclusive. The respondents also said that people of all class and leaders like MP, Chairman and elite, government officers work together.

Benefit of participation was seen as it removes possibility of any conflicts. It was specifically said that, if there is participation there is no social conflict. Everybody's interest is served or at least all had opportunity to give opinion and decision taken considering all opinion.

There was some difference in opinion. It was argued that the elite people should be invited to participate rather than all or the poor in particular. The elite should be invited because they are more capable to participate. The poor can be involved to work voluntarily while the elite people can contribute money as well as materials. The poor can also get employment such as in the LCS but not to be involved in decision making.

The SO of BWDB saw participation as “good” but “people are motivated by self interest”. He felt that the Government should empower them (officers) and general people should help the BWDB so that the power elite cannot take all benefits.

6.7.2. The reality in participation

The statements of the respondents in the FGD and KII revealed that the participation is not inclusive and real. There was a tendency that the government agencies value opinion of the elite and UP Chairman, member etc. and not of the common people. It can be acceptable that for practical reasons, the government agencies seek opinion of the peoples’ representatives or ask them to attend meeting with suitable persons from the locality. But the respondents felt that the Chairman and Members consult their “own people” and not the “common people”. This remains a threat to enhancing participation of the common people.

In the case of WMA and WMG (also the gate committee), the landowners and gher owners are dominant force and not the landless or women. In the Fourth Fisheries Project, the Block and Polder Committees had good representation of landless, women and fishers. This is forgotten by now as there no monitoring from the DoF or BWDB in this regard. Also, the registration authority, the cooperatives department do not see it as good evaluation criteria for annual audit. Their audit is mainly financial and record keeping about holding of AGM etc.

It was also remarked that participation is found on paper indicating false reporting. It was also said that common people lack access to the relevant government agencies and that the government agencies do not disseminate information to common people which is a constraint for the common people to effectively participate.

A woman household head of Tildanga UP said that she has doubt whether any woman can participate in the WMA. This is supported by the belief of the UP Member Tildanga that “common people are not interested to take responsibility”. The gher owners and the landowners find interest and participate.

UP Member of Pankhali said that the UP is involved in water management and that the Chairman does not work alone (in the gate committee). With him, the “elite people” participate.

All these taken together give clear indication of the elitism in whatever committees are there working on water management. The common people, particularly the poor, landless and women are considered to be not interested and not capable to participate, not only by the government agency officers but also by the peoples’ representatives like the UP members.

6.7.3. Gender

Women outnumbered men in the polder with sex ratio (M/F*100) 96.5. However, in the Upazila as a whole, sex ratio balanced. Literacy rate in the polder 58.3, about 5% higher than the literacy of the country but female literacy rate was only 1% higher in the polder than in the country as a whole. Male literacy in the polder was 66% indicating wide gap between male and female literacy. This is a very clear indication of higher gender imbalance in the polder compared to the country as a whole. This also means that the women in polder 31 are socially staying behind the average women of the country. A number of statements of the FGD and KII participants detailed below provides example of the subordinate status of women in polder 31.

The FGD participants at village Mosamari, Tildanga said that in each Block Committee there is a woman member who attends meeting and give opinion. It is not understood how number of women members has come down to one from three or four or one third (as said by former president of the polder committee) in the FFP time. This could be for most women members became inactive after FFP and women members not enrolling now for elite domination.

FGD participants at Moukhali, Pankhali UP said that women members are included in all committees of the UP (officially/ on paper) but even the concerned women members do not in which committee her name is included. It seems that these are kept in file for record keeping and if some high official visit, the committee files are shown.

There is no woman in the executive committee of the WMA (Tildanga). But during the FFP good number of women (3 or more) included in the polder committee. Although number of EC member is less, there should have been reserve seat for woman. Otherwise women are unlikely to be elected in the EC. This needs amendment of the bylaws of the WMA with the approval of the District Cooperatives Officer.

Although there is no woman in the EC, women are still there in the general committee and according to the WMA respondents, they can give opinion in the general body. If such views are accepted and recorded in the resolution, it becomes binding on the EC to follow. Still, there is opportunity for the WMA to value women's opinion concerning water management.

There is wage discrimination by sex. Woman household head in Tildanga UP said that daily wage rate of woman was Tk. 100 against Tk. 200 for men. Working hour and type of in which the stated wage rate applied for men and women were not stated and asked.

It seems that the society still holds the old notion that women must work inside of the house and men work outside. This was the idea of a shrimp farmer in Tildanga UP.

7. OPERATION OF SLUICE GATES

7.1. Operation through WMA

BWDB does not operate gates directly and it is not possible for them since there is no gateman in the polder deployed by the BWDB. Long ago, BWDB had a gateman at each gate and there was a gateman's house. Now, the BWDB has taken a policy of not recruiting any gateman and to assign responsibility of operation the gate to the community level organizations, the gate committee in the case of Pankhali UP and the WMA in the case of Tildanga UP. This happens so because the Tildanga UP has a WMA formed during the FFP along with 13 Block Committees who function like polder level WMA and local (Block) level WMG. Each WMG has usually one gate and some have two gates under their management (In total 18 gates for 13 BC). The WMA has a role of inter block coordination and oversight. In addition, the WMA liaise with the UP, BWDB and higher levels.

In Pankhali UP there is no WMA established under any project. In this area, each gate has a gate committee headed by concerned UM member or the UP Chairman. Other members are local elites.

