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Kingdom of the Netherlands



Department of Agricultural Extension (DAE)



Polder Development Plan (PDP) – DRAFT

Polder 31-Part

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List of Abbreviations

BADC	Bangladesh Agricultural Development Corporation
BBS	Bangladesh Bureau of Statistics
BRRRI	Bangladesh Rice Research Institute
BWDB	Bangladesh Water Development Board
CAHW	Community Animal Health Worker
CAWM	Community Agricultural Water Management
CBO	Community-Based Organisation
CDMP	Comprehensive Disaster Management Program
CO	Community Organizer
DAE	Department of Agricultural Extension
DLS	Department of Livestock Services
DOC	Day Old Chicks
DPP	Development Project Proforma
DoC	Department of Cooperatives
DoE	Department of Environment
DoF	Department of Fisheries
DP III	Director of Planning III of BWDB
DPHE	Department of Public Health Engineering
DRR	Disaster Risk Reduction
DTL	Deputy Team Leader
EIA	Environmental Impact Assessment
EKN	Embassy of the Kingdom of the Netherlands
FCD	Flood Control and Drainage
FCDI	Flood Control, Drainage and Irrigation
FFS	Farmers Field School
FGD	Focus Group Discussion
FO	FFS Organiser
FT	Farmer Trainers
GAP	Gender Action Plan
GIFT	Genetically Improved Farm Tilapia GIFT
GoB	Government of Bangladesh
GoN	Government of Netherlands
GPWM	Guidelines for Participatory Water Management
Ha	Hectare
HH	Household
HYV	High Yielding Variety
IGA	Income Generating Activity
IAPP	Integrated Agriculture Productivity Project
IPM	Integrated Pest Management
IPs	Input Providers
IPSWAM	Integrated Planning for Sustainable Water Management
IPSWARM	Integrated Planning for Sustainable Water Resources Management
IRRI	International Rice Research Institute
KII	Key Informant Interview
LCS	Landless/Labour Contracting Societies
LGED	Local Government Engineering Department
LGI	Local Government Institutions
M&E	Monitoring and Evaluation
MFI	Microfinance Institutions
MFS	Market Oriented Farmers Field School
NGO	Non-Governmental Organisation

O&M	Operation and Maintenance
PCD	Program Coordinating Director at BWDB
PD	Program Director at DAE
PDP	Polder Development Plan
PSF	Pond Sand Filter
PTO	Power Tiller Operator
PWMR 2014	Participatory Water Management Rules 2014
RF	Resources Farmers
SAAO	Sub-Assistant Agricultural Officer
SaFaL	Sustainable Agriculture, Food Security and Linkages
SMART	Specific Measurable Attainable Relevant Time Bound
SRDI	Soil Resources Development Institute
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TA	Technical Assistance Team of Blue Gold Program
TL	Team Leader
TOT	Training of Trainers
UP	Union Parishad
VC	Value Chain
VCA	Value Chain Analysis
VCD	Value Chain Development
VCS	Value Chain Selection
WASH	Water Sanitation and Hygiene education
WMA	Water Management Association
WAP	Water Management Group Action Plan
WMF	Water Management Federation
WMG	Water Management Group
WMO	Water Management Organisation
XEN	Executive Engineer
ZSE	Zonal Socio Economist

Glossary

Arotdar	Service provider to Bepari and Pikers in wholesale markets. Facilitates the buy/sell process. May provide purchase negotiation assistance, storage space, selling space, short term and seasonal credit, and arrange truck transport of goods purchased by Bepari to markets.
Beel	Naturally depressed land inundated under water for at least one season
Bepari	Key wholesaler in the supply chain. Moves goods between markets buying in source markets and selling in destination markets. Exerts the main influence on price earned by farmers.
BKash	BKash Limited is a joint venture between BRAC Bank Limited, Bangladesh, and Money in Motion LLC, USA. Less than 15% of Bangladeshis are connected to the formal banking system whereas over 68% have mobile phones. BKash utilize these mobile devices and the omnipresent telecom networks to extend financial services to the under-served remote population of Bangladesh.
Business service	Service that is sustainable through private sector transactions and that improves the performance of the value chain, its access to markets, and its ability to compete.
Capture Fisheries	Capture fisheries refer to open water fisheries resources in both marine and freshwater environments. Capture fisheries is exploitation of aquatic organisms without stocking the seed. Recruitment of the species occurs naturally. This is carried out in the sea, rivers, reservoirs, khal, beel, floodplain etc.
Climate Change	Climate change refers to any change in climate (average weather) over time, whether due to natural variability or as a result of human activity. Average weather includes temperatures, wind patterns and precipitation.
Cross-cutting issues	Issues that affect all areas of concern within their context.
Culture Fisheries	Culture fisheries are the cultivation of selected fishes in confined areas with utmost care to get maximum yield. The seed is stocked, nursed and reared in confined waters, and then the crop is harvested. Culture takes place in ponds, ditches, rice fields which are fertilized and supplementary feeds are provided to fish to get maximum yield.
Disaster Risk Reduction (DRR)	DRR is a conceptual framework intended to systematically avoid (prevent) and limit (prepare/mitigate) disaster risks with regard to losses in lives and the social, economic and environmental assets of communities and countries.
Embankment	An embankment is a high earthen dike surrounding an area in order to protect it from external floods and salinity.
Enabling environment	Environment favourable to working, participating and demonstrating potentials.
Farmers Field School	FFS is a participatory group based learning approach where farmers can learn

(FFS) Governance	by doing and share their experiences. Description of the dynamic distribution of power, learning, and benefits among participants in a value chain.
Inlet	Inlets are small structures across the embankment to take in fresh water for irrigating high lands along the periphery of the polder. Outlets are small structures across an embankment to drain out local pockets in the polder.
Landless/Labour Contracting Societies	It is an approach to engage local poor people/labourers as a group for construction of rural infrastructures. The group is treated by the development authorities/project as a contractor for the work allocated.
Local Governmental Institutions (LGIs)	The institutions formulated under different Acts/Ordinances to run the different administrative unites of Local Government system by the Government.
Kharif-I	Pre-monsoon season, from March to half July.
Kharif-II	Monsoon and post-monsoon season, from July to October.
Khal	Excavated or natural routes across any land area for draining out excess water and flushing in required water.
Market Actor	Smallholder, input supplier and output market players directly participating the value chain.
Market development based	Activities that try to make the interaction between demand and supply more effective.
Market transaction	The exchange between demand and supply is at full market price (the price at which suppliers are prepared to sell and consumers are prepared to buy, in an unsubsidized situation).
Market	A set of arrangements by which buyers and sellers are in contact to exchange goods or services—the interaction of demand and supply.
Needs Assessment	It is an assessment of the needs and priorities of local population in a polder.
Piker	Buys directly from various farmers to ensure a bulk. Bulk is sold to Arotder or to destination market. Exerts the main influence on price earned by farmers.
Polder	A polder is an area protected by embankment all around, having necessary structures across the embankment to drain out excess rain water and flush in required fresh water for irrigation.
Rabi	Dry season, from November to March.
Standing Committees of UP	Standing Committee means the Standing Committee formulated under the Local Government (Union Parishad) Act, 2009.
Sluice	A sluice is a structure constructed across an embankment to drain out excess water from a polder and / or flush in required water in to the polder.

Union Parishad (UP)	Union Parishad means the Union Parishad formulated under section 10 of the Local Government (Union Parishad) Act, 2009.” It is the lowest tire of the Local Government system in Bangladesh.
Value Chain	A ‘value chain’ can be defined as all the actors who buy and sell from each other in order to supply a particular set of products or services to final consumers.
Water Management Group Action Plan (WAP)	It is the plan and strategy of the WMG, to address issues and problems of their area at a given time as well as to implement their actions as part of the polder development planning.
Ward	Ward means the Ward of Union Parishad. Each Union Parishad consists of 9 Wards.
Water Management Organisations (WMO)	It is a common name for all organizations formed for the purpose of water management in a polder, namely WMG, WMA and WMF.
Water Management Group (WMG)	Local people organized within a hydrological unit or at village level to manage water resources are collectively called Water Management Group.
Water Management Association (WMA)	It is a higher tier of water management organization formed by representatives of WMGs.
Water Management Committee (WMC)	It is a committee to initiate and coordinate operation and maintenance activities in a catchment area. It is formed by representatives of WMGs.
Water Management Federation (WMF)	This is the highest tier of water management organization in the polder. It is formed by representatives of all WMAs.
Zonal level	Blue Gold has three field offices in Patuakhali, Khulna and Satkhira to coordinate and manage the project interventions; these are sometimes called zonal offices.

1. Introduction

1.1 Blue Gold Program Context

The overall objective of the Blue Gold Program is to reduce poverty in the coastal area by enhancing the livelihood of the rural population, through more efficient water resources management and increase productivity of mainly crops, fishery and livestock in the polders and by empowering the communities to be the driving force.

The specific objectives of the Program are to:

- Increase sustainability of the development of the polders through effective community participation. The community organizations will become the driving force for the natural resources based development, whereby environment, gender and good governance are effectively addressed in their operations;
- Protect floods and use water resources effectively;
- Increase farmers' income and strength livelihood through improved productivity (for each polder a Business Plan will be developed with the value chain analysis); and
- Improve environment, drinking water and sanitation. The living environment will be realized and sexual reproductive health rights (SRHR), balanced nutrition, and good governance issues are well understood and applied.

1.2 Definition and Objective of a Polder Development Plan

Definition of a Polder Development Plan

A Polder Development Plan (PDP) contains an integrated analysis and planning for developing a polder in relation to community mobilization, water management, agriculture, business development, environment, gender, and institutions¹.

Objectives of a Polder Development Plan

1. The provision of an internal discussion document for the Blue Gold TA team and the implementing agencies (BWDB and DAE) to plan, design and implement at polder level in an integrated manner;
2. A clear outline for WMOs what type of activities Blue Gold is providing, which helps them to develop their own WMG Action Plans (WAP);
3. A starting point for BWDB to prepare detailed rehabilitation plans and for DAE to fine-tune the FFS modules and stimulate business activities as well as a strategy to strengthen institutions like Union Parishad (UP); and
4. Linkages with Blue Gold's logical frameworks and M&E activities, to ensure that the proposed interventions at polder level are contributing to the overall program objectives and can be justified towards stakeholders and donors.

¹ An important consideration is that a polder is a multi-dimensional geographical unit delineated by water in which various and continuously changing development processes take place. Polder boundaries do not always coincide with administrative boundaries. The PDPs developed by the Blue Gold Program therefore do not capture the full picture. They zoom in on specific water and production related features of polders and try to make a dynamic analysis of the water management organisations operating in that sphere, their resources, their activities and their needs. Other Local Government Institutions (LGIs), NGOs and donors are operating in the same polders and they have their own sphere of interest, scope, analysis, plans and programs within or even beyond the physical boundaries of these polders. A Blue Gold PDP is thus not a substitute or umbrella plan for all types of activities and programs taking place in the polder.

2. Present Situation and its Challenges

2.1 Physical Features and Demography

Polder 31-Part covers only the Surkhali union under Batiaghata Upazila of Khulna District. The polder was constructed in 1967-72 by Bangladesh Water Development Board (BWDB). The polder is located in the South-West hydrological region of Bangladesh, with administrative jurisdiction under the Khulna O&M Division -2, BWDB, Khulna. The polder is directly surrounded by the Upper Bhadra River in the west, Jhapjhapia River in the east, Manga River in the southeast and Bhadra River (dead) in the southwest. The characteristics of the polder can be found in Table 1 and the location map of the polder with respect to Upazilla and Union headquarters is shown in Figure 1.

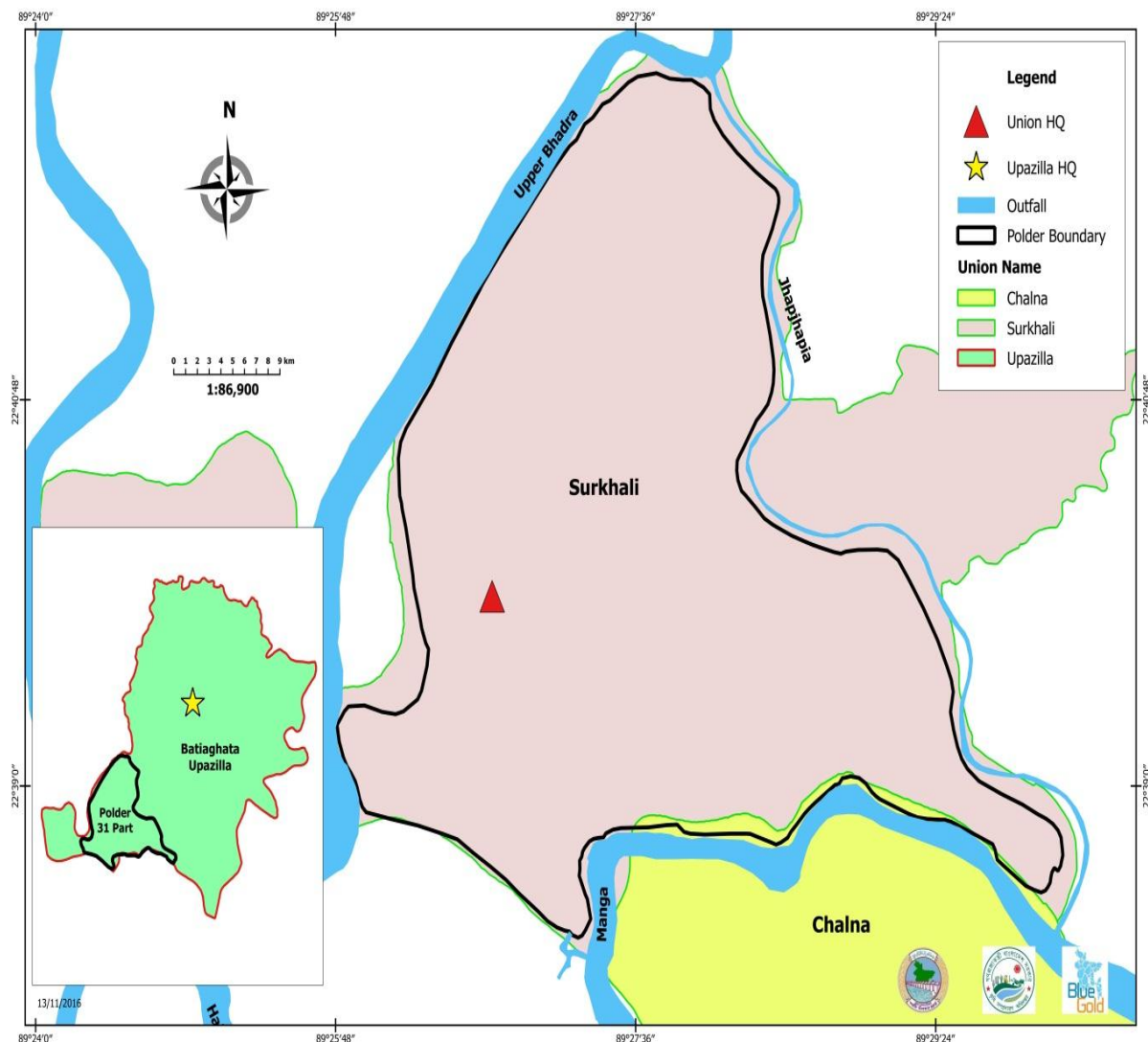


Figure 1: Location of Polder 31-Part in Batiaghata Upazila under Khulna District

Table 1: Main Physical and Demographic Characteristics of polder 31-Part

Characteristics			
Included Upazila(s)	Batiaghata		
Included Unions	Polder 31 part is situated in Surkhali union under the Batiaghata Upazila.		
Polder boundary (in km)	26.672 km		
Total number of Mouzas	14		
Total polder area (in ha)	4848		
Total number of households in the polder	5196		
Total number of catchments	9		
Net cultivable land (in ha)	1,853 ha	High land: 2% Medium-high land: 75%	Low land: 15% Medium-high land: 8%
Population	9400		
Literacy rate	44.72%		
Major occupations	Agriculture (37.1%)	Agricultural labour (21.5%)	Business (6.5%) Others (34.9%)
Economic condition	Rich: 10%	Middle class: 25%	Poor: 65%
Status of seasonal labour migration	According to field findings, peoples who are not permanently employed tend to engage themselves with seasonal works including agricultural labourers, fishers, brick field worker, earth workers, and cleaners. People stated that out migration of labourers is slightly found (2%) in the study area whereas in-migration is almost absent. These out-migrants are mainly agricultural labourer usually go to neighbouring upazilas (Gopalganj, Khulna, Dhaka) during May to September for better livelihood and lack of employment opportunity over the polder from April to June.		
Status of internal road communication	Internal road communication facilities are partially depends on embankment road and inside branching roads are connected with embankment road. In the polder there are 51 Km road in which 10 km Pucca road (Bituminous road), 12 km are Herring Bone (Brick made) and 29 km kaacha (earth made) road.		

2.2 Water Resource Management and Infrastructure

In the main characteristics of the water resource management and infrastructure of polder 31-Part are highlighted and Figure 2 shows the existing infrastructure and khals in polder 31-Part. Further details can be found in Appendix 2.

Table 2: Main Water Resource Management and Infrastructure characteristics of polder 31-Part

Characteristics			
Length of embankment (in km)	30.00		
No of drainage/flushing sluices	10	Well-conditioned: 10	Bad conditioned: Nil
No of inlets	02	Well-conditioned: 01	Bad conditioned: 01
No of (drainage) outlets	01	Well-conditioned: Nil	Bad conditioned: New Construction
No of canals	17 (Main-11 and Secondary-7)		
Length of canals (in km)	50		
Main outfall rivers and khals	Mouga (More Active), Bhadra (Dead), Lower Salta (Active), Jhapjhapia (Nearly Dead).		
Situation of tidal and river flooding	There is no tidal flooding in polder 31-Part. River flooding takes place in monsoon. Expected depth of inundation is about 0.60m to 1.50m in monsoon. The duration of inundation about 2 to 3 months.		
Locations with water logging and siltation.	Water logging locations are Rajakhar beel, Gariardanga, Sapa, Barobhuyan Sluice area and Ralia, Chardanga, Thandamari khal area.		
Most river erosion prone area	Barobhuiyan two places, Bhagobatipur and Keshorabad area.		

Other relevant water issues	Polder 31-Part falls in the minor wind risk zone.
Key challenges in effective water management	1. To be removed water logging and Protect erosion point.
Challenges in planning construction of water infrastructures within polder area	Not found during planning construction of water infrastructure within polder 31-Part area.
Current internal polder water management practices	During this year 2016, there is one Community Agricultural Water Management areas in Ghatarkhal.
Overall condition of internal polder water management	Partially Good.
Opportunities for internal polder water management	Horizontal Learning between Ghatarkhal WMG with other WMGs.

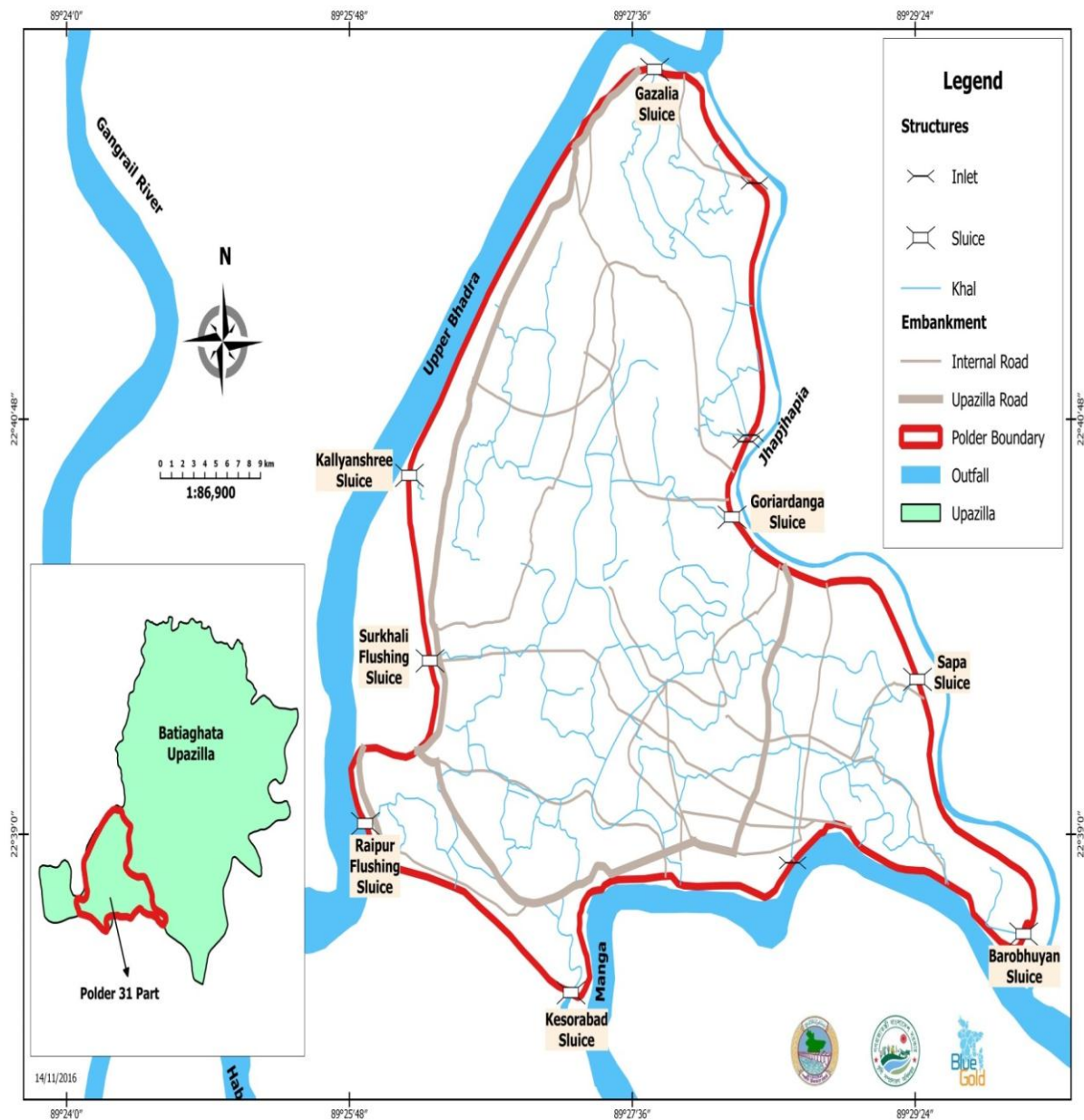


Figure 2: Map of Polder 31-Part showing the existing Khals and Water Management Infrastructure

2.3 Institutional Framework for Participatory Water Management

The main institutional actors in polder 31-Part are Union Parishad (UP), its Wards, various Local Governmental Line Departments, a number of NGOs, Micro-finance Institutions, Market Committees, Water Management Groups (WMGs), a Water Management Association (WMA) and Union Disaster Management Committees (UDMC). Main characteristics of the WMGs and WMAs and other institutional actors are highlighted in the Table 3. The boundaries and names of the WMG and WMA are shown in Figure 3.

Table 3: Main characteristics of the Institutional Framework of PWM in polder 31-Part

Characteristic			
Number of WMGs	12	Registered: 12	Non-registered: 0
Members of WMGs	4580	Female: 1941	Male: 2639
HHs being part of WMGs	2867		
Number of WMAs	2	Registered: 0	Non-registered: 2
Female representation in WMGs	42%		
Total deposited fund (BDT)	262077		
Total savings of WMGs (BDT)	164240		
Total number of WMGs with O&M fund	41218		
Names of projects and organisations with similar / related activities	No related activities		
Existing WMOs linkages with other stakeholders	Generally strong linkage with UPs, however linkages with other service providers like DAE, BWDB, LGED and NGOs and private sector actors could still be further strengthened.		
Number of WMGs member including in UP standing committee	15		
O&M agreement signed with BWDB	No		
Current participation of WMOs in O&M	Moderate. WMG does it as per their need.		
Existing conflicts on water management	No major conflicts		
Key challenges in strengthening PWM	<ol style="list-style-type: none"> 1. River erosion is seriously hampering embankment and as well as it has major negative impact in livelihood. 2. Operation of water infrastructure which is currently operating by LGIs and its petty challenges to handing over to WMOs 3. Political influence 4. Lack of smooth internal water management 5. To build capacity in managing WMOs without conducting training in time. 		
Key challenges in relation to women participation	No challenges here in polder 31-Part in relation to women participation but still some women's those who are out of WMOs still cannot have their much mobility access. Still women from rich family are not coming in the water management group.		
Key opportunities in PWM	<ol style="list-style-type: none"> 1. Linkages with other institutional actors could be further strengthened. 		

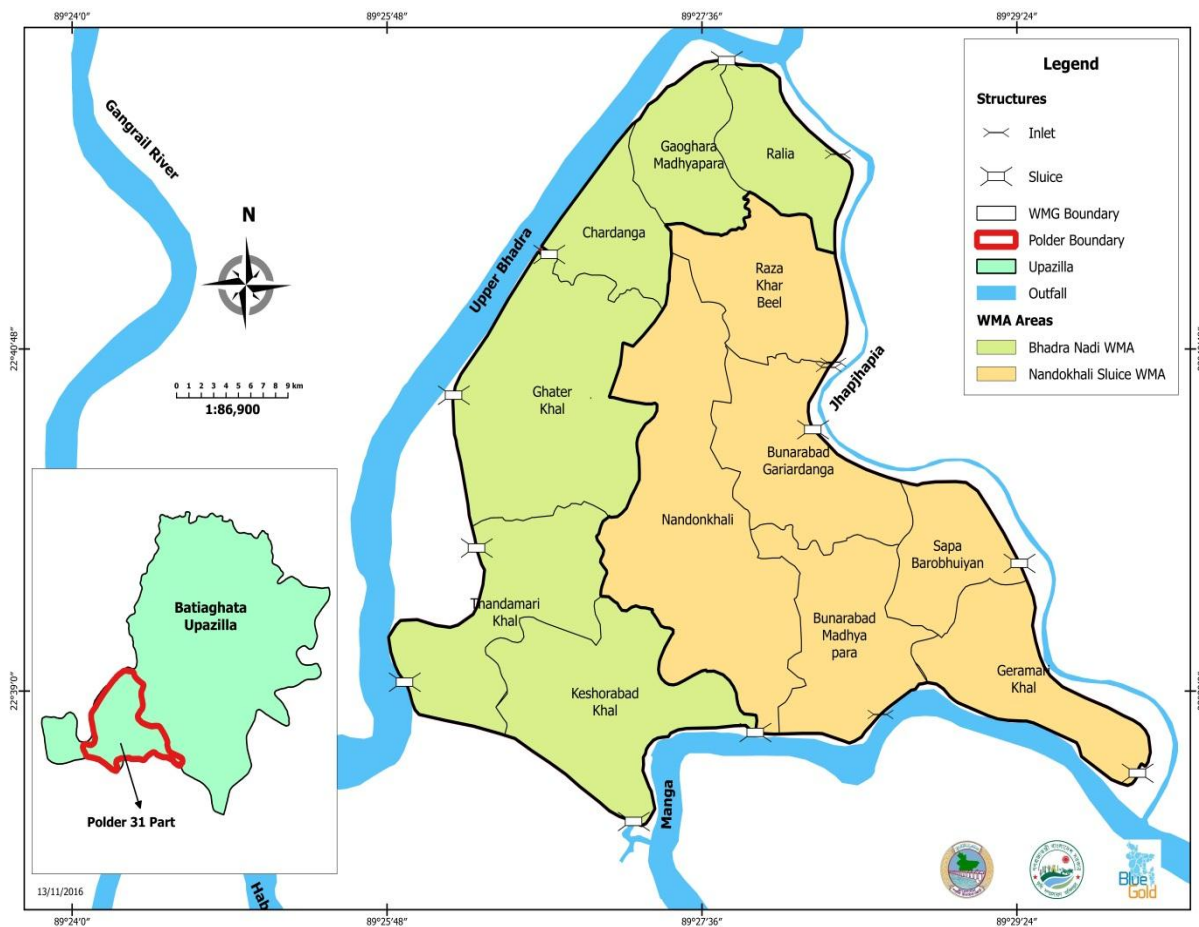


Figure 3: Name of WMG and WMA areas in Polder 31-Part

2.4 Agricultural and Marketing Services

In polder 31-Part, most polder dwellers are involved in crop production and fish culture. Livestock keeping is to a certain extent important. The most important characteristics and challenges of agricultural production and marketing services can be found in Table 4. The main markets of polder 31-Part are shown in Figure 4.

Table 4: Main characteristics of Agricultural and Marketing Services in polder 31-Part

Characteristic			
Main crops (top three)	1. T.Aman	2. Sesame	3. Boro
Current most common cropping calendar(s)	Fallow – T. Aman – Fallow Fallow – T. Aman – Boro Fallow – T. Aman – Sesame Fallow – T. Aman – Vegetables		
Current cropping intensity	176%		
Main vegetables	Bottle gourd, Snake gourd, Ash gourd, Ridge gourd, Okra, Bitter gourd, Indian spinach, Red Amaranth, Yard-long bean, Country bean, Cucumber, Chilli, Brinjal		
Main fruits	Sapodilla, Mango, Guava, Coconut, Wood apple, Banana and Jujube		
Available agricultural machinery	Power tiller, Low lift pump, Sprayer, thresher etc. at farmers level which is not sufficient.		

Present irrigation practices	There is no command area under irrigation scheme but people cultivate Boro rice through irrigation from their gher. Sometimes few farmers produce Boro rice through irrigation using low lift pump. All together about 10% land is under irrigation practices.
Availability of inputs	The inputs are available but quality inputs are not available. Such as rice seed is available but HYV rice seed are not available in the polder area. 80% of the farmers use their own preserved seeds (local and HYV) for rice production, the rest of the farmers collect from BADC or private companies. Sesame seeds are also available to the farmers.
Current knowledge on proper input use	The knowledge level of the farmers of this polder is very low regarding proper input use. They don't know the optimum doses of fertilizers and seeds that affect their yield and net benefit as well. The farmers have very limited knowledge on judicious use of pesticide also.
Key challenges in agriculture	<ol style="list-style-type: none"> 1. Water logging and salinity. 2. Poor knowledge on improved agricultural technologies 3. Inadequate extension services
Percentage of households owning livestock	<p>Cattle : 90-95 %</p> <p>Poultry : 85-90 %</p> <p>Goat: 60-70 %</p> <p>Sheep: 5-10%</p>
Availability of inputs for livestock	In the polder level inputs like Mastered oil cake, till oil cake, rice bran etc. are available but farmers are not satisfied with the timely availability and its prices. So they move to Dumuria or Khulna for purchasing feeds and medicine also.
Important business trend in livestock	The number of commercial poultry farm specially broiler farm gradually increasing in the polder area and also layer farm becomes popular in the polder.
Key challenges in livestock	<ol style="list-style-type: none"> 1. Awