03 Social, Physical and Environmental Context

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To provide background and context to the design of the Blue Gold Program, the following

information is provided in this chapter:

- **Environmental context**: using four groupings (ie Khulna, Satkhira, Patuakhali north and Patuakhali south) for the 22 Blue Gold polders, an analysis is provided of the hydrological, biological, bio-ecological, agricultural and environmental characteristics.
- **Social context**: provides information on project demographics, educational status, type of construction and facilities at household level, relative poverty levels and the outreach target population for poverty-focused activities (such as homestead FFSs).
- **Physical context:** purpose of polder infrastructure (safety and water management), vulnerability to threats, and a summary of for each polder of the dates of construction, investments by earlier projects, location, the responsible BWDB Division and Upazila administration, and characteristics of the infrastructure - length of embankment, numbers of structures and length of primary drainage channels or khals.

Briefing Materials



The following materials illustrate concepts, interventions, outcomes and lessons learnt, including through stories from community members.

Slide decks

No slide decks for the current chapter.

Thematic brochures

No thematic brochures for the current chapter

Case studies

No case studies for the current chapter.

Videos

• Farming-as-a-business (Bangla with English subtitles)

Manuals

No manuals for the current chapter.

Flipcharts

No flipcharts for the current chapter.

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Environmental context[edit | edit source]

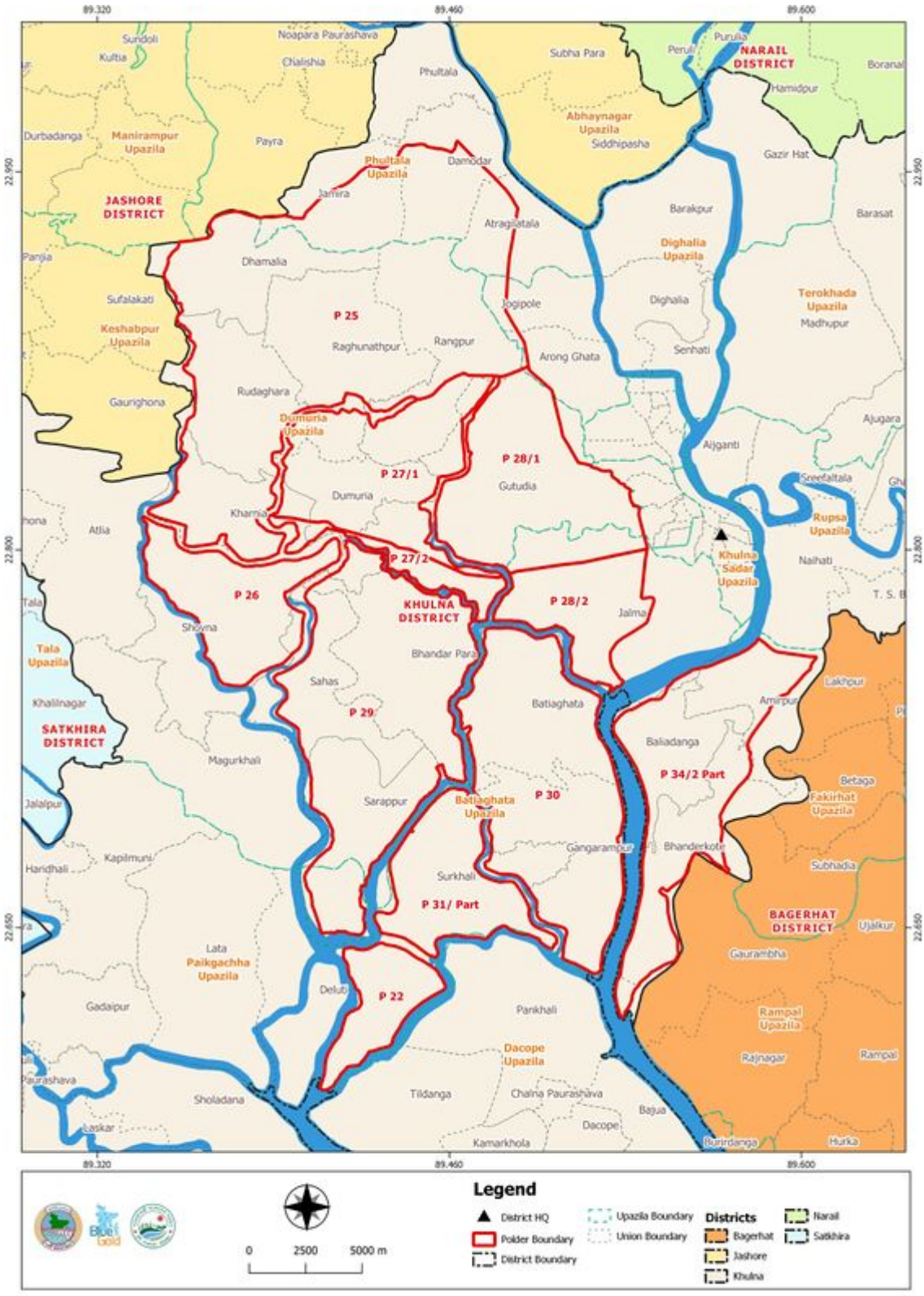
The coastal zone has a complex agroecology, with low-lying lands between huge tidal rivers.

Waterlogging is a problem in large parts of the coastal zone, but especially in the southwest (Satkhira, Jessore, Khulna and Bagerhat). This is caused by the reduction of dry season flow resulting from water abstractions at Farakka barrage on the Ganges just upstream from the border with India. This has contributed to increased salinity and greater sedimentation in the tidal rivers that drain the polders. The construction of polders during the 1960s and 1970s reduced the tidal prism of the rivers by preventing flooding across the tidal plain and contributed to accelerated river siltation. Because of the reduced drainage capacity caused by siltation, these tidal rivers are unable to drain adjacent lands and polders, and this causes the waterlogging. More information on the decision to form coastal polders, together with a review of the water resources projects in the coastal zone - both historical and current is provided in Chapter 4.

The physical and environmental context for all twenty-two Blue Gold polders is provided below, using four groupings (ie Khulna, Satkhira, Patuakhali north and Patuakhali south), and including an analysis of the hydrological, biological, bio-ecological, agricultural and environmental characteristics. The data and information are mostly obtained from Polder Development Plans (PDPs), Environmental Impact Assessments (EIAs) and the Bangladesh Delta Plan 2100 Baseline Study Report on Coastal and Polder Issues.

Khulna[edit | edit source]

Blue Gold includes eleven polders[Notes 1] within the Upazilas of Dumuria, Batiaghata, Fultola and Dighulia, all in Khulna District. The polders are located in the South-West hydrological region of Bangladesh, with BWDB's responsibilities discharged by Khulna-1 and Khulna-2 O&M Divisions from Khulna[Notes 2]. It is surrounded by a network of tidal rivers: Bhairab, Rupsha and Kazibacha river to the east; Teligati, upper Vodra and Gangrail rivers to the west; Hari, Sree Hari and upper Bhairab rivers to the north, and Pashur and Sibsa rivers to the south.



Map of Khulna

The rivers and drainage channels around these eleven polders are fed by tidal flows through Sibsa and Pashur rivers. During the monsoon months, when the sluice gates are opened, freshwater flow takes place both in and out of the polder. The polder situated most southern, P22, is in a straight-line distance of 75 km from the shores of the Bay of Bengal. The distance from buffer radius of the Sundarbans mangrove forest (under Nolian range) ranges from about 28 km for P34/2-part to about 49 km for P25. Due to the distance from the Sundarbans and the nature of rehabilitation works, there are no negative influences on the Sundarbans Ecological Critical Area resulting from Blue Gold interventions.

South-West hydrological region with Ganges Tidal Flood Plain (AEZ-13) zone, Sibsa and Pashur river at the south are the main distributaries are connected with Bay of Bengal

The area encompasses two bio-ecological zones, namely the Ganges Floodplain (which comprises of a smooth landscape of ridges, basins and old channels) and the Saline Tidal Floodplain (which has a low ridge and basin relief, crossed by innumerable tidal rivers and creeks). The greater part of the area in this grouping lies in the Saline Tidal Floodplain, which is characterised by smooth relief and large areas of saline land of varying degrees of salinity.

The eleven polders have a gross area of 60,200 ha of which 49,400 ha is used for agricultural purposes, 10,800 ha for fisheries (with white fish *gher*s of 9,500 ha and shrimp *ghers* of 1,300 ha). The highland in the polders under Dumuria Upazila is around 16% which are mostly used for homestead vegetable, the medium high land is around 44% which is mostly used for rice, vegetable and seasonal white fish farming in monsoon and the low land which is around 40% area is mostly used for fish with one rice crop in the dry months. Around 13% of the area under Dumuria Upazila is prone to salinity. In Batiaghata Upazila, the highland area of around 8% of the agricultural area is mainly used for homestead vegetables, with the medium high land of around 75% used for rice, vegetables and seasonal white fish farming in monsoon, and the low land of around 15% used for fish with one rice crop in the dry months. Around 38% of Batiaghata Upazila is prone to salinity.

The internal road communication facilities are good. In the polders, there are 55% *pucca*, 20% herringbone (brick-made) and 25% *kacha* (earthen) roads. The business communications and market facilities are good within the District and for access to Upazila headquarters. The demand for vegetables in Khulna and adjacent cities is served by Dumuria and Batiaghta Upazilas. The condition of the embankments is reasonable but there are a number of reaches which are especially prone to erosion: in Chandghar and Baroaria (P29); Koria, Bujbunia and Shealidanga (P34/2-part); Barobhuiyan (P31-part); Kismotfultola, Kathamari, Boronpara and Hogalbunia (P30); Kalinagar, Darunmollik, Durgapur, Bigordana and Telikhali (P22); Khornia bazar to Mery Bricks reach (P25); Zialtola (P26) and Kachubunia (P28/2).

The issues that affect the sustainability of agricultural production and fisheries – and thereby the livelihoods of local inhabitants – include:

1. **Salinity intrusion, especially in the dry period.** Such salinity intrusion causes severe scarcity of drinking water sources in particular in Char Charia, Dighalia, Ratankhali, Jaliakhali, Akra, Chandgarh and Sundar Mahal.
2. **Drainage congestion.** Around 40% of the khals inside the polder suffer from severe drainage congestion, mainly caused by: (i) silting of khals which are connected to outfall rivers; (ii) illegal use of the *khals* for fisheries either on lease through the local administration or relying on local influence; and (iii) congestion of *khals* by water hyacinth
3. **Sediment congestion.** During tidal flood flows (i.e. tidal phase during which the tidal current is flowing inland), sediment is deposited in the outfall rivers resulting in congestion and a reduced drainage capacity. This mostly occurs during the dry months when the inflow from rivers is negligible.
4. **Congestion of water hyacinth.** Most of the internal khals, field channels, low current rivers are congested by water hyacinth.

5. **Conversion of agricultural land into settlements** is occurring in peri-urban areas around Khulna city, such as P25, P28/1 and P28/2.

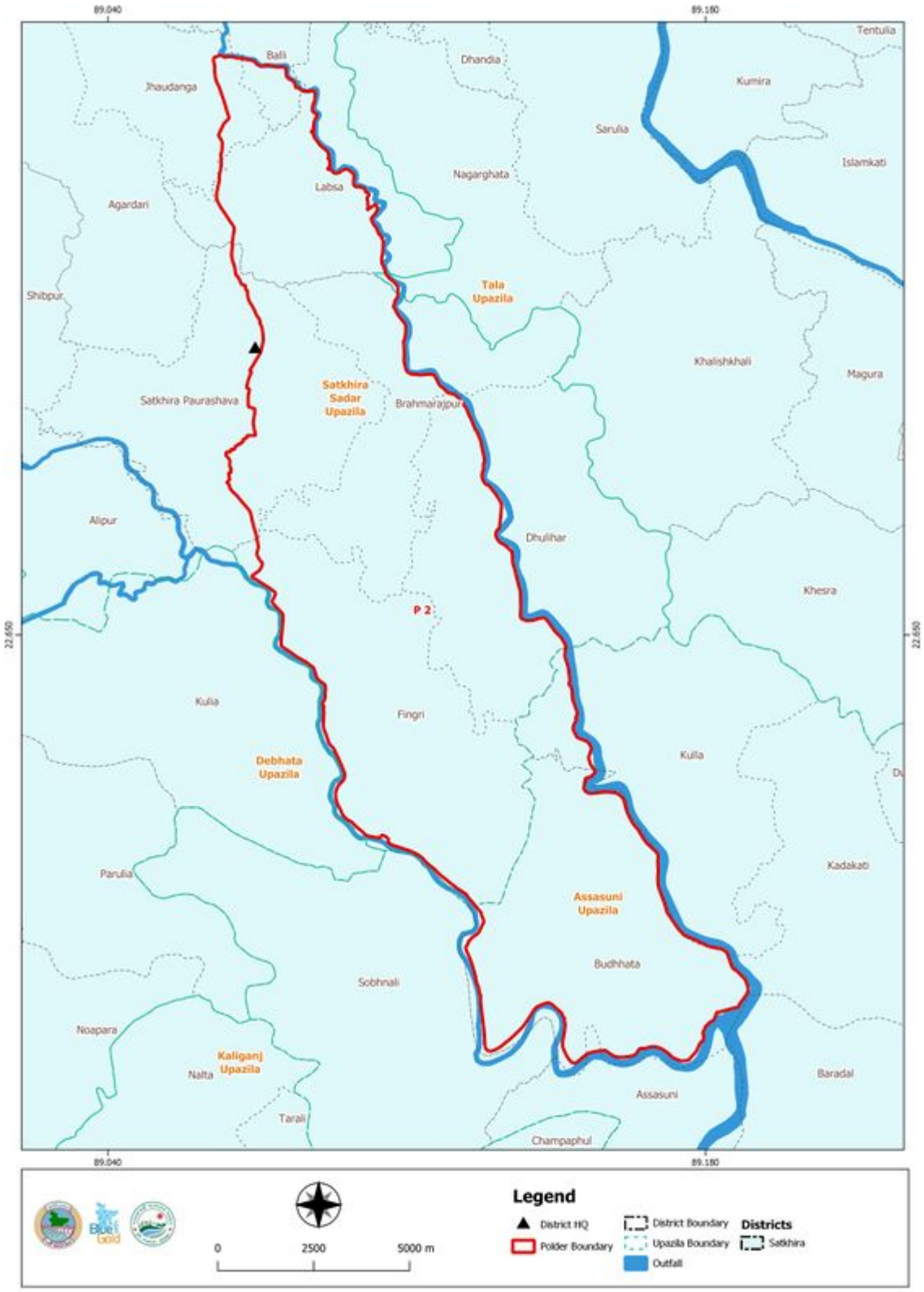
Satkhira[edit | edit source]

Blue Gold targeted one polder in Satkhira District, Polder 2 (P2), which is surrounded by the Betna River on the east and Morichap River on the south-west. The upstream reaches of Betna River are silted, with the result that there is no water flow in the dry season. The Morichap River is now fully silted with almost no drainage capacity, and is being used for rice-*gher* cultivation. The drainage system has been declining since Farakha barrage was commissioned in 1974 but particularly severe effects have been felt by P2 communities in the last 10 to 15 years when the Betna and Morichap river have been significantly silted. Satkhira khal is poorly connected with outfall Morichap river. Therefore some water drains out in Kolikata khal and Tiket khal from Morichap river and finally fall in the Ichamoti river.

South-West hydrological region with High Ganges River Floodplain (AEZ-11) and Ganges Tidal Flood Plain (AEZ-13) zone, Kholpetua and Kanksiali river at the south are the main distributaries are connected with the Bay of Bengal

P2 is around 85 km away from the Bay of Bengal and is affected by tidal influences. The polder is of an elongated north-south orientation. The south-east corner of the polder is located within 12 km of the buffer area of the Sundarbans. The polder is situated in the south-west hydrological regions of the country with BWDB responsibilities being discharged by Satkhira-2 O&M Division, in Satkhira. The area is represented by two agro-ecological zones (AEZs): High Ganges River Floodplain (AEZ-11) and Ganges Tidal Flood Plain (AEZ-13). During high tide, water flows from the Bay of Bengal to the Kabodak river system, which feeds in turn the peripheral Betna and Morichap rivers.

P2 has a gross area of 12,600 ha land, with 11,000 ha used for agricultural, 1,600 ha for fisheries (400 ha for white fish *ghers* and 1,200 ha for shrimp *ghers)*. The highland which is around 10% area, is mostly used for rice and vegetable, the medium land which is around 50% area is mostly used for rice and seasonal white fish farming in monsoon and the low land which is around 40% area is mostly used for fish with one rice crop in the dry months. About 10% area is saline prone, which is likely to expand northward due to the effect of climate change if no adequate mitigation measures are taken.



Map of Satkhira

The internal road communication facilities are good. In the polder there are 60 km pacca road, 25 km herringbone bound (brick made) and 20 km kaacha (earth made) road. The business communication and market facilities are good with the District and Upazila headquarters. The existing condition of the embankment is good with the exception of one erosion vulnerable spot at Chapra area.

The embankment at the north-eastern part has been turned into a rural herringbone road which now allows heavy vehicular movements during all seasons. A huge number of brickfield have been established at north-eastern part (at Benarpota, Machkhola, Shalley and Beradangi village area) along the bank of Betna river which required movement of trucks and heavy vehicle for carrying bricks and materials which previously caused damage to the embankment.

The issues that affect the sustainability of agricultural production and fisheries – and thereby the livelihoods of local inhabitants – are the following: **-**

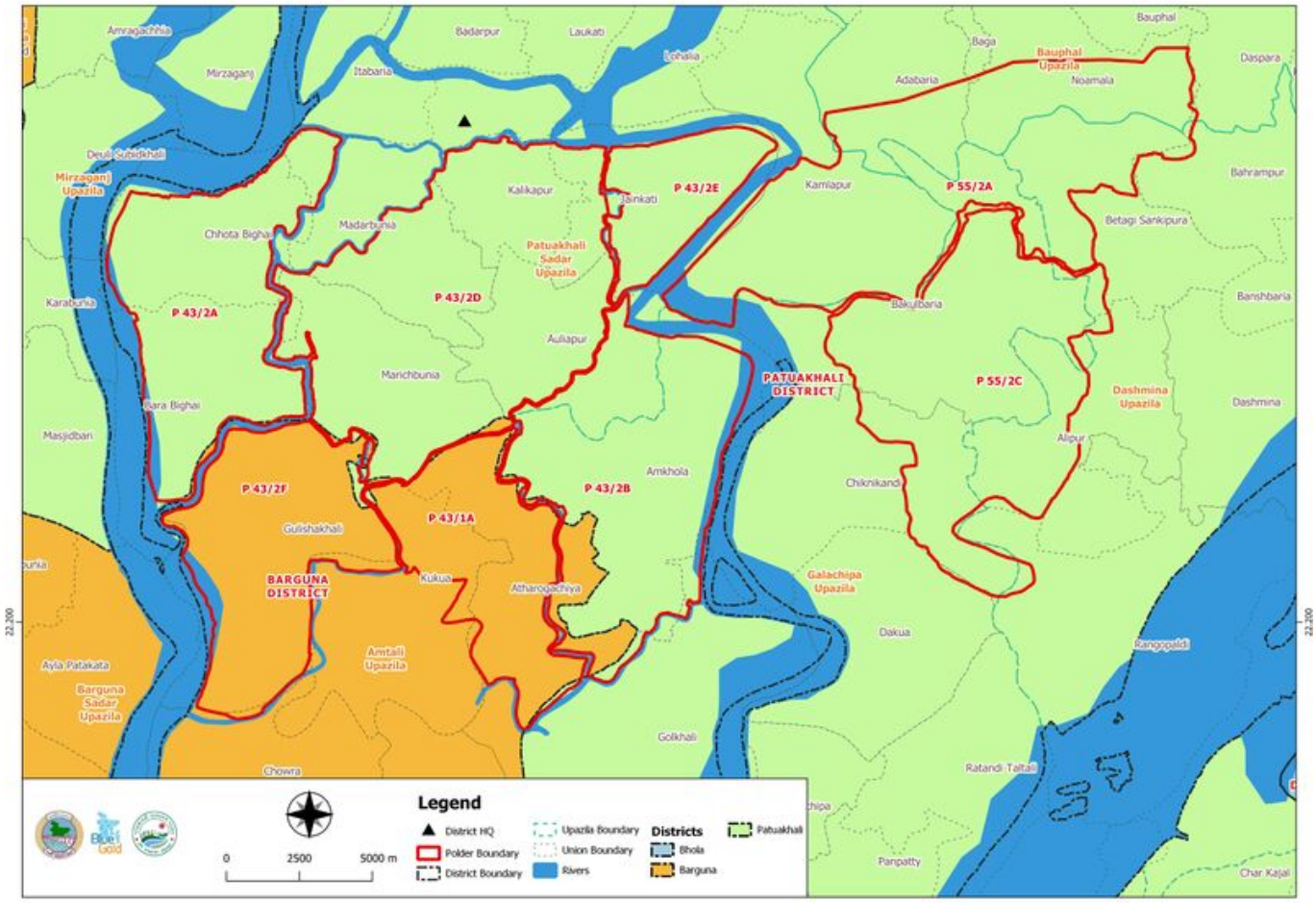
1. **Drainage congestion.** During monsoon and post-monsoon, most of the khals running through the polder area cannot cope with the increased rainfall occurrences, leading to moderate to severe drainage congestion in about 60% of the polder area. The siltation of the Betna and Morichap river is the main reason for such drainage congestion. Water logging at the north and middle and brackish water shrimp farming at the south are causing a problem of unemployment in the area, since labor requirements are reduced as a consequence of a reduction in crop cultivation. This causes migration of local labor to the nearby Khulna and Jashore District.
2. **Sediment congestion.** During the high tide the sediment comes through the outfall rivers with the tidal water and congests the connected canals/river side of the gates. This mainly takes place during the dry months when the upstream flow is low. The sediment congestion contributes to morphological changes (i.e. formation of new lands, river course shifting) and may thus be affect the peripheral rivers and be the cause of other anthropogenic development (i.e. conversion into shrimp farming, settlement etc.).

Patuakhali North (Patuakhali and Barguna)[edit | edit source]

Blue Gold includes eight polders within the Upazilas of Patuakhali Sadar, Galachipa, Dashmina and Bauphal under Patuakhali District[Notes 3] and Amtoli under Barguna District[Notes 4]. The polders are located in the South hydrological zone of the country, with BWDB's responsibilities discharged by the Patuakhali O&M Division, Patuakhali and Barguna O&M Division, Barguna. These polders are surrounded by various tidal rivers: Tetulia river to the east; Pyra river to the west; Lohalia river to the north, and Galachipa and Patua rivers to the south.

South-Central hydrological region at Ganges Tidal Flood Plain (AEZ-13) zone, Rabnabad and Patua river at the south are main distributaries are connected with Bay of Bengal

This region occupies an extensive area of Ganges tidal floodplain (AEZ-13) with the greater part of the region influenced by upstream flows from the Meghna system. Deep, rapidly permeable sandy loams and sandy clay loam soils are dominant in the region. The aerial distance from the coast of the Bay of Bengal ranges from 45 km (from P43/2E) to 30 km (P43/2F). All the peripheral rivers and drainage channels around these eight polders are tidal with inflow from the Bay of Bengal entering the peripheral rivers including Galachipa, Lohalia, Pyra and Tetulia rivers through the Rabnabad and Patua rivers.



Map of Patuakhali North

The eight polders have a gross area of 40,400 ha, of which agricultural land is approximately 33,000 ha. Among the cultivable land single, double and triple cropping is practiced at a scale of 22%, 66% and 12% respectively. The highland in the polders is about 15% while the medium high land is around 75% and low land is 10%. 88% of the populations are engaged in the agriculture sector including farming, agricultural labour, fishing, day labour etc. About 5% of the population is engaged in the salaried service sector, including employees in government and the private sector. The industrial sector employs only 7% of the population implying that industrialization is still underdeveloped. Farmers are mainly owner-operators, preferring to cultivate their own land rather than using sharecropping arrangements.

Salinity levels in these eight polders are low. No surface water salinity exists in the area in monsoon and post monsoon seasons, even though very minor surface water salinity is found along the peripheral rivers i.e. the Payra and the Gulishakhali during dry season. The reason for this low salinity level is the freshwater discharge from the upstream Meghna River system towards the rivers of the South Central hydrological region. The soils of the polder area become very slightly saline in the dry season (Jan-May). According to the DAE, the soil and water salinity gradually increases with dryness from January and reached maximum level in the month of March-April and then decreases due to the onset of the monsoon rainfall.

Rain-fed agriculture is practised during the kharif-I and kharif-II seasons for Lt. Aus, HYV Aman, and Lt. Aman crops; whereas surface water irrigation is provided to around 95% area of watermelon and groundnut crops during Rabi season. Irrigation is not required in some areas for groundnut since only areas of high soil moisture are used, and for watermelon which is grown by the sides of rivers or khals. Water is also required for other rabi season crops (sunflower, sesame, khesari etc.) but no supplementary irrigation is needed for these crops as sufficient soil moisture is available during the

season.

The greatest part of the internal road network is *kacha* (earth made). During monsoon, it is difficult to communicate through the earthen roads inside the polder due to heavy mud formation. The business communication and market facilities is not very good with the District and Upazila headquarters.

The issues that affect sustainability of agricultural production and fisheries – and thereby the livelihoods of local inhabitants – include:

1. **Lack of irrigation facilities** which results in large areas remaining fallow from March to June. About 5 to 10% of agricultural land has been brought under irrigation, apart from P55/2A and P55/2C where irrigation covers 8 to 12% of agricultural land. Some 728 Low Lift Pumps (LLPs) are used for surface water irrigation across the eight polders[Notes 5].
2. **River bank erosion and tidal flooding** include erosion hotspots near Angulkata, Gulishakhali, Dalachara and Naiapara in P43/2F; Balaikati & Sonakhali in P43/2B; Bhajna, Matibhanga, Banshtala, Kazirhat bazar and Kewabunia in P43/2A; Morichbunia in P43/2D and Modhupura, Sutabaria, Ronuabazar and Alipura sluice area in P55/2C.
3. **Congestion of water hyacinth and duck weed.** Due to siltation, many khals only function for part of the year, and become blocked with duck weed and water-hyacinth. Water-hyacinth prevents sun light to penetrate through the water which hampers photosynthesis of other aquatic vegetation. The decomposition of water-hyacinth reduces the water quality and has a negative impact on the fisheries and other aquatic life.

Patuakhali South (Kalapara)[edit | edit source]

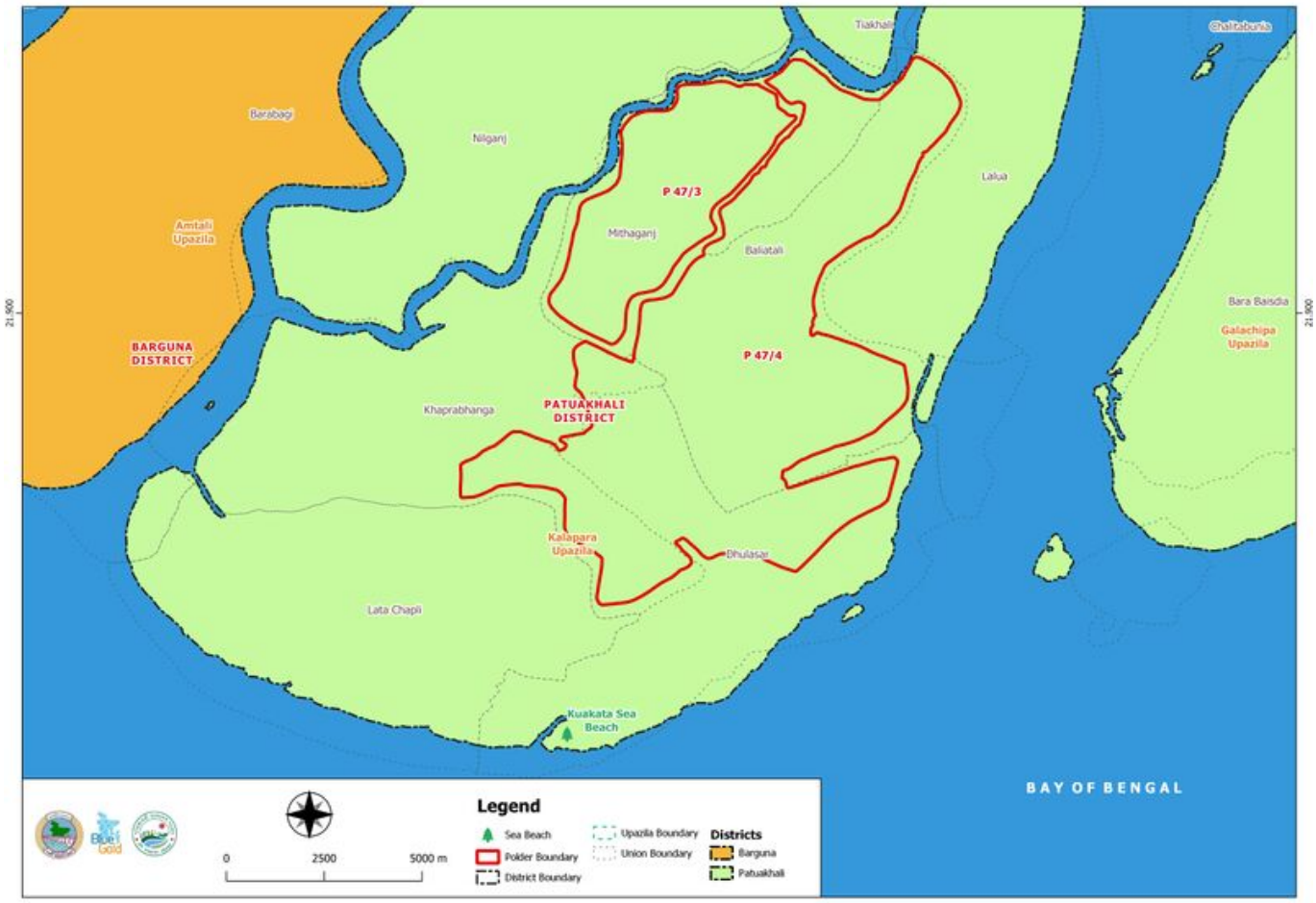
Two polders[Notes 6] in Kalapara Upazila in Patuakhali District are included in the Blue Gold Program. The polders are located in the South region, with BWDB's responsibilities discharged by the Patuakhali Water Development Division based in Kalapara. It is surrounded by Patua and Rabnabad rivers to the east; Andharmanik river to the west; Hauder Bharani river to the north, and connected to the Bay of Bengal at the south through Rabnabad river.

South-Central hydrological region at Ganges Tidal Flood Plain (AEZ-13) zone, Rabnabad and Patua river at the south are main distributaries are connected with Bay of Bengal

This region occupies an extensive area of the Ganges tidal floodplain (AEZ-13) with the largest part of this region of smooth relief with extensive saline areas. Deep, rapidly permeable sandy loams and sandy clay loams are dominant in this region. The aerial distance from the coast of the Bay of Bengal ranges between 3 km (from Mithagonj Union of Polder 47/3) and 2 km (from Dhulasar Union of Polder 47/4). The peripheral and internal rivers and canals are subject to the diurnal tidal cycles. During high tide, water flows from the Bay of Bengal comes in to the peripheral rivers through the Rabnabad and Patua river.

P47/3 and P47/4 are to some extent saline prone areas. There are two erosion affected areas at P47/3, one is located from Tegachia Bazar to Joy Bangla Bazar in the bank of Hauder Bharani khal/river and another one is near Dakshin Charpara bridge and five erosion prone zones at P47/4

which are Banglabazar (near Mithaganj), Katakhali (near Monoshatali village), Paschim Dhulasar School Ghat, Char Dhularsar and Char Baliatali.



Map of Patuakhali South

The polders are about 8,600 ha in size, of which 7,000 ha (82%) is agricultural land. In both polders, the irrigation facilities are poor, in P47/3 approximately 3% and in P47/4 approximate 2% of the land is irrigated, especially for the cultivation boro rice and vegetables in rabi season. Surface water (reserved canal and pond water) is generally used for irrigation. Around 80-90% of the population depend on deep tube-wells as a source of drinking water and the remaining 10% depend on pond water, *kup* (protected dug well) water etc.

The internal road communication facilities are poor. Internal polder roads consist of about 37 km of bituminous roads, 12 km of brick-soled roads and 80 km of earthen roads. The poor business communications and market facilities result in additional costs for farmers to deliver and sell their rice and vegetables to Upazila or District level markets. However, for fish such as *Hilsha* the business communication is good because of a *Hilsha* landing centre in Kalapara, and - after packaging - *Hilsha* can be readily transported to outside markets.

The issues that affect sustainability of agricultural production and fisheries – and therefore, the livelihoods of local inhabitants – are:

1. **Drainage congestion,** which is the major problem in P47/3 and P47/4. It is most severe from mid-July to mid-November because of siltation and man-made causes, including artificial blockages made to serve fisheries interests in the rivers and *khals* and damage to regulators at the outfall of *khals*. In these polders the Tulatola beel, Choto Baliatoli, Pokhiyapara beel, Boga Khalir beel and Charbaliatoli beel under Baliatali Union; Baultali and Tarikatar beel under

Dhulasar Union; Tegachhiar beel under Mithaganj Union and Kortaliar beel under Dalbuganj Union are particularly prone to drainage congestion.

2. **Lack of irrigation facilities.** Irrigation facilities are poor with very small areas in both P47/3 and P47/4 being served by irrigation facilities.

Social context[edit | edit source]

This section describes the social context of the livelihood of coastal Bangladesh. To explore the social contexts and poverty situation of coastal communities, the data of three Districts and its Upazilas under Blue Gold Program areas are included from Bangladesh Bureau of Statistics, 2010-11 (BBS). Besides this, polder level data is included from the Baseline survey-phase I, 2017. It is noteworthy that limited data on polders versus national units. First section of this chapter includes some social indicators like demographic features, educational status, household structure and other facilities of the households (electricity, sanitation and electricity) of three Districts, Upazilas and polders. The next section the chapter includes the poverty data of the three Districts, and Upazilas, land-based household categories in polder level and their income from different sources. At the end this section tried to draw a link between land ownership and incidence of poverty and targeting households for BGP interventions.

Demographic features[edit | edit source]

In term of area and population, Khulna District has the highest number among the three Districts of BGP area and the areas and population of different Upazilas of these three Districts varY significantly. Population densities in Khulna (528/km^2) and Satkhira (520/km^2) are similar, but lower in Patuakhali District (477/km^2). The population density varies significantly among the different Upazilas within the same District. The highest population density is considered as most vulnerable. The population density is more than double in the Upazilas which are near to zila center like Phultala Upazila (1,476/km^2) of Khulna District and Sadar Upazila of Satkhira(1,156/km^2) compared to Paikgacha Upazila (603/ km^2) of Khulna District and Asasuni Upazila (717/ km^2) of Satkhira District. Population growth rate varies among the Districts and Upazila. Some Upazilas have negative growth rate due to migration related to climate change and rapid urbanization. The national average family size is 4.4, this size is not significantly varying among the Districts and Upazila with the highest (4.6) in Patuakhali Sadar and the lowest 4.1 in Paikgacha, Kalapara and Satkhira Sadar.

Table 3.1: Demographic features of Khulna District and its Upazilas

Demographic features (BBS 2011)	Khulna District	Upazilas under Khulna District within BGP areas			
		Batiaghata	Dumuria	Paikgacha	Phultala
Area (sq. km)	4,394	248	454	411	57
Population	2,318,527	171,691	305,675	247,983	83,881
Density per sq. km.	528	691	673	603	1,416
Annual population growth rate (%)	(-)0.25	1.99	0.87	(-)0.1*	0.85
Households (no)	547,347	40,779	71,909	59,873	19,555
Average HH size (no)	4.2	4.2	4.2	4.1	4.3

*Negative growth rate of population due to migration of population to other places

Table 3.2: Demographic features of Patuakhali District and its Upazilas

Demographic features (BBS 2011)	Patuakhali District	Patuakhali District and Upazilas within BGP areas					Barguna
		Bauphal	Dashmina	Galchipa	Kalapara	Patuakhali Sadar	Amtali
Area (sq. km)	3,221	487	352	1,268	492	362	721
Population	1,535,854	304,284	123,388	361,518	237,831	316,462	270,802
Density per sq. km.	477	625	351	285	484	873	720.8
Annual population growth rate (%)	0.49	(-)0.02	0.52	1.05	1.62	(-)0.19	0.41
Households (no)	346,462	67,833	28,490	80,054	57,525	68,813	63,212
Average HH size (persons)	4.4	4.5	4.3	4.5	4.1	4.6	4.3

Table 3.3: Demographic features of Satkhira District and its Upazilas

Demographic features (BBS 2011)	Satkhira District	Upazilas under Satkhira District within BGP areas	
		Assasuni	Satkhira Sadar
Area (sq. km)	3,817	374	398
Population	1,985,959	268,754	460,892
Density per sq. km.	520	717	1,156
Households (no)	469,890	62,037	109,105
Average HH size (no)	4.2	4.3	4.1
Population growth rate (annual) (%)	0.62	0.74	1.15

Table 3.4 below provides information for each polder including:

- Previous project interventions: IPSWAM, KJDRP or WMIP
- Location by District, BWBD Division and Upazila
- Gross and cultivable area (ha)
- Numbers of households per polder and per WMG, with estimates of the population based on the average household size provided by the Bangladesh Bureau of Statistics (BBS).

Table 3.4[Notes 7] Information on Blue Gold Polders

Sl. No.	Polder	Previous History	District	BWDB Division	Upazila	Gross Area (hectare)	Cultivable Area (hectare)	No. of households of local stakeholders	No. of households enrolled in WMGs	People per Polder	Members enrolled in WMGs	No. of WMAs	No. of WMGs	HHs per WMG	HHs per WMA	People per WMG	People per WMA
							Khulna									4.22	
1	22	IPSWAM	Khulna	Khulna O&M-2	Paikgachha	1,630	1,417	2,145	1,684	9,052	2,132	1	12	179	2,145	754	9,052
2	26	none	Khulna	Khulna O&M-1	Dumuria	2,696	2,100	3,962	3,051	16,720	5,072	1	15	264	3,962	1,115	16,720
3	29	IPSWAM	Khulna	Khulna O&M-1	Dumuria, Batiaghata	8,218	6,570	12,232	7,476	51,619	7,896	2	56	218	6,116	922	25,810
4	30	IPSWAM	Khulna	Khulna O&M-2	Batiaghata	6,396	4,048	8,187	4,875	34,549	5,385	1	40	205	8,187	864	34,549
5	31 Part	none	Khulna	Khulna O&M-2	Batiaghata	4,848	4,048	4,196	3,224	17,707	4,584	1	12	350	4,196	1,476	17,707
6	25	KJDRP	Khulna	Khulna O&M-1	Dumuria, Fultala	17,400	14,379	30,323	17,759	127,963	18,292	2	61	497	15,162	2,098	63,982
7	27/1	KJDRP	Khulna	Khulna O&M-1	Dumuria	3,765	3,000	5,292	3,102	22,332	3,221	1	15	353	7,181	1,489	30,304
8	27/2	KJDRP	Khulna	Khulna O&M-1	Dumuria	495	400	1,889	1,142	7,972	1,236		6	315		1,329	
9	28/1	KJDRP	Khulna	Khulna O&M-1	Dumuria, Batiaghata	5,600	4,500	2,393	1,419	10,098	1,431	1	12	199	5,382	842	22,712
10	28/2	KJDRP	Khulna	Khulna O&M-1	Batiaghata	2,590	2,000	2,989	1,766	12,614	1,817		12	249		1,051	
11	34/2 part	none	Khulna	Khulna O&M-2	Batiaghata	4,900	4,030	9,617	6,334	40,584	7,724	1	20	481	9,617	2,029	40,584
					Sub-Total: Khulna	**58,538**	**46,492**	**83,225**	**51,832**	**351,210**	**58,790**	**11**	**261**	**319**	**7,566**	**1,346**	**31,928**

						Patuakhali										4.41	4.12
12	43/1A		IPSWAM	Barguna	Barguna O&M	Amtali	2,675	2,200	5,129	3,571	21,131	3,936	2	14	366	2,565	1,616	11,309
13	43/2A		IPSWAM	Patuakhali	Patuakhali O&M	Patuakhali Sadar, Amtali	5,182	3,887	8,434	5,700	37,194	7,465	2	22	383	4,217	1,691	18,597
14	43/2B		IPSWAM	Barguna & Patuakhali	Patuakhali O&M	Galachipa, Patuakhali Sadar, Amtali	5,460	4,000	8,885	5,817	39,183	7,210	3	28	317	2,962	1,399	13,061
15	43/2D		IPSWAM	Patuakhali	Patuakhali O&M	Patuakhali Sadar, Galachipa	6,500	4,875	9,988	6,472	44,047	7,364	5	28	357	1,998	1,573	8,809
16	43/2E		IPSWAM	Patuakhali	Patuakhali O&M	Patuakhali Sadar	1,650	1,300	2,317	1,761	10,218	1,962	2	12	193	1,159	851	5,109
17	43/2F		IPSWAM	Barguna	Barguna O&M	Amtali	4,453	3,500	6,639	4,602	27,353	6,459	3	27	246	2,213	1,084	9,759
18	55/2A		WMIP	Patuakhali	Patuakhali O&M	Patuakhali Sadar, Bauphal, Dashmina, Galachipa	7,166	5,000	13,966	7,838	61,590	7,838	1	14	998	13,966	4,399	61,590
19	55/2C		none	Patuakhali	Patuakhali O&M	Dashmina, Galachipa	6,275	5,020	10,173	6,468	44,863	7,600	2	16	636	5,087	2,804	22,431
20	47/3		none	Patuakhali	Kalapara	Kalapara	2,025	1,660	2,313	1,668	10,200	2,326	1	7	330	2,313	1,457	10,200
21	47/4		none	Patuakhali	Kalapara	Kalapara	6,600	5,600	7,453	5,105	32,868	6,847	1	18	414	7,453	1,826	32,868
						Sub-Total: Patuakhali	**47,986**	**37,042**	**75,297**	**49,002**	**328,647**	**59,007**	**22**	**186**	**405**	**3,423**	**1,767**	**14,939**
						Satkhira											4.22	
22	2 and 2 ext*	2 Extension	none	Satkhira	Satkhira O&M-2	Satkhira Sadar and Assasuni	11,290	10,122	25,077		105,825		3	58	432	9,272	1,825	39,129
			none	Satkhira	Satkhira O&M-2	satkhira Sadar	1,310	1,174	2,740		11,563			6	457		1,927	-
						Sub-Total: Satkhira	**12,600**	**11,296**	**27,817**	**17,761**	**117,388**	**19,122**	**3**	**64**	**435**	**9,272**	**1834**	**39,129**
					Total		**119,124**	**94,830**	**186,339**	**118,595**	**797,244**	**136,919**	**36**	**511**	**365**	**5,176**	**1,560**	**22,146**

The table below (Table 3.5) presents averages for the polders, WMAs and WMGs whose details are provided in Table 3.1. Whilst averages are a useful indicator, it is also helpful to appreciate the ranges between upper and lower limits of the data set -which are provided in the table in brackets beneath the average figure.

Table 3.5: Average areas and numbers of households and populations per polder, per WMA and per WMG

	Area (ha)	No HHs	Population	No. of WMAs	No. of WMGs
Average polder (22 no.)	5,415 (range 1,630 to 17,400)	8,470 (2,145 to 30,323)	36,238 (9,052 to 127,963)	1.6	23
Average WMA (36 no.)	3,309 (1,485 to 8,700)	5,176 (1,159 to 15,162)	22,146 (9,052 to 63,982)	--	14
Average WMG (511 no.)	233 (83 to 512)	365 (179 to 998)	1,560 (754 to 4,399)	--	--

BWDB’s preference was to have one WMA per polder, and therefore one O&M Agreement per polder between the WMA and BWDB’s Executive Engineer - except for the very large polders (such as P25 and P29). For historical reasons, more WMAs per polder were formed in Patuakhali at an early stage in the project, and despite attempts by BWDB in 2019/20 to consolidate these WMAs, this is still the case (22 WMAs for 10 polders). This in contrast with Khulna where each polder has only one WMA (11 WMAs for 11 polders – admittedly through the merger of P27/1 and P27/2 and P28/1 with P28/2).

The potential influence of WMAs and WMGs to act collectively in Union or Upazila elections, or in the purchase of agricultural inputs or sale of agricultural products is evident from the table: a WMA represents nearly 5,200 households and a WMG represents 365 households.

Table 3.6: Polder level demographic features from baseline data 2017

Polder	Average HH size	Average male members	Average female members	Children (up to 12 yrs)	Female headed HH (HH %)
25	4.6	2.4	2.2	0.9	2.1
31 Part	4.4	2.2	2.2	1.1	6.5
28/1	4.4	2.2	2.2	0.7	2.9
34/2 part	4.7	2.4	2.2	1.1	4.9
55/2A	5.1	2.6	2.5	1.1	4.7
47/4	4.6	2.4	2.3	1.1	3.8
2 & 2 Ext.	4.3	2.2	2.1	0.8	3.3
Khulna zone	4.6	2.4	2.2	0.9	3.5
Patuakhali zone	4.3	2.2	2.1	0.8	3.3
Satkhira zone	4.9	2.5	2.4	1.1	4.3
Total (N=3,651)	4.6	2.4	2.2	0.9	3.6

2017 Baseline data shows that average family size is higher in Khulna and Patuakhali zone compared to the national average. This data also reveals that there is a significant difference in the average size of household among the different types of holding households. The average number of male and female members within the households is very similar while all the polders have a slightly higher average number of male members. The average number of children is around 1. The data shows as well-being improve from the landless to the large farmer, household sizes become significantly larger from 4 to 6. Overall, 3.6% households are headed by the female with highest in Patuakhali 4.3. Female-headed households are more prevalent (6.6%) in the landless household category while none of the large farm households is the female headed household. Female headed households are one example of relatively poorer households (they are over-represented in LCS groups). However, the incidence of households with a male head who is unable to work (due to disability, chronic illness, etc) or migrated to other places for work seems quite substantial. Informal interviews find that husbands of many women of the poor group in the rural areas work and reside outside their villages at least for a certain period within a year.

Educational status[edit | edit source]

BBS 2011 shows that more than 50% population are literate. However, females are significantly behind than their counterpart in three Districts and in all the Upazila. Although country has achieved positive improvement in education but still illiteracy is the one of the main problems of coastal areas as well as the country. School attendance among 7-24 years people is highest in Khulna District with 58% people. So, around 40% school going age people are not enrolled in school. Female are also less enrolled than male in these age group. To reduce the gender gap in education, some initiatives has been taken by the government and various NGO’s but still a long way to go.

Table 3.7: Educational status in Khulna

Educational status (BBS 2011)	Khulna District	Upazilas under Khulna District within BGP areas			
		Batiaghata	Dumuria	Paikgacha	Phultala
Literacy Rate (7 years & above) (%)					
Both sex	60.1	54.9	52.6	52.8	58.0
Male	64.3	59.0	57.4	58.6	62.8
Female	55.9	50.7	47.7	47.1	55.3
School attendance (5 to 24 years)(%)					

Both sex	58.1	54.2	58.1	55.3	48.3
Male	61.4	58.3	62.9	59.0	50.6
Female	54.8	50.1	53.4	51.8	45.8

Table 3.8: Educational status in Patuakhali

Educational status (BBS 2011)	**Patuakhali District**	**Patuakhali District and Upazilas within BGP areas**				**Barguna**
		Bauphal	**Dashmina**	**Galachipa**	**Kalapara**	**Patuakhali Sadar**	**Amtali**
Literacy Rate (7 years & above) (%)							
Both Sex	54.1	57.1	48.7	45.4	52.0	59.5	45,9
Male	56.2	59.5	52.6	47.2	52.6	62.7	54.9
Female	52.0	55.1	45.1	43.7	51.5	56.5	50.8
School attendance (5 to 24 years) (%)							
Both Sex	56.8	60.1	54.0	50.6	51.7	60.0	39.3
Male	59.8	63.5	57.8	52.7	53.5	64.9	42.4
Female	53.8	57.0	50.3	48.5	49.8	56.1	36.2

Table 3.9: Educational status in Satkhira

Educational status (BBS 2011)	**Satkhira District**	**Upazilas under Satkhira District within BGP areas**	
		Assasuni	**Satkhira Sadar**
Literacy Rate (7 years & above)			
Both sex	52.1	49.8	56.5
Male	56.1	54.9	59.8
Female	48.2	44.8	53.2
School attendance (5 to 24 years) (%)			
Both sex	56.1	56.3	56.5
Male	59.6	59.8	60.0
Female	52.8	53.0	53.0

Table 3.10: Level (%) of education of HH head the school enrolment in different polders

Level of education (Baseline 2017)	**Polder**							
	25	**31 Part**	**28/1**	**34/2 part**	**55/2A**	**47/4**	**2 &2 ext.**	**Total**
Illiterate	8.9	12.4	10.5	10.5	7.9	5.7	11.6	9.2
Can sign only	21.5	32.5	25.0	25.0	24.0	28.3	26.7	25.1
Primary	25.8	24.3	27.9	27.9	33.7	34.6	26.7	28.1
Secondary	24.6	21.3	21.2	21.2	21.0	18.4	20.7	21.5
SSC	7.9	4.7	5.4	5.4	6.6	4.9	5.5	6.5
HSC	4.4	2.4	4.9	4.9	3.6	3.2	3.0	3.9
Graduate and above	4.2	2.4	3.1	3.1	2.7	3.2	3.3	3.7
Others	2.7	0.0	2.0	2.0	0.5	1.7	2.5	2.0
Total	100	100	100	100	100	100	100	100
School enrollment (6-12yrs)	97.4	90.8	92.6	92.6	94.0	90.2	95.6	93.8

The educational status of the household heads in polder level shows that there is considerable variation in the level of education of the HH heads across the polders. In the polder areas, the rate of no schooling (Illiterate and can sign only) of the household heads is highest in the polder 31 Part. Overall, 9.2% are illiterate and 28% of the household heads completed primary level education. In

total 21.5% household heads have a secondary level education while only 6.5% completed SSC level. However, proportions of the household heads having completion of HSC or graduate and above level are quite low (3.9% and 3.7% respectively). Across polders, the proportion of school-age children who do not go to school is lowest in polder 25 (2.6 %) that is the closest polder near to Khulna city and highest in polder 47/4 (9.8 %) in Patuakhali. Overall, a considerable percentage of the school enrolment of children is visible across the zone and all types of households. The trend does not vary significantly among different types of households. The percentage of sending children to school increases rapidly due to the initiatives of government and NGOs.

Household structure and other facilities[edit | edit source]

BBS 2011 shows that around 58% household structure are kutcha or jhupri in Khulna and Satkhira while it is significantly high (around 92%) in Patuakhali. household structure significantly varies within the Upazilas. Though a considerable household have access to safe drinking water, still around 15% households in Khulna and Satkhira do not have access to safe drinking water. This problem in Khulna and Satkhira is mainly related to the problem of high salinity level and arsenic contamination in ground water. Around 22% and 29% households in Khulna and Patuakhali do not have access to sanitary latrine. It is significantly high in Satkhira with around 42% households. A significant percentage of households in Khulna (64.3%) has access to electricity while it is less than half (31%) in Patuakhali and 41% in Satkhira.

Table 3.11: Household structure and other HH facilitates of Khulna

Household structure and other facilities (BBS 2011)	Khulna District	Upazilas under Khulna District within BGP areas			
		Batiaghata	Dumuria	Paikgacha	Phultala
HH Structure (% of HH)					
pucca house	18.3	6.2	11.1	12.4	17.9
semi-pucca house	23.0	11.9	20.0	18.1	42.9
kutcha house	56.6	79.3	67.6	68.5	37.4
Jhupri	2	2.6	1.3	1.0	1.8
Source of drinking water (tube-well & tab) (% of HH)	85.7	96.5	100.0	64.0	98.3
Sanitation (% of HH)					
Sanitary latrine	78.0	87.4	81.8	57.6	78.9
Non-sanitary latrine	18.4	9.7	13.6	37.7	19.9
no toilet facilities	3.6	2.9	4.6	4.7	1.2
Access to electricity (% of HH)	64.1	39.9	69.8	43.1	82.4%

Table 3.12: Household structure and other HH facilitates of Patuakhali

HH structure & other facilities (BBS 2011)	Patuakhali District	Patuakhali District and Upazilas within BGP areas					Barguna
		Bauphal	Dashmina	Galachipa	Kalapara	Patuakhali Sadar	Amtali
HH Structure (% of HH)							
pucca house	2.6	2.2	1.1	1.1	1.6	5.5	1.2
semi-pucca house	5.7	5.7	2.8	3.7	3.3	9.3	4
kutcha house	86.6	91.3	93.7	83.6	85.2	83.9	87.4
jhupri	5	0.8	2.4	11.6	9.9	1.3	7.4
Source of drinking water (tube-well & tab)							

(% of HH)	97.4	97.5	94.2	97.3	99.0	98.1	98.1
Sanitation (HH %)							
Sanitary latrine	71.4	70	76.1	62.4	70.9	76.7	66.9
Non-sanitary latrine	25.3	36.2	21.2	29.9	24.9	21.9	28.7
no toilet facilities	3.4	1.5	2.7	7.7	4.2	1.4	4.4
Access to electricity (HH %)	31.8	36.2	14.1	22.9	31.6	40.4	21.6

Table 3.13: Household structure and other HH facilitates of Satkhira

Household structure and other facilities (BBS 2011)	**Satkhira District**	**Upazilas under Satkhira District within BGP areas**	
		Assasuni	**Satkhira Sadar**
HH Structure (% of HH)			
pucca house	14.3	11.1	18.0
semi-pucca house	28.5	14.3	42.1
kutcha house	55.8	73.9	38.3
jhupri	1.4	0.7	1.7
Source of drinking water (tube-well & tab) (%of HH)	85.0	72.8	94.4
Sanitation (% of HH)			
Sanitary latrine	58.9	64.1	54.5
Non-sanitary latrine	38.1	32.4	41.8
no toilet facilities	3.7	3.4	3.7
Access to electricity (% of HH)	41.8	30.7	58.3

Table 3.14: Level (%) of households reporting the numbers of room and the materials of roof and wall

Household structure (Baseline 2017)	**Polder**							
	25	**31 Part**	**28/1**	**34/2 part**	**55/2A**	**47/4**	**2 &2 ext.**	**Total**
Number of rooms								
One room	86.9	90.5	91.3	88.4	97.7	96.8	94.6	92.6
Two rooms	13.1	9.5	8.3	10.9	2.3	3.0	4.8	7.1
Three or more rooms	0.0	0.0	0.4	0.7	0.0	0.2	0.6	0.3
Materials of roof								
Tin	83	94.7	78.9	89.7	97.7	96.8	34.9	74.9
Concrete	13.9	1.8	16.9	6.9	2.3	0.8	14.8	9.5
Tiles/hemp/hay/ bamboo/ others	3.1	3.6	4.1	3.3	0	2.3	50.3	15.6
Materials of Wall								
Mud brick/CI sheet/ wood	38.9	61.5	59.1	55.6	92.7	95.6	31.9	57
Concrete	55.2	16	33.1	16.7	6.6	1.9	59.6	34.1
Hemp/hay/bamboo/ others	5.8	22.5	7.9	27.7	0.7	2.5	8.5	8.9

Polder level data shows that most of the rural households (92.6%) in coastal zones live in the houses that have only one-bedroom. The percentages of one-bedroom households are significantly higher in

the polder 55/2A and 47/4 with around 97% in Patuakhali District. On the other hand, the prevalence of two-bedrooms houses is observed in the polders of Khulna District, the percentage is highest in the polder 25 (13.1%) followed by the polder 34/2 Part (10.9%), polder 31 Part (9.5%) and the polder 28/1 (8.3%).

Data also shows that the majority of the households (74.9%) in the polders live in dwelling units roofed with tin with proportions ranging from 34.9% in the polder 2 and 2 Ext. to 97.7% in the polder 55/2A. About 10% of households live in houses that are roofed concrete while around 16% households living in houses roofed with tiles/ hemp/hay/bamboo/others. Data indicates that more than half of the households (57%) live in dwelling units whose outer walls are mainly constructed with either mud brick or CI sheet or wood while around one-third of the households (34.1%) occupy dwelling units with outer walls made of concrete that are considered as pucca house. Overall, 8.9% households having outer wall is made of hemp/hay/bamboo/others, however, this wall material is significantly high in polder 34/2 Part (27.7%) and the polder 31 Part (22.5%).

Table 3.15: Level (%) of households having access to safe water and sanitation in different polders

Other facilities (Baseline 2017)	Access to safe drinking water	Access to hygienic latrine	Wash hand with soap before meal
25	99.1	97.2	27.4
31 Part	89.3	98.2	43.2
28/1	97.5	98.3	51.7
34/2 part	98.9	97.8	42.9
55/2A	98.9	98.2	38.4
47/4	96.6	97.3	56.5
2 & 2 Ext.	61.0	95.7	22.2
Khulna zone	97.8	97.6	37
Patuakhali zone	97.8	97.8	46.7
Satkhira zone	61	95.7	22.2
Total (N=3651)	87.7	97.2	35.7

Polder level data is related to hygiene and health of the people shows that about 88% of households have access to safe drinking water. Polder 25 has the highest proportion of households (99.1%) have access to safe drinking water while the polder 2 and 2Ext. has the least (61%). Data shows that only around one-third households in the polders have the practice of washing hand with soap before a meal. Approximately 97% households have access to some kind of hygienic toilet facilities. Data from zonal level shows that around 98% households of Patuakhali and Khulna zone have access to safe drinking water and hygienic latrine while having access to safe drinking water is significantly lower in Satkhira zone due to the widespread prevalence of arsenic in the groundwater in this region. Moreover, only 22% of households of Satkhira zone have the habit of washing hand before a meal while the percentage is more than double in Patuakhali zone but still more than half of the households do not have this habit.

Poverty prevalence in coastal areas[edit | edit source]

Using the upper poverty line as calculated in the Household Income Expenditure Survey (HIES, 2010), the nationwide incidence of poverty is estimated at 35.2 percent in rural areas and 21.3 percent in urban areas. Using the lower poverty line, below which people are considered extreme poor, the incidence of poverty is estimated at 21.1 and 7.7 percent in respectively the rural and urban areas. Overall, a large majority can be said to be vulnerable and be determined as poor. HIES 2010 shows that around 39% households are poor in Khulna while it is more than 46% in

Satkhira. Though poverty prevalence is lower (25.8%) in Patuakhali compared to these two Districts, it is still higher than national average 17.6%. Between these lines are the moderate poor. In the Sadar Upazila of Patuakhali, 36.6% households are identified as poor. Most of the cases poverty prevalence is more in the Upazilas levels as well as polders under these Upazilas of BGP areas.

Table 3.16: Poverty prevalence in Khulna District and its Upazila (HIES, 2010)

District and poverty rank	Polders in these Upazila	% extreme poor (lower poverty line)	% poor (upper poverty line)
Khulna (46/64)		21.2	38.8
	Upazila		
Batiaghata	29,30, 31part, 28/1, 28/2, 34/2 part	22.7	40.5
Paikgacha	22	23.3	42.2
Dumuria	29, 26, 25, 27/1, 27/2	19.6	37.2
Fultala	25	17.0	33.7

Table 3.17: Poverty prevalence in Satkhira District and its Upazila (HIES, 2010)

District and poverty rank	Polders in these Upazila	% extreme poor (lower poverty line)	% poor (upper poverty line)
Satkhira 56/64		29.7	46.3
	Upazila		
Satkhira Sadar	2 ext.	26	43.1
Assasuni	2	32.0	48.4

Table 3.18: Poverty prevalence in Patuakhali District and its Upazila (HIES, 2010)

District and poverty rank	Polders in these Upazila	% extreme poor (lower poverty line)	% poor (upper poverty line)
Patuakhali (20/64)		14.7	25.8
Barguna (9/64)		9.8	19.0
	Upazila		
Amtali	43/1A, 43/2A, 43/2B, 43/2F	12.0	22.8
Patuakhali Sadar	43/2A, 43/2D, 43/2E, 55/2A,	23.3	36.9
Galachipa	43/2B, 43/2D, 55/2A, 55/2C	14.4	26.0
Bauphal	55/2A,	13.9	24.0
Dashmina	55/2A, 55/2C	11.3	21.8
Kalapara	47/3, 47/3	9.7	20.3

Table 3.19: Percentage of the farmer households based on land owning pattern (Baseline 2017)

Polder	Landless < 5 dec	Marginal 5- 49 dec	Small 50- 249 dec	Medium 250-749 dec	Large =>750	Total
25	15.5	42.9	32.7	8.7	0.1	100.0
31 Part	18.3	52.1	21.3	6.5	1.8	100.0
28/1	7.0	38.8	42.1	10.3	1.7	100.0
34/2 part	20.8	49.6	21.7	6.3	1.8	100.0
55/2A	7.0	44.4	40.0	7.2	1.4	100.0
47/4	13.9	42.4	31.2	9.9	2.5	100.0
2 & 2 Ext.	28.7	43.9	20.2	5.7	1.6	100.0
Total (n=3651)	17.8	44.3	28.9	7.5	1.4	100.0

Land is a valuable asset that is thinly shared by the majority of the people in the rural areas of Bangladesh, and the situation of the 22 polders of BGP are not an exception. The 2017 Baseline Survey also reveals that about 18% the total HHs of theses polders do not even have any cultivated land. Some of them are residing on embankment slopes and/or residing in somebody else's land. The survey further reveals that while 44.3% of the total HHs own some land (less than 50 decimal), only about 29 % of the HHs own 50-249 decimal of land, with only 1.4% as large farm HHs having more than 750 decimals of land.

Table 3.20: Land holding pattern (average land size in decimal) of different category of farmer households

Baseline Survey 2017	Landless		Marginal farmer		Small farmer		Medium farmer		large farmer		Total	
Polder	Homestead	Cultivable	Homestead	Cultivable	Homestead	Cultivable	Homestead	Cultivable	Homestead	Cultivable	Homestead	Cultivable
25	2.0	0.0	9.4	10.0	19.1	96.7	48.1	326.1	100.0	1,055.0	14.9	65.8
31 Part	2.3	0.0	10.9	4.6	31.6	77.1	59.1	377.3	60.0	816.7	17.7	57.9
28/1	2.6	0.0	11.9	5.1	16.6	91.0	40.8	350.5	106.3	768.8	17.8	89.3
34/2 part	1.8	0.0	10.1	3.6	25.4	89.2	77.0	333.1	147.6	1,065.6	18.3	61.0
55/2A	2.4	0.0	12.4	7.6	26.9	97.2	62.8	353.5	72.5	786.4	22.0	78.8
47/4	1.7	0.0	18.1	3.3	37.7	82.8	64.2	318.4	133.1	1,348.1	29.4	93.0
2 & 2 Ext.	2.1	0.0	9.9	7.7	24.7	93.1	60.8	366.1	89.0	1,061.3	14.8	59.8
Total (n=3651)	2.0	0.0	11.4	6.7	25.2	92.3	58.4	342.1	105.5	1,049.1	18.6	70.3

The above table explains the landholding patterns for homestead and cultivable land among the different categories of farmers in the different study polders. The land distribution is highly skewed among different categories of households but is not significantly varied among the polders. There are significant differences among the large and other types of households in terms of the average homestead and agricultural land ownership in each polder. Large farmer households have got larger average homestead and cultivable land compared to the different classes of households. The average of homestead land of all the polders rated 2.0 decimal for landless households. It is noteworthy that households of this category have no cultivable land of their own. For the marginal farmer the average homestead land is more than five times compared to the landless. The average homestead land for small farmer households is 25.2 decimal while it is more than double for medium farmer households and four times more for the large farmer households compared to the small farmer households. In term of cultivable land, the differences are more significant, the average cultivable land for small farm household is around 92 decimals whereas the medium farmer households own three times more and the large farmer households possess more than 10 times compared to them.

Table 3.21: The HIES and BGP baselines survey 2017 relate landownership to respectively poverty incidence and sources of income

	Land size dec.	% HHs **	Upper ***	Lower ***	Non-agric income	Crop income	Livestock & fisheries	Lease-out land income	Agric labour
Landless	< 5	17.8	53.1	35.9	62.2	7.5	15.9	0.22	14.1
Marginal	5 - 49	44.3	38.8	22.1	58.3	11.4	20	0.6	9.7
Small	50 - 249	28.9	21.7	11.9	48.2	18.8	26.7	2.96	3.4
Medium	250 - 749	7.5	11.6	4.3	39.5	19.1	31.2	9.89	0.2
Large	=> 750	1.4	7.1	4.2	28.3	24.7	26.7	20.3	0
Total		**100**	**35.2**	**21.1**	**51.9**	**14.9**	**23.4**	**3.26**	**6.6**

**** Data from Baseline Survey Analysis Phase II**
***** from HIES 2010**
****** latter four columns from Baseline Survey Analysis Phase II**

Table 3.22: Annual household income (BDT) from agricultural and non-agricultural sector

Baseline 2017	Landless	Marginal	Small	Medium	Large	Average
Agricultural Sector (BDT)	40,924	58,436	91,653	169,370	312,516	76,865
Agri. Sector (% of income)	37.8	41.7	51.8	60.5	71.7	48.1
Non-Agri. (BDT)	67,480	81,776	85,237	110,505	123,192	82,974
Non- agri. sector (% of income)	62.2	58.3	48.2	39.5	28.3	51.9
Total income	108,404	140,212	176,890	279,875	435,708	159,839
$/Capita/day	0.77	1.00	1.27	2.01	3.12	1.15
	< 5 dec	< 50	< 250	< 750	>750	
	17.8%	44.3%	28.9%	7.5%	1.4%	

Above two tables show an important deduction is that while there is a strong negative correlation between land ownership and incidence of poverty[Notes 8] (62% households (landless and marginal) live below or just 1 $/capita/day while another 29% small farmer households having just $1.27/capita/day), not all landless are poor (in fact some 50% are) and that there are also a substantial number of poor with higher landownership[Notes 9]. The HIES notes that the poverty incidence amongst some landless households is lower than other landless households mainly due to their involvement in non-agricultural activities which provides them with income enough to escape poverty through engaging in various non-farm economic activities[Notes 10] (HIES,2010). The respective sources of income contributions to overall HH income, show some clear correlations but above all they provide a glimpse of how mixed the livelihood strategies are in the polders as a large majority is poor. These indications of poverty incidence and sources of income are of importance to BGP twin strategy (see Chapter 21 and Chapter 25) and for the selection of participants where this applies in Blue Gold approaches.

Defining targets – satisfying a realistic outreach of HH for TA FFS[edit | edit source]

In summary, HIES national statistics for rural areas put poverty at 35%, while the poverty map puts it for the coastal zones at 44% and above, BBS 2011 also indicates that around 60% people are illiterate, more that 65% people live in *kacha* or *jhupri* house, and likely to be within the poverty situation. On the other hand, polder level data shows that about 63% household head are either illiterate or having only primary education and around 93% people live in a one-bedroom house that shows it might be as high as this percentage. Those poor are spread over all land ownership categories with some 50% poor amongst landless and with the categories above still having poverty incidence varying from more than 25% to nearly 10%.

With respect to BGP twin strategy, BGP focuses on the following issue.

1. Some 50% of the households are not considered landless and are definitely involved in cropping. Not all necessarily personally or throughout the whole year, as they lease there land out or allow share cropping. A substantial %[Notes 11] of the landless in this way join ranks with

the landowners to benefit from Blue Gold's water resource management and production system shift programme[Notes 12]. Amongst both these landless and landowner participants there are a substantial number of poor. As water resource management is geographically determined, the question to identify and select these poor households does not pose itself. All participants do benefit from the commercialisation programme and it is our experience that, especially the poorer households, are participating in the collective actions.

2. The second Blue Gold strategy, the TA FFS programme, along with the LCS approach, is aimed at the 50% landless in the polders. To optimise impact of this programme, there is specific attention needed to identify and select the appropriate participants. A few points can be made.
    - Not all landless are poor (in fact 50% are) and other criteria than landownership have to be considered.
    - Amongst the landless there are households who provide their labour to the agricultural sector in the polder or on a migrant basis, for shorter or longer duration, to sectors beyond the polder[Notes 13]. Agricultural labour offers 14% of income amongst the landless.
    - Amongst the landless there are those who are leasing or sharecropping land and probably are benefitting from the WRM/commercialisation programme, be it limited to where infra rehabilitation allows.[Notes 14]
    - Participating in the FFS modules demand a minimum of specific assets and for most, those with no land at all, are probably not able to benefit from TA FFS.
    - As indicated, there are households at the lower end of the landownership which are already gaining substantial income from other sources (transport, non-agricultural labour, rural services, business, etc).
    - The UP has lists of needy households which they support in a safety net programme. These should be of guidance.

With respect to a target number of households to be reached in the TA FFS program we can state the following. With 50% landless in the total population of 200,000 Blue Gold households, there are 100,000 belonging to the landless category of which again 50% are poor, or 50,000 households. Some of these, involved in leasing land under different forms, will benefit most from increasing the productivity of their land and labour assets in the WRM/commercialization program, while a small percentage do lack the minimum asset requirements to gain from TA FFS participation or are already using their, mainly, labour assets to good results elsewhere and/or in non-agricultural sectors. Without further insights in these percentages a target of 30,000 households to be reached by TA FFS can be considered a fair assessment, while keeping in mind that an additional number will be reached by horizontal learning.

Physical Context[edit | edit source]

Purpose of Polder Infrastructure[edit | edit source]

Safety

One of BWDB's primary responsibilities in the coastal region is to ensure the integrity of the polder embankment and to thus protect the vulnerable communities who live and work in the polders. Polder communities are provided with safety against tidal floods, storm surges, river erosion and salinity through embankment strengthening, breach closing and erosion protection measures. In combination with the infrastructure improvements, disaster risk reduction (DRR) activities involving local community organisations and the concerned government departments has increased the state of preparedness of polder inhabitants to prospects of embankment breaches and overtopping, and encouraged consideration of pre-emptive actions.

All of those who live and work in the SW face the consequences of erosion damage to polder embankments. And many BWDB professionals have practical experience of the consequences of breaches to polder embankments. But those who are resident in the polders, and whose families and livelihoods are dependent on the exclusion of flood waters from the polder bear the brunt of the consequences when polder embankments fail. There is enormous social and economic impact.

Water Management

Within the polders, the re-excavation of primary canals and some major secondary canals, and rehabilitation of water management structures (sluices, outlets etc) aims to improve the overall water management and to create scope for in-polder water management (IPWM) and community-led agricultural water management (CAWM). Where infrastructure works are complete, unobstructed flow of water is possible through the cleared main *khals*, and the rehabilitated sluices/outlets allow improved water regulation. Previously, many areas were either unable to be drained and remained inundated, or suffered water shortages as their main outlets or inlets were obstructed or poorly functioning.

Photo 3.1 shows one of the 186 regulators which was rehabilitated under Blue Gold. Note the agricultural area to the left of the tree-lined embankment which protects the polder area (P31-part) from high river levels, and the scale of the tidal river – the Kazibacha River. The regulator drains water into a tidal river – it is low tide so there is drainage from the polder. The high tide mark is visible.



Photo 3.1 A regulator draining excess water from Polder 31-part into the Kazibacha River

Vulnerability of Polder Infrastructure[edit | edit source]

In the harsh environment of the coastal zone, polder infrastructure is subject to many threats and – sea surges, cyclones, rivers in flood, high salinity tidal flows, sedimentation of river channels, intense rain storms, road traffic, human interventions etc.

There have been more than 40 severe cyclones[Notes 15] in the coastal zone of Bangladesh since 1961. Of recent note are the following seven cyclones:

- 15 November 2007: **Cyclone Sidr** with wind speeds up to 260 km/hour, made landfall in southern Bangladesh, causing over 3,500 deaths and severe damage.
- 27–29 May 2009: A severe **Cyclone Aila** devastated 15 Districts of south-western part of Bangladesh with wind speeds up to 120 km/hour; about 150 deaths, 200,000 houses and crop losses across 120,000 ha of cultivated land.
- 29 July 2015: **Cyclone Komen** with wind speeds up to 75 km/hour, Komen made landfall near Chittagong. About 510,000 houses in the country were damaged or destroyed, and many residents lost their source of income as 270,000 ha of crop fields were damaged. The floods killed 132 people, of which at least 39 were directly related to Komen.
- 4 May 2019: **Cyclone Fani** moved into Bangladesh after making landfall in Odisha, resulting in the death of 17 people in ten Districts of Bangladesh. It destroyed about 63,000 ha of farmland in 35 Districts of the country, causing agricultural losses estimated at US$4.6 million, and a total damage in Bangladesh amounting to US$64 million.
- 9 November 2019: **Cyclone Bulbul** made landfall near West Bengal, and crossed into Bangladesh. It caused severe flooding and storm surge in the country, with the loss of approximately 72,000 metric tonne of crops with an estimated total value of US$31 million.
- 20 May 2020: **Cyclone Amphan** moved into Bangladesh after making landfall in West Bengal.
- 26 May 2021: **Cyclone Yaas** crossed the northern Odisha coast around 20 km south of Balasore on 26 May at its peak intensity as a very severe cyclonic storm. Despite the distance of Patuakhali from the landfall in Odisha, the high winds associated with the cyclone combined with the occurrence of a spring tide resulted in extensive damage to polder embankments along many of the major rivers draining into the Bay of Bengal.

Because of this exposure to natural and man-made threats, polder infrastructure requires significant repair and maintenance investments – to provide emergency repairs as well as periodic maintenance. And the repairs to cyclone damage can take many years – for example, repairs caused by Cyclone Sidr (in 2007) were still ongoing in 2015.

For the 22 Blue Gold polders, Table 3.3 (below) provides a summary of the dates of construction, the dates of investments by earlier projects, as well as the location, the responsible BWDB Division and Upazila administration, and characteristics of the infrastructure (length of embankment, numbers of structures and length of primary drainage channels or khals).



The table below is long and wide. If we want to skip the table, please click on **Collapse** link beside the name of the table and move ahead to the next content. Not all columns fit on the screen. Please look at the accessibility guide here to understand how to navigate inside the table.

Table 3.3 Blue Gold Polders - Key Data

Sl. No.	Polder	Date of Construction	Previous History	District	BWDB Division	Upazila	Gross Area (hectare)	Cultivable Area (hectare)	Embankment (km)	Regulator (no)	Flushing Inlet (no)	Drainage Channel (km)
1	2		3	4		5	6					
						Khulna						
1	22	1970-72 DDP	2003-2011 IPSWAM	Khulna	Khulna O&M-2	Paikgachha	1,630	1,417	19.5	7	12	45.0
2	26	1967-68 CEP	none	Khulna	Khulna O&M-1	Dumuria	2,696	2,100	28.7	7	-	25.0
3	29	1966-71 CEP	2003-2011 IPSWAM 1988 DDP	Khulna	Khulna O&M-1	Dumuria, Batiaghata	8,218	6,570	49.3	14	43	156.4
4	30	1967-72 CEP	2003-2011 IPSWAM	Khulna	Khulna O&M-2	Batiaghata	6,396	4,048	40.3	21	3	39.0
5	31 Part	1967-72 CEP	none	Khulna	Khulna O&M-2	Batiaghata	4,848	4,048	28.0	14	2	17.5
6	25	1963-67 CEP	1993-2002 KJDRP	Khulna	Khulna O&M-1	Dumuria, Fultala	17,400	14,379	50.5	13	-	60.0
7	27/1	1963-65 CEP	1993-2002 KJDRP	Khulna	Khulna O&M-1	Dumuria	3,765	3,000	32.4	8	-	30.0

8	27/2		1974-76 CEP	1993-2002 KJDRP	Khulna	Khulna O&M-1	Dumuria	495	400	15.3	3	-	15.8
9	28/1		1965-70 CEP	1993-2002 KJDRP	Khulna	Khulna O&M-1	Dumuria, Batiaghata	5,600	4,500	23.2	7	2	27.0
10	28/2		1973-75 CEP	1993-2002 KJDRP	Khulna	Khulna O&M-1	Batiaghata	2,590	2,000	20.1	8	-	31.0
11	34/2 part		1998-2005 GoB	none	Khulna	Khulna O&M-2	Batiaghata	4,900	4,030	37.0	38	14	43.0
							Sub-Total: Khulna	**58,538**	**46,492**	**344.2**	**140**	**76**	**489.6**
							Patuakhali						
12	43/1A		1989-90 EIP	2003-2011 IPSWAM	Barguna	Barguna O&M	Amtali	2,675	2,200	27.0	5	11	58.5
13	43/2A		1985-87 EIP	2003-2011 IPSWAM	Patuakhali	Patuakhali O&M	Patuakhali Sadar, Amtali	5,182	3,887	40.0	5	34	44.3
14	43/2B		1989-98 EIP	2003-2011 IPSWAM	Barguna & Patuakhali	Patuakhali O&M	Galachipa,Amtali	5,460	4,000	41.5	6	42	39.5
15	43/2D		1989-98 EIP	2003-2011 IPSWAM	Patuakhali	Patuakhali O&M	Patuakhali Sadar, Galachipa	6,500	4,875	43.0	16	58	110.4
16	43/2E		1989-90 EIP	2003-2011 IPSWAM	Patuakhali	Patuakhali O&M	Patuakhali Sadar	1,650	1,300	20.3	7	40	42.0
17	43/2F		1989-94 CEP	2003-2011 IPSWAM	Barguna	Barguna O&M	Amtali	4,453	3,500	35.3	17	38	32.8
18	55/2A		1988-94 EIP	2008-2015 WMIP	Patuakhali	Patuakhali O&M	Patuakhali Sadar, Bauphal, Dashmina, Galachipa	7,166	5,000	41.0	12	6	35.0
19	55/2C		1988-90 EIP	none	Patuakhali	Patuakhali O&M	Dashmina, Galachipa	6,275	5,020	47.5	7	29	37.5
20	47/3		1961-64 CEP	none	Patuakhali	Kalapara	Kalapara	2,025	1,660	20.0	8	10	25.3
21	47/4		1961-64 CEP	none	Patuakhali	Kalapara	Kalapara	6,600	5,600	61.0	26	1	65.0
							Sub-Total: Patuakhali	**47,986**	**37,042**	**376.6**	**109**	**269**	**490.3**
							Satkhira						
22	2 and 2 ext*	2	1963-65 CEP	none	Satkhira	Satkhira O&M-2	Satkhira Sadar and Assasuni	11,290	10,122	63.0	17		65.2
		2 Extension	1963-65 CEP	none	Satkhira	Satkhira O&M-2	Satkhira Sadar	1,310	1,174		4		
							Sub-Total: Satkhira	**12,600**	**11,296**	**63.0**	**21**	**-**	**65.2**
Total								**119,124**	**94,830**	**783.7**	**270**	**345**	**1,045.2**

The 22 Blue Gold polders were constructed over a nearly 30 year timeframe, with start dates ranging from 1961 to 1989 (with one outlier, P34/2-part in Batiaghata, Khulna where construction started in 1998). Most of the polders in Khulna and Satkhira were constructed between 1963 and 1975, whilst those in Patuakhali date from 1985 to 1998, with two (P47/4 and P47/4) in Kalapara being constructed between 1961 and 1964. They vary in age from 57 years (P47/3 and P47/4 in Kalapara were built from 1961 to 1964) to 16 years (P34/2-part in Khulna, built from 1998 to 2005) with an average age of 42 years (based on the year of completion of construction, up to the year of Blue Gold's completion, 2021). The average age of the 12 polders in Khulna and Satkhira is 48 years, and for the 10 polders in Patuakhali is 34 years.

An aggregation of these polder characteristics represents the scale of the problem: 784km of embankments, 615 large structures and 1,045km of primary drainage channels. Earthen embankments are subject to daily attack from river erosion and road traffic, and can be readily breached when conditions combine - spring tides, monsoon floodwaters, augmented by wind erosion or cyclonic storms. Structures provided in the embankment to allow drainage (or to admit freshwater for storage for subsequent use for irrigation) can be damaged by seepage or piping, mal-operation of the gates, erosion of the bank or bed around the structure, and made non-functional if gates don't close off the flow of water, or if sedimentation in the outfall river obstructs water from discharging from the polder.

Notes[edit | edit source]

1. ↑ Polder 22, 30, 31 Part, 34/2 Part, 29, 25, 26, 27/1, 27/2, 28/1 and 28/2.
2. ↑ O&M Division 1 with polder 25, 26, 27/1, 27/2, 28/1, 28/2 and 29; O&M Division 2 with polder 22, 30, 31 Part and 34/2 Part
3. ↑ Polder 43/2A, 43/2B, 43/2D, 43/2E, 55/2A and 55/2C
4. ↑ Polder 43/1A and 43/2F
5. ↑ In Polder 43/2A there are 115 LLPs, 43/2B-130 LLPs, 43/2D-110 LLPs, 43/2E-60 LLPs, 55/2A-95 LLPs, 55/2C-78 LLPs, 43/1A-75 LLPs and 43/2F-65 LLPs.
6. ↑ Polder 47/3 and 47/4
7. ↑ Average household size in Khulna & Satkhira is 4.22 and in Patuakhali is 4.41 (based on Population Census 2011).
8. ↑ That is, as land size increases, the incidence of poverty decreases.
9. ↑ Not all land is of similar value either, e.g. depending on the cropping intensity.
10. ↑ Owning land can also keep the HH away of selling their labour elsewhere, resulting in underemployment. This is corroborated for example by LCS experience where there is also a definite interest by Landless II.
11. ↑ This baseline survey refers to 8% of income from cropping sources. Subsistence production might bias this figure though.
12. ↑ This includes DAE FFS, CII, CAWM and other water management focused WMO facilitation.
13. ↑ Not necessarily all stepping out as some finance their leasing of land by remittances.
14. ↑ BGP does not have reliable data on this but at presently estimate it at 5 to 10%. Some of this could be seasonal.
15. ↑ Source Wikipedia (2020)

See more[edit | edit source]

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Chapter 02: Institutional Setting		Chapter 04: Policy framework, history of interventions and project definition

Section A: Background and context

Chapter 01: Overview, Purpose and Structure of Report	Chapter 02: Institutional Setting	Chapter 03: Social, Physical and Environmental Context
1. Overview 2. Water management for development 3. Purpose of the Report 4. Structure of this report	1. Executive Authorities 2. Implementing Agencies 3. Other public sector organisations 4. Private Sector	1. Geography of the coastal zone 2. History of polders 3. Social context 4. Polder infrastructure

Chapter 04: Policy framework, history of interventions and project definition

1. Policy and regulatory framework for Participatory Water Management
2. History of interventions
3. Project definition
•

Blue Gold Wiki

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Farmer Field School - A group-based learning process through which farmers carry out experiential learning activities that help them to understand the ecology of their fields, based on simple experiments, regular field observations and group analysis. The knowledge gained from these activities enables participants to make their own locally specific decisions about crop management practices. This approach represents a radical departure from earlier agricultural extension programmes, in which farmers were expected to adopt generalized recommendations that are formulated by specialists from outside the community.

An area of low-lying land surrounded by an earthen embankment to prevent flooding by river or seawater, with associated structures which are provided to either drain excess rainwater within the polder or to admit freshwater to be stored in a khal for subsequent use for irrigation.

human intervention in the capture, conveyance, utilisation and drainage of surface and/or ground water in a certain area: a process of social interaction between stakeholders around the issue of water control.

Bangladesh Water Development Board, government agency which is responsible for surface water and groundwater management in Bangladesh, and lead implementing agency for the Blue Gold Program

Earthen dyke or bundh raised above surrounding ground level, for example so that roads or railway lines are above highest flood levels, or so that an area is empoldered to protect it from external floods and saline waters.

A defined set of temporary activities through which facilitators seek to effect change

river whose flow and level are influenced by tides

Sedimentation is the process by which fine particles of silt and clay suspended in river water settle out, for example when there is a drop in velocity.

Typically undesirable increase in concentration and deposition of water-borne silt particles in a body of water.

Soil is regarded as waterlogged when it is nearly saturated with water much of the time such that its air phase is restricted and anaerobic conditions prevail. In agriculture, various crops need air (specifically, oxygen) to a greater or lesser depth in the soil. Waterlogging of the soil stops air getting in. How near the water table must be to the surface for the ground to be classed as waterlogged, varies with the purpose in view. A crop's demand for freedom from waterlogging may vary between seasons of the year.

Environmental Impact Assessment

A vertical gate to control the flow of water; also referred to as 'regulator'

hectare

An area enclosed by low embankments to store either freshwater or brackish water for the production of fish, shrimps or prawns.

An area enclosed by low embankments to store either freshwater or brackish water for the production of fish, shrimps or prawns.

0-30 cm: intermittent flooding, land suited to HYV T Aman in monsoon season

permanent, official, an improved version: brick-paved road as opposed to an earthen road; brick-built house as opposed to earth-walled house

A livelihood is a way of making a living. It comprises capabilities, skills, assets (including material and social resources), and activities that households put together to produce food, meet basic needs, earn income, or establish a means of living in any other way.

the south-western coastal zone is characterised by broad tidal flats and fluvio-tidal plains, lying approximately 1 metre above sea level, with drainage provided by numerous tidal creeks and channels a some major rivers. Empolderisation now protects the intrusion of sea water to agricultural areas but restricts the deposition of sediments to within the channels, thus reducing the drainage capacity of the rivers and channels, causing drainage congestion.

drainage channel or canal

In the coastal zone, the river or rivers surrounding a polder which carry the outflow from the regulators or sluices to the sea

Department of Agricultural Extension, a department of the Ministry of Agriculture responsible for disseminating scientific research and new knowledge on agricultural practices through communication and learning activities for farmers in agriculture, agricultural marketing, nutrition and business studies.

High Yielding Variety - Introduced varieties developed through formal breeding programs. HYVs have a higher yield potential than local varieties but require correspondingly high inputs of fertiliser and irrigation to achieve high yields.

The dry season (typically mid-October to mid-March) with low or minimal rainfall, high evapotranspiration rates, low temperatures and clear skies with bright sunshine. Crops grown are boro, pulses, sunflower, sesame and mungbean.

tidal flooding is the temporary inundation of low-lying areas during high tide events.

A rice crop planted under irrigation during the dry season from December to March and harvested between April and June. Local boro varieties are more tolerant of cool temperatures and are usually planted in areas which are subject to early flooding. Improved varieties, less tolerant of cool conditions, are usually transplanted from February onwards. All varieties are insensitive to daylength.

Protected dug well

wetland inundated for at least one season per year, formed by the inundation of a low-lying natural depression

Lowest tier of local government

Bangladesh Bureau of Statistics

Blue Gold Program

Household

Integrated Planning for Sustainable Water Management

Khulna Jessore Drainage Rehabilitation Project

Water Management Improvement Project (WB-funded)

Water Management Group - The basic organizational unit in Blue Gold representing local stakeholders from a hydrological or social unit (para/village). Through Blue Gold, 511 WMGs have been formed and registered. The average WMG covers an area of around 230 ha has 365 households or a population of just over 1,500.

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Water Management Association - In Blue Gold, the polder-level representative of WMGs, and signatory to an O&M Agreement with BWDB

Household

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Operation and Maintenance

assumed in this report to operate up to 0.5 acres (0.2 ha)

assumed in this report to operate more than 5.5 acres (2.23 ha)

Labour Contracting Societies - Groups of usually landless people who are contracted by an agency to carry out a certain type and volume of earthwork within a given time period. For BWDB, the rules for engagement of an LCS are set down in PWMR 2014 Chapter 6

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Non-Governmental Organisation

Cropping intensity - The number of crop harvest per unit land per year. The average cropping intensity (CI) is calculated as the total area of all crops per year divided by the area of cultivable land. In its CI calculations BGP treats fish ghers as another crop; the DAE method excludes fish ghers in its CI calculations. Hence the CI calculated by BGP is higher than as calculated by DAE.

one hundredth of an acre (0.004 ha)

assumed in this report to operate between 0.5 acres and 2.5 acres (0.2 to 1.0 ha)

assumed in this report to operate between 2.5 acres and 5.5 acres (1.0 to 2.23 ha)

Bangladesh Taka

The strategies that people employ in order to utilize and transfer assets to produce income today and deal with problems tomorrow. These strategies change and adapt in response to various shocks, external influences, institutional norms and rules, and other factors.

Technical Assistance

Farmer Field School - A group-based learning process through which farmers carry out experiential learning activities that help them to understand the ecology of their fields, based on simple experiments, regular field observations and group analysis. The knowledge gained from these

activities enables participants to make their own locally specific decisions about crop management practices. This approach represents a radical departure from earlier agricultural extension programmes, in which farmers were expected to adopt generalized recommendations that are formulated by specialists from outside the community.

Collective action - by a producer group is one way to partially overcome constraints such as in weak markets, where inputs and services essential to production innovations, are generally scarce, costly to access and/or to obtain. Collective action is working in group instead of individually in order to gain economic or social benefit. Through collective action, farmers can address constraints in their market linkages, organise their activities jointly and use their collective bargaining power to reduce input costs through bulk purchase, or to obtain services from buyers such as farm-level collection of produce

Water Resource Management

Union Parishad - Union Council chaired by an elected Union Chairman

A process through which stakeholders influence and share control over development initiatives and the decisions and resources which affect them.

Disaster Risk Reduction - The Union Disaster Management Committee (UDMC) has been given the mandate to lead disaster preparedness, mitigation, emergency response and post disaster rehabilitation, by informing local people, empowering them to take practical measures to reduce risk at household and community levels and to disseminate success stories of reducing disaster risks widely among local people.

South-West hydrological region, one of the eight hydrological regions covering Bangladesh, with an area of 26,226 km2 including the Garai, Kumar and Bhairab-Kapatakhya rivers

In-polder water management; term used in Blue Gold to describe water management interventions which aim to deliver excess water from the field through field drains to secondary khals and thence to primary khals for evacuation through the sluice/regulator

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Community-led Agricultural Water Management - with DAE, Blue Gold established a network of schemes for demonstration purposes where locally-applicable annual cropping patterns are introduced along with water level control facilitated by small-scale water infrastructure, and the development of value chain skills in farmers

the principal function of a regulator or drainage sluice is to allow the drainage of water from the polder into a peripheral river when there is a differential head across the regulator (ie when the

polder or country-side water level exceeds the level in the tidal river). The regulator is provided with a lift gate on the country-side (to allow freshwater to be held in the khal for irrigation during the dry season) and a flap gate on the river-side (to prevent water entry from the river channel into the polder during high tide conditions). A frame is provided on the river-side so that the flap gate can be lifted when there is freshwater in the river (during the monsoon flood season), thus allowing freshwater to be stored in the khal within the polder and used for irrigation during the dry season. The size of the culvert is determined from the drainage area served by the structure.

actions taken to prevent or repair the deterioration of water management infrastructure and to keep the physical components of a water management system in such a state that they can serve their intended function.

Government of Bangladesh; a donor to the Blue Gold Program

Early Implementation Project

the adjustment of gates in water management infrastructure to control hydraulic conditions (water levels and discharges) in a water management system.

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Cropping Intensity Initiative: Year-long demonstrations with farmers on increasing cropping intensity related to improved water management, also involving market actors, and by organising demand driven sessions and workshops

Water Management Organizations - The common name of organizations of the local stakeholders of a water resource project/sub-project/scheme. The concept WMO typically refers to WMGs and WMAs (and/or WMFs) together

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Variants

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Blue Gold Program Wiki

The wiki version of the Lessons Learnt Report of the Blue Gold program, documents the experiences of a technical assistance (TA) team working in a development project implemented by the Bangladesh Water Development Board (BWDB) and the Department of Agricultural Extension (DAE) over an eight+ year period from March 2013 to December 2021. The wiki lessons learnt report (LLR) is intended to complement the BWDB and DAE project completion reports (PCRs), with the aim of recording lessons learnt for use in the design and implementation of future interventions in the coastal zone.

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