FGD participants in Tildanga and Pankhali UP respectively said that the Block Committee and the Gate Committee is responsible to operate the gates. Since there is no gateman from the BWDB one half of the FGD groups in Tildanga and Pankhali UPs said that the concerned gate committee or the block committee has engaged gateman privately. Some were confused to say that the SO BWDB hired the gateman but actually the block or gate committee hired. In other half of the FGDs it was said that they do not have any gateman and the local farmers operate the gate voluntarily. In the case of hired gateman, the committee pays either in cash and the money comes from the sale of fishing right in the canal attached to the (Pankhali UP) or giving the gateman fishing right instead of cash payment. In the case of voluntary operators, it is quite likely that they too enjoy fishing right in the adjoining canal. In any case, fishing right pays for the cost of gate operation by voluntary or hired gatemens plus minor repair. If extra cost needed the beneficiary gher owners/ landowners subscribe.

The decision regarding when to open and close and for how long etc comes from the gate committee or Block Committee (collective decision) or from the key person in the committee (The UP Chairman, Member or Block Committee President or Secretary). The gateman opens or close based on the decision given by the authority noted here. It was said that the decision maker consults local farmers but in practice it is limited to large gher owners or elite, even if consulted.

In Pankhali UP and Northeast part of Tildanga the gates are closed in winter (January when salinity starts increasing) and are kept closed until June when salinity starts decreasing. In monsoon (July) gates are opened and remain open until Dec. This is good for paddy cultivation. In most part of Tildanga (south and west) gates are opened in February to June/July during fortnightly strong tides for flushing and drainage, 5-7 days every fortnight. The gates are kept open from July to December. This system is good for one season shrimp (Feb-July) and one season paddy (Aug-Dec). This statement is however generalized based on the pattern of information which can vary and that is decided by the gate committee or block committee.

The UP Chairman Pankhali said that opening and closing gate is difficult because pulling a shutter manually requires up to 50 persons pulling rope. It can be simpler if each shutter has a wheel that one person can handle like a steering of a car. For the difficulty of operation gates are opened or closed infrequently. The result is silt deposit blocking the gate.

7.2. Operation by UP

The UP is not directly involved in gate operation. But the UP has strong role in both gate committee and WMA. UP involvement is higher in the case of Gate Committee in Pankhali UP as the UP representative is the head of the gate committee. In this UP the UP chairman assign responsibility of each gate to specific UP member. In Tildanga UP, the Block Committees and the WMA are deciding factor in which the UP has advisory and oversight role.

7.3. Operation of Private Gates

The list prepared by the IWM shows 24 private gates and seven pipes located in polder 31. Two thirds of the gates and 4 of the 7 pipes are reported to be in good condition. However, all pipes and 22 of the 24 private gates are said be active. All pipes and one half of the private gates are located in Tildanga UP.

It was learnt from the respondents that the private gates are not operated by the gate committee or the WMA/WMG as there is no committee for such gates. These are operated privately by individual gher owner or at most a group of beneficiary gher owners. So is the case of pipes which are managed privately.

The problem of private gates and pipes is that they are of low standard and constructed without following BWDB design. Hence the embankment adjoining such gates is more vulnerable and such areas were damaged by AILA.

It was said that the SO of BWDB and the UP have control on the private gates and pipes. If they wish they can stop construction of private gates. And, if the BWDB wish, they can force private gate maker to follow design and operate them following instructions. It is however difficult to control setting of pipes as this is done at night and most pipes are so small that they are not seen easily. The WMA and gate committee must be vigilant on it and affected people like paddy farmers must be encouraged to complain to the UP and the BWDB so that corrective measures can be taken.

7.4. How gate operation takes place

Table 12 below provides a description of gate operation in polder 31

Table 12: Operation of sluice gates in Polder 31

Type of Gate	Formal authority as stated by respondent	Effective control	Gateman	Gateman's pay/ Cost & how paid
BWDB/FFP gates, Tildanga	WMG (Block Committee)	Gher owners	Hired by the BC or voluntarily by the farmers	Fishing right in the canal
BWDB gates, Pankhali	UP/ Gate committee headed by UP member or Chairman	Gher owner	Hired by gate committee	Cash remuneration and fishing
Private gate	Beel Committee	Gher owners	Private	Cash paid by gher owners

8. CONFLICTS

8.1. Conflicts regarding paddy and shrimp farming

FGD participants at village Mosamari, Tildanga said that everybody cultivates same crop (aman paddy followed by mixed farming of shrimp and fish). So, there is no conflict. This group also said that the musclemen cannot influence now and we have consensus that shrimp is produced in two

mouza in the west and south and shrimp is not produced in one mouza in the northeast. So, there is no conflict, said Dilip of Mosamari. FGD participants of village Kaminibasaria also said that there is no conflict as shrimp and paddy cultivated in two different season. This statement is however incorrect as the same group said in response to other question that BELA filed cases against farmers of this village.

Salt water prevention movement (pani committee) stopped bagda farming in village Tildanga and part of Batia ghata. In other villages of Tildanga UP (in the south and west) bagda farming by lifting salt water from the rivers continued. Reason is that land is less suitable for crop farming, has many sluice gates and canals to take salt water from the river and shrimp is more profitable than paddy farming.

A woman household head of village Nissankhali, Tildanga said that the landowners prefer shrimp farming and the landless is against it as excess salt water of shrimp farms flood their homestead land (affecting production of vegetables, fruits and livestock rearing) and internal road. She has also mentioned that the landless could fish in the canal but this opportunity is lost because of shrimp farming and private control of the public canals.

8.2. Conflict regarding high and low land and connectivity to canals and gates

Individual gher owners make own gher dyke and so many gher dykes obstruct natural drainage path from high land to low land then canal and finally to the river. Those having gher or crop land near the canal (if not closed) can drain or take in water. But those not linked to the canal are waterlogged and that affect productivity of both paddy and shrimp and fish. It happens that, if there is good relation between farmers, drainage of water from one gher to other and through it to the river or canal is allowed. But usually what happens is that the gher with access to canal blocks other land to force them leasing out and then has upper hand to get lease at low rent.

UP Member, Tildanga said that when the FFP re-excavated Botbunia khal in 2005, some landowners entered water to make shrimp gher and others wanted to drain out salt water earlier to plant paddy. Without excavation of this canal, owners of low land would continue shrimp farming and owners of high land would cultivate paddy. The canal was re-excavated with good intention but different interest groups turned into conflicts from simple management problem to use the canal optimally for better interest of various stakeholder groups. Here is an opportunity to see how efficient management and equitable distribution can minimize conflict.

8.3. Pro-and anti shrimp movement: Gher owners vs. Pani Committee

Pro and anti shrimp conflict has worsened so much that it is no longer resolved in the WMA or UP level. It has gone to the extent of expensive litigation to the district court and even to the High Court for getting bail. An accused shrimp farmer spent Tk. 25,000 for litigation in a matter of days, one was imprisoned for two months and returned on bail from the High Court and another one is absconding. These are few examples came from the interview but there are many other cases.

Mohanonda Babu who was president of polder committee during the FFP and had leading role to construct and renovate about 18 gates, each resolution of the Block and older Polcer Committee signed by him is now anti shrimp activist and next president of Polder Committee (now registered WMA), Himangsu Babu who was elected president and still holding the position has many shrimp gher controlling over 1000 bigha gher area is pro-shrimp activist. Many other local leaders like Mr. Himangsu have large shrimp gher. Several NGOs like BELA, Nijera Kori, AOESD, Proddipan and Rupantor patronizes anti shrimp pani committee movement while Shrim Farmers Association opposes it. The arguments of the pani committee is that entry of salt water to the polder increases

salinity, affects environment, reduces production of paddy and other crops, reduces livelihoods opportunity in fishing and livestock rearing and fruits and vegetables production. Also the shrimp farmers make “unlawful” cuts of embankment and pipe inlets that cause damage to embankment. Such damage cause disaster during natural calamities like cyclone AILA and therefore non-shrimp farmers are angry on the shrimp farmers.

The argument of the shrimp farmers is that paddy yield is low in their area (south Tildanga), only profitable economic activity is shrimp farming, bagda shrimp is produced after harvesting aman paddy hence paddy area does not decrease much but yield is reduced and that is more than compensated by shrimp and fish, many people get employment in shrimp gher and business, services and transport related to shrimp farming. The shrimp have also argued that children of Tildanga who are now higher educated, the parents could afford it because of shrimp farming. Interestingly, the Tildanga UP, which is more remote and isolated has higher literacy (60%) than Pankhali (56.5%) which closer to Upazila town and the whole Upazila (56%). Male literacy in Tildanga is 69.1%, quite high in Bangladesh standard. Also female literacy is higher in Tildanga 51.3% compared to the Upazila 49.1 percent.

UP Member of Tildanga said that when the polder was open and there was no shrimp farming, all canals were open too, there was no conflict like today. Now there is two groups, pro and anti shrimp (pani committee and shrimp farmers). The shrimp farmers want to take in salt water (February to June when salinity remains high and good for shrimp farming), non-shrimp farmers (now patronized by the pani committee and several NGOs) want to stop entry of salt water. The latter group has now stronger legal support as the High Court issued rule for not entering salt water inside of the polder forcibly.

Paddy farmer Shushanto of Tildanga UP filed a case against Gher owner Nittaranjan Kobiraj of the same UP for taking in salt water to the gher that has reportedly damaged crops and fish of Shushanto. Before filing the case it is learnt that Shushanto repeatedly requested Nittaranjan to stop taking in of salt water. As Nittaranja did not listen, Shushanto filed a case. Police came to the village and Nittaranjan is now absconding. It is also said that Nittaranjan already drained out water.

A different story came from a shrimp farmer of village Kaminibasias of Tildanga UP. He vsaid that the pani committee created trouble and shrimp farmers could not take water in to the gher in time and in adequate quantity. In his three bigha gher he earned Tk. 50,000 in one season but last year his income declined to Tk. 30,000. He argued that 90-95% landowners in south Tildanga are interested in shrimp farming in one season and paddy farming in another season. But, few anti-shrimp activists are creating trouble. He suggested that shrimp and non-shrimp area should be demarcated in consultation with farmers.

The anti shrimp movement gained momentum after two events. One is natural disaster, AILA affecting the polder. AILA damage was higher because of polder cuts, pipe inlets, poorly constructed private gates, poorly maintained public gates and embankment. For the polder cuts, private gates and pipe inlets, the shrimp farmers were largely responsible and all anger of affected people fell on the shrimp farmers. This increased non-shrimp farmers support to pani committee. Another event was legal, the High Court Issued instruction to stop “forcible” entry of salt water into the polder area. This verdict came in view of a petition made by the NGO BELA and Nijera Kori. After this, pani committee movement closed most of the canals except the ones in the west and south part of the polder along the rivers Dhaki and Shibsha limiting shrimp farming in one side of the polder. In the whole of Pankhalki and part of Tildanga pani committee movement was very strong and the closed all canals in Pankhali and some in Tildanga. Then, there has been increase of litigation concerning this conflict.

FGD participants of village Kaminibasias, Tildanga UP said that “BELA is biased. They tended to file cases against the people of Kaminibasias and Gorkhali and not against those taking salt water in

other areas. The reason could be that BELA receive more complaints against farmers of these villages as shrimp farming has high concentration here and non-shrimp farmers of the adjoining area (village Tildanga) are affected by seepage of water from this area.

It was remarked that the present anti shrimp activists were shrimp farmers a year ago and they are few in number. The polder committee president of FFP was pro shrimp activist when he was president but joined anti shrimp movement when he could establish linkage with anti shrimp NGOs. Being a lawyer in profession, his income should have increased with the movement. But the FFP gate that he could locate front of his house is still used for shrimp farming and his family is still involved in shrimp farming like before. This is true for many others. Some WMA members including a former WMA president said that people of village Tildana is coming back to shrimp farming as paddy farming is not profitable. In Pankhali UP, canals are closed but shrimp farming continued in a limited scale with the use of ground water which is salty and suitable for bagda farming.

UP Chairman of Pankhali said that, as there is conflict between fresh water and saline water, people on the side of fresh inform the SO, BWDB who files a case in the Thana. After getting entry, the case runs under the article 15 and 75 (b) and only High court can bail of this case.

8.4. Control of canals and gates

Many canals in Tildanga UP have been occupied by influential people by taking lease from the government (Example: Mora Bhodra, Gorkhali) and smaller ones merged to adjoining crop land, homestead area and gher. FGD participants at village Mosamari said that everybody, both shrimp farmers and paddy farmers demand re-excavation of canals for improving drainage in particular. Shrimp farmers need it also to take in salt water all need it to keep canals open in the monsoon to take in fresh water and drain out excess water so that both fish and paddy can be produced. So, everybody is in favour of canal excavation and land grabbers oppose it. It was said that wealthy people get lease of canals and they make the canals private property and ultimately grab them. This is the main cause of water logging in the polder.

It was noted earlier that one of the 13 FFP gates is damaged. The design of the gate was perfect, location was a bit risky for possible riverbank erosion. That too was not a main problem as 7 year after construction river erosion has not damaged it. The problem was workmanship. The bottom soil was not well compacted. As a result water leaked in and loosen the soil further. Adjoining area farmers were divided and did not take initiative to fill the holes. The Block Committee could not decide to fill the holes which would cost only a few thousand taka worth a few kg of shrimp. So little repair was not done for the conflict, who should control the gate and the canal. As a result the gate sunk down and is now inactive. Now a diversion dyke has been made to make sure that if the gate collapse some day and the polder breads, the second dyke will prevent flooding.

8.5. Conflict mitigation

FGD participants at Mosamari said that they have resolved the problem by mutual agreement between farmers of different villages with the mediation of the UP Chairman and WMA. It has been agreed that gher owners will take water through Gorkhali and Mozamagar gates while Botbunia gate will remain closed during the salt water season. This effectively means that gher owners in the south and west can produce shrimp while salt water must not enter the northeast part of the polder. This group specified that, as agreed, shrimp can be produced in two mouza (Kaminibasias and Gorkhali and part of Botbunia village) and shrimp cannot be produced in village Tildanga of Tildanga mouza.

A woman household head of Nissankhali, Tildanga said that if problem arises like homestead area or internal roads flooded affected people complain to the UP Chairman and members and they instruct the gher owners to drain out water to some extent so that roads are not submerged.

A woman household head of Pankhali said that the gateman opens or closes the gate as per need of the "people". In her knowledge, if someone wants that the gate should be opened or closed he requests the gateman and the gateman opens or closes by order of the gate committee.

The respondents said that there is a legal binding for the gher owners to keep a drain beside the gher so that other farmers can access the canals for taking and draining water. This was followed in the 1980s when gher owners were of big size and small in number and there was a need for gher registration. Now registration system is gone although the law is still there.

FGD participants of village Kaminibasaria said that, if some farmer constructs private sluice gate without permission (of the BWDB) the gate committee (actually block committee since Kaminibasaria is in FFP area) and UP intervene to solve the problem. If unsolved, the farmer fails to get permission of BWDB, the gate is closed, if needed the UNO is informed and police called.

FGD participants of Kaminibasaria said that the UP Chairman of Tildanga calls monthly meeting to discuss problems regarding water management in the polder. The SO of BWDB is invited and representatives of WMA attend. This is a good initiative but problems are not solved as UP has limited power to fine and can mediate if both parties agree. If one party disagrees then one can go to the court. This is the reason for increased litigation.

9. CONCLUSION

9.1. Study Findings

Location: The polder 31 of BWDB is located in Dacope Upazila of Khulna District, about 40 kms South of Khulna city. It comprises two UPs with an area of about 31.70 sq kms.

River Mora Bhadra (closed by the BWDB embankment and now called Mora Bhodra canal divided the polder in two parts, Pankhali and Tildanga. The polder is crisscrossed by canals. The canals are all closed by the embankment, but 67 sluice gates, regulators and culverts were constructed to regulate water but most of the link canals are silted or closed.

Accessibility: The polder is connected to Khulna city by an Upazila road Road condition is poor bus available from Khulna city to Pankhali Ferry ghat, on the other side of the river. Most internal roads are earthen and a few brick soling roads and bituminous road exists from the ferry ghat to Chalna Bazaar and Dacope Upazila headquarters. Hired motorbike and rickshaw van are usual mode of transport. Road communication is harder during the rainy season. Country boat for passenger transport is not used but engine boat became a frequent transport. Still there is motor launch service to Khulna from Batbunua of Tilkdanga and Chalna Bazaar of Pankhali.

Demographic features: Total population of the polder 31 is 32,576 and average household size is 4.2. Both population density and household size are similar in the two Union Parishads and the Upazila. Females outnumbered males in the polder with sex ratio 96. Muslim Hindu share of the population is 51:49 compared to 90:10 in the whole country. Literacy rate of the polder 31 is 58.3%, where male literacy is 66% and female literacy is 50.9%. The polder area has higher literacy than the country as a whole.

Basic facilities: According to national census 2011 about 37% households in Tildanga and 20% in Pankhali UP have electricity. It is surprising because Tildaga is not connected power grid while Pankhali is connected to grid line. Households with electricity in Tildanga means those having solar panel on roof top and in Pankhali is seems power grid connection only. People in the interior villages, also in Pankhali UP have solar panel. If that were counted, households with electricity in Pankhali would be around 35-40 percent.

History of polder development: One or two hundred years ago polder 31 was part of Sundarbans. Then people cleaned the forest to expand agricultural and started living here. Open water fishing and livestock rearing were other two occupations.

Before constructing the embankment in 1960s local people made a ustomashi bandh (temporary dyke constructed for 8 months by voluntary labour). But the narrow dyke and its low height was good enough to protect robi crops in the dry season. During the monsoon, the dykes got destroyed every year and after monsoon they were rebuilt. Local variety aman paddy was grown in natural condition and yield was low but plenty of fish were available. Crop damage was frequent due to flood and tidal surge.

The former East Pakistan Water and Power Development Authority (WAPDA) now succeeded by the BWDB constructed embankment with limited number of sluice gates in 1960s. The purpose of constructing polder was to prevent flood and tidal surge and thus protect crops. This objective was served, crop yield increased. In the mid 1980s the canals and rivers were silted, water logging became a

problem and export oriented shrimp farming emerged as a new opportunity. From mid 1980s to mid 1990s the economy transformed from rice oriented to shrimp oriented and brackish water entry was needed rather than prevented. Therefore more sluice gates were needed for both flushing and drainage. To serve the changed need, the FFP in late 1990s and FFP in 2005 constructed more sluice gates, repaired old gates and re-excavated some canals in Tildanga UP. Besides structural interventions, the FFP helped establishing WMA and WMGs in Tildanga UP.

Farming system: Dominant farming system in two thirds of Tildanga UP is one season paddy (Aug-Dec) and one season bagda shrimp and fish. In the remaining part of Tildanga and the whole of Pankhali only aman paddy is grown in most area. In about 5-10% area of Pankhali mixed farming of bagda, golda and fish is found and for this purpose ground water is extracted during the dry season (Feb-May) and rain water in June-Nov. Besides aman paddy, HYV boro is cultivated in limited area of Pankhali but in Tildanga HYV boro not yet introduced. Some made experimentation on it.

Fruits and vegetables growing coming up again in Pankhali and non-shrimp part of Tildanga. In the shrimp part of Tildanga affluent households elevated their homestead area and the dykes of homestead pond where fruits and vegetables are grown. For the poor it is difficult to grow fruits and vegetables. Livestock rearing declined but increasing again as people's purchasing power improved (Tildanga UP) and salt water entry stopped (Pankhali UP). Particularly, cow and lamb increased in both UP. In the shrimp area goose are plenty.

Profitability of crop farming and aquaculture: Paddy farming does not appear as a profitable economic activity. Somehow it covers cost but does not yield much profit. Although value of HYV Boro, local aman and HYV aman paddy produced per acre of land is estimated Tk. 27,200, 17,000 and 23,800 respectively net return to sharecropper is as low as Tk. 3,433, 1,100 and 2,000 respectively which is equivalent to only four to 12 days of wage labor's income after paying cost of inputs, tillage, hired labour, rent to landowner (one third to one half of gross production) and imputed value of family labor's wage.

Compared to paddy farming, aquaculture appeared highly profitable. In one season bagda plus fish farmers had sale proceed of Tk. 102,000 per acre of land of which gross profit was Tk. 56,650 and net profit (after deducting all cost as well as imputed value of family labor wage) was Tk. 36,650. From mixed farming of bagda, golda and fish round the year sale proceed per acre of land was Tk. 188,000 of which 93,500 is gross profit and Tk. 53,950.

Condition of the polder: Condition of the embankment is poor in most part of the polder for several reasons. The reasons are riverbank erosion, absence of maintenance and unlawful cuts and pipe inlets. The respondents said that the height and width of the embankment reduced substantially, some have said that compared to 1960s, width reduced to about one half. So, the embankment cannot take pressure of high tides and upstream flows in the monsoon, fortnightly cycles of stronger tides and tidal surges caused by the cyclone like AILA. In several locations of both UPs, the embankment had to be realigned for the main embankment eroded to river. The main embankment constructed in the 1960s had 60 feet bottom width but now bottom width reduced to 40 feet (a former president of WMA). As a result the embankment during the AILA collapsed in such weak sections.

Condition of the sluice gates: Generally, the condition of sluice gates is reasonably good in Tildanga UP than in Pankhali UP because the sluice gates the former area were newly constructed or renovated under the Fourth Fisheries Project in 2005 while Pankhali UP did not receive such support and maintenance were carried out under normal O&M programme of the BWDB with inadequate funding.

Condition of canals: It is generally said that most canals are silted and closed because of damaged structures, siltation and lease or recording of khal as private property. Canal lease is a common problem in both UP causing private control of the public property. In Pankhali UP all canals are recorded as private property, still shown open as public easement in the land survey record of Pakistan period (SA record) but actually their use right is sold by the record holders and the canals closed by mud filling. In Tildanga UP Gorkhali canal is claimed to be private property of an influential person now it is reported that he got lease of the canal for 99 years. Several canals are leased to fake/non local fisheries society who subleased to others. One leased to mosque committee is open for flow of water. However, the mosque committee gets some rent from local fishers. Some other canals on the two sides have been permanently leased to the "landless" or to adjoining land owners.

Water management related problems: Main problems concerning water: Three main problems were noted from each FGD and KII. Most frequently stated problem was water logging, followed by riverbank erosion, scarcity of drinking water, salinity and scarcity of water for irrigation.

BWDB Pre-project activities: The polder was constructed long ago in the 1960s and after that BWDB maintained the polder. Pre-project activities of that time were not discussed in the FGD and KIIs. Thereafter substantial improvement was done of the polder in Tildanga UP under the Third and Fourth Fisheries Project. This was discussed with the participants. Before implementing the TFP, NGO CARITAS was engaged by the executing agencies to facilitate formation of Block and Polder Committees, carry out community consultation and assist participation of local stakeholder in the implementation process. The community consultation was however weak and the block committees and polder committee organized simply to satisfy donor conditionality. The result was poor selection of sites influence by the elite, poor quality of works and all structures were damaged within a few years. The broken structures have to be closed and main purpose of the project, improved water management could not be achieved.

From the above learning of the TFP, the FFP incorporated a more comprehensive community consultation process. NGOs having strong base in the concerned polder were contracted for reorganizing the block and polder committees, the implementing agencies were reoriented to enhance community participation and own the process rather than doing it half heartedly. For this purpose, strong community management unit was established in the project headquarters in Dhaka and in the field level partner NGOs worked full time with the community. Designing of each project intervention had to be agreed in writing by the concerned Block Committee and the Polder Committee. In addition, the Block and Polder Committees designated members to regularly monitor progress of implementation and quality of works.

BWDB during project implementation: BWDB constructed the embankment with four sluice gated in Tildanga and similar number of gates in Pankhali UP 1960s. During that time the contractors constructed the embankment and structures under the supervision of the BWDB. Community participation was not incorporated in the project design in those days. During the TFP, the BWDB constructed seven structures in Tildanga UP and to it community participation was involved but superficially. During the FFP 13 new structures were constructed and three TFP structures renovated and this work incorporated community participation more seriously. In Pankhali UP no new project was implemented but the embankment and structures maintained under regular O&M programme of the BWDB. However, considerable amount of work was implemented under rehabilitation programme of AILA affected infrastructure. SO of BWDB told Pankhali UP Chairman that in last fiscal year (2010-2011) Tk. 680 million was spent to repair AILA affected infrastructure in Dacope and there was another budget of

Tk. 500 million. But the BWDB is working haphazardly without proper plan. In the past the BWDB paid compensation for any land taken for infrastructure construction but now no compensation is paid. This affects quality of construction as substitute dyke has to be constructed on land voluntarily (under pressure of local administration, UP and local politicians) and dykes are narrower than needed.

BWDB post project activities: BWDB is responsible for all work in the polder including repair, operation and maintenance but effectively they have very little real involvement in the improvement and O&M of polder. As reported by the participants in Pankali UP including its Chairman; the UP keeps BWDB informed of any problem in the polder, but often without any result. In the case of Tildanga, the WMA keeps the BWDB informed but without any project or special allocation, the BWDB has too little resources to respond adequately.

LCS: Two LCS groups met in two UP, both belonging to RREMP of the LGED. All 16 LCS members met are women and none member of WMG or gate committee. About 31% of the members belong to households owning 0.25 ton 2.0 acres land and they cultivate crops as well as shrimp and fish besides LCS work. Others are landless and occasionally work as sewer and all are fully involved in household chores. This means that women LCS members work double time, 5 hours as LCS labor and more than that as household worker. Daily wage is Tk. 120. There is no wage discrimination by gender. The LCS group in Tildanga improved economically because the male earners in the household have better work opportunity in both paddy and shrimp farming but the Pankhali ones reported no improvement because the male members are seasonally unemployed. Both groups mentioned scarcity of drinking water as a main problem and both access UP to complain if face any problem.

Operation through BWDB and WMA: BWDB does not operate gates directly and it is not possible for them since there is no gateman in the polder deployed by the BWDB. Long ago, BWDB had a gateman at each gate and there was a gateman's house. Now, the BWDB has taken a policy of not recruiting any gateman and to assign responsibility of operation the gate to the community level organizations, the gate committee in the case of Pankhali UP and the WMA in the case of Tildanga UP. This happens so because the Tildanga UP has a WMA formed during the FFP along with 13 Block Committees who function like polder level WMA and local (Block) level WMG. Each WMG has usually one gate and some have two gates under their management (In total 18 gates for 13 BC). The WMA has a role of inter block coordination and oversight. In addition, the WMA liaise with the UP, BWDB and higher levels.

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Operation of Private Gates: It was learnt from the respondents that the private gates are not operated by the gate committee or the WMA/WMG as there is no committee for such gates. These are operated privately by individual gher owner or at most a group of beneficiary gher owners. So is the case of pipes which are managed privately.

Emergency response: Respondents in both UP said that they repaired vulnerable part of the embankment during AILA, Sidr and in other natural disasters. There was announcement from the mosque in loud speaker and people from all class- men & women, rich & poor took part in mud filling. The UP Chairman took leadership role and respected people like him joined the work with the common people. This is the tradition and thus emergency situation is faced. Poor people like the LCS labour expect payment or some sort of benefits when government or NGO allocates fund for the repair work.

They expect that they are given food support and employment support when such opportunities come. The landowners and gher owners do not expect such relief type support but expects that forthcoming project will benefit their land and the current response will save their crops.

Maintenance: Maintenance of Polder 31 in both Tildanga and Pankhali UP is the responsibility of the BWDB as the polder belongs to them. The BWDB has a special wing called Operation and Maintenance of the polders and in each district there is an O&M office headed by Executive Engineer. But the maintenance activity remains weak as reported by the respondents and observed by the field team. The UP cooperates with the BWDB to repair embankment and sometimes allocate fund from UP budget for repair. It is currently low, only about Tk. 20-50 thousand but this is an indication that the UP can do better if they can get more resources. In Tildanga, UP holds meeting if there is any problem in polder water management and in such meeting the SO is invited to attend. Besides this type of coordinating role, the UP re-excavates canals. In Pankhali, the UP re-excavated pond to retain drinking water and utilized allocation of the 40-days employment support program for such work.

In Tildanga, the WMA keeps BWDB informed of any damage to polder or structure. In case minor repair, the Block Committee (WMG) repairs and bears the cost. Major repair is the responsibility of the BWDB and such repair is always delayed for allocation of fund. The WMA/BC also re-excavates canals to some extent. In Pankhali UP, there is no registered WMA. The gate committee plays this role under the leadership of the UP Chairman.

In Tildanga UP, the gher owners are involved in maintenance or repair as the main stakeholder group in the WMA and WMG. They contribute money for the repair done by WMA or gate committee. In Pankhali UP the gher owners and landowners are not much involved in the repair of gate as the gates have been closed by the pani committee. Here, the UP is more active in the repair work and re-excavation of canals.

Meaning of participation: To most respondents, participation meant involvement, inclusiveness, voluntarism and people's opinion valued by the concerned government agencies. The respondents also said that people of all class and leaders like MP, Chairman and elite, government officers, all should work together. Benefit of participation was seen as it removes possibility of any conflicts. In contrast to this idealist view, there was some difference in opinion. Some argued that the elite people should be invited to participate because they are more capable and for the poor, they should be involved in the LCS and not in WMA. The SO of BWDB saw participation as "good" but "people are motivated by self interest". He felt that the Government should empower the officers and general people should help the BWDB so that the power elite cannot take all benefits.

The reality in participation: The statements of the respondents revealed that the participation is not inclusive and real. There was a tendency that the government agencies value opinion of the elite like UP Chairman, member etc. and not of the common people. The respondents felt that the Chairman and Members consult their "own people" and not the "common people". This remains a threat to enhancing participation of the common people.

In the case of WMA and WMG (also the gate committee), the landowners and gher owners are dominant force and not the landless or women. In the Fourth Fisheries Project, the Block and Polder Committees had good representation of landless, women and fishers. This is forgotten by now as there no monitoring from the DoF or BWDB in this regard. It was also remarked that participation is found on paper. It was also said that common people lack access to the relevant government agencies and that the government agencies do not disseminate information to common people.

Gender: Women outnumbered men in the polder with sex ratio 96.5. Literacy rate in the polder 58.3, is about 5% higher than the literacy of the country but female literacy rate was only 1% higher in the polder than in the country as a whole. Male literacy in the polder was 66% indicating wide gap between

male and female literacy. This is a very clear indication of higher gender imbalance in the polder compared to the country as a whole.

The FGD participants at village Mosamari, Tildanga said that in each Block Committee there is a woman member who attends meeting and give opinion. It is not understood how number of women members has come down to one and whether such token participation can reflect views of the women in the BC while in the FFP period their involvement was higher. Further there is no woman member in the EC.

There is wage discrimination by sex. Woman household head in Tildanga UP said that daily wage rate of woman was Tk. 100 against Tk. 200 for men. Working hour and type of in which the stated wage rate applied for men and women were not stated and asked. But in the LCS work of LGED there was no wage discrimination. It seems that the society still holds the old notion that women must work inside of the house and men work outside. This was the idea of a shrimp farmer in Tildanga UP.

9.2 Main concerns

Most respondent held pessimistic view saying that the national as well as local economy will suffer due to decline of shrimp farming. This view came from participants in Tildanga UP. Many said that the area will sink and road communication will be cut off due to water logging. Some have specified that the whole polder area will go under 2 feet water and embankment height will decrease due to lack of maintenance. Most said that no crops will be produced and water logging will further increase as the canals are closed.

There was just one positive remark from a woman LCS group (Pankhali) who said that since salt water entry stopped, crop production will increase and in a few years time more diversified crops will be produced.

9.3 Suggestions

1. Reconstruct embankment, make it stronger, wider and height increased by 6 feet.
2. Repair the sluice gates properly.
3. Re-excavate all public canals in proper depth.
4. Stop closing of gate and canal by mud filling (done by pani committee activists).
5. The gher dykes obstructing flow of water of blocking the canals must be stopped.
6. The embankment sides should have trees planted and managed by benefit sharing basis.
7. The NGOs should rebuild embankment and paved roads.
8. Keep gates and canals free for public use and manage in the interest of mass people.
9. Farmers should have freedom to produce both paddy and shrimp without any obstruction such as by closing canal or gate.

10. Excavate canal providing linkage to all gher and make gher of proper size combining small plots by mutual agreement (lease, collective gher meaning gono gher).
11. Provide steel shutter in all gates replacing wooden shutter.
12. Improve the technology of pulling and pushing shutter up and down by iron wheel instead of ropes.
13. Excavate new pond or re-excavate old public ponds to store water for drinking. Provide pond sand filter on the bank of such pond so that arsenic free and salinity free fresh water is easily available to all households.
14. Provide plastic tanks to each household to store drinking water by rain water harvest.
15. Provide plastic tank and rain water harvest system in the institutions like mosque and temple, UP office, Land revenue (Tahsil) office and school.
16. Stop constructing and continued use of risky private gates, pipe inlets and pipes. There shall be no gate outside of the management of the WMA/WMG and gate committee.
17. Stop leasing khas khal to any individual or group other than WMA/ gate committee. They must ensure proper management for the optimal benefit to the whole community. There shall be no obstruction like earthen dam, pata or bamboo and net fencing. Only approved types of moving nets and no fixed nets will be allowed for fishing. The WMA/ gate committee endorsed by the concerned government agency will issue seasonal fishing pass for a small fee that will be used for minor repair and re-excavation as agreed in the gate committee/WMA/.WMG.

9.4. Who to take responsibility of water management in the polder

In response to the above question, seven FGD groups in the two UP gave six different answers. Two groups said that the UP should take responsibility because this is the institution easily accessed all people (although some chairman and member may favor own people), one group said NGO should take responsibility and one group said that the WMA/WMG/gate committee should take sole responsibility. Other three groups assigned joint responsibility. One group said that BWDB, UP and NGO should work together for better water management, one group said that BWDB, UP and LGED should have joint responsibility and the last group said that UP and LGED should take responsibility.

This can be seen in another way. Two groups gave sole responsibility to the UP and three other groups gave UP a major role jointly with other institution. One group gave sole responsibility to the NGO and two other groups gave NGO a major role jointly with other institutions. None gave sole responsibility to the BWDB or LGED. Two groups gave BWDB a major role in partnership with NGO, UP and BMDB and one group gave LGED a major role together with UP and BWDB.

This is a very interesting finding that the community level respondents voted for the institution closest to them and elected by them. They have quite good sense that water management in the micro level (a gate or a canal covering one or a few villages) cannot be efficiently handled by the institutions like BWDB or LGED although they may have higher technical capability. It gives a strong signal of designing institutional arrangement for water governance.

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 is defined mainly by water 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).

The BWDB is responsible for its improvement as well as operation and maintenance of this polder.

Local Government Engineering Department (LGED)

LGED is not involved in the maintenance of this polder as it belongs to the BWDB but has some role in repair maintenance as the embankment where they make brick pavement using the embankment as road. Such pavement is provided in the Botbunia and Gorkhali areas of Tildanga UP.

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 polder is under the jurisdiction of two Union Parishads in Dacope Upazila, district Khulna. The UP is not involved in water management in this polder as the BWDB is doing it. In this polder UP involvement however appeared prominently in the discussion as a part of the Gate Committee in Pankhalki UP and in advisory position in the WMA in Tildanga UP. In both areas the UP occasionally supported repair of embankment, re-excavation of canals and in conflict mitigation. 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/MP

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 two UPs there is role for the Upazila of inter Union coordination by the UNO. The role of UNO came-up in the FGD and KII discussions. Their role seemed important to enhance better implementation of projects and enhancing participation of and benefits to the marginalized groups. DC's role came up in the discussion regarding canal lease.

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 Sub Project area the participants did not mention of any assistance received from the DAE. Despite Upazila office inside of the polder the DAE officers have very little interaction in the field level and the farmers may not find interest even to consult them.

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.

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 BRAC and Union Parishad and request for deep tube wells or piped water supply systems to access safe drinking water.

ii) NGOs

The field team got names of 18 NGOs and MFIs working in the polder comprising two Union Parishads where 7,830 households live of maximum 60% could be considered belonging to the target group. So, for about 5000 households to reach 18 NGOs are competing, without overlapping one would find less than 300 clients which can be reached by just one or two field staff. The NGO and MFIs working in the polder include: Grameen Bank, BRAC, ASA, HEED Bangladesh, DSK, Proddipan, Rupantor, Ad-din, AOSED, World Vision, Proshika, Adams, Nijera Kori, Grameen Shokti and BELA.

Several NGOs including BELA, Nijera Kori, AOSED and Rupantor are involved in salt water prevention movement; Grameen Shokti is popularizing solar panels selling them by installment, BRAC supports water supply and Sanitation under WASH project. All except Grameen Shokti and BELA have micro finance activity as the main programme.

iii) Private actors:

Private sector is not active in this polder. However, one large group of companies called Akij Group provided relief materials after AILA.

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 Establishment	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)	Ministry of Water Resources	Effectively up to district level	* Develop and maintain polder infrastructure * Implement national water policy in the field level	* Upazilla 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) Not involved in this polder	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 khasjalmohal management * Leasing out of khas land, khasjalmohal	* 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

Authority/ Organization	Concerned Ministry	Field Presence	Relevant Functions	Constraints	Suggested remedial measures
Upazila Parishad	Ministry of Local Government Rural Development and Cooperatives	Upazila headquarters	<ul style="list-style-type: none"> - Development coordination between UP and across line departments - Law and order - Conflict mitigation - Khas lease 	<ul style="list-style-type: none"> * Bureaucratic and political interference * Upazila Parishad not yet empowered to function independently * Very little local resource mobilization and inadequate grants from the government * Line agencies nor effectively accountable to the Upazila Parishad 	<ul style="list-style-type: none"> * Upazila Parishad to be empowered * Make line agencies accountable to the Upazila Parishad * Enhance opportunities for local resource mobilization and its transparent management * Stop political and bureaucratic interference
Department of Agriculture Extension (DAE)	Ministry of Agriculture	Effectively up to Upazila level. Officially multi village block level below UP	<ul style="list-style-type: none"> * Provide technical advice * Assist distribution of input subsidies, agr loan etc. 	<ul style="list-style-type: none"> * Sub Assistant Agriculture Officer rarely seen in the village/ UP * Low skills of employees * Political interference * Assigned many work by the government which are not related to agriculture sector 	<ul style="list-style-type: none"> * 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 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, * Q control of shrimp and fish * 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 UAO and SAAO must report to Upazilla and UP chair respectively

Authority/ Organization	Concerned Ministry	Field Presence	Relevant Functions	Constraints	Suggested remedial measures
Department of Public Health Engineering (DPHE)	Ministry of Local Government Rural Development and Cooperatives	Up to Upazila level.	<ul style="list-style-type: none"> - Support water supply and sanitation - 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	<p>38 functions</p> <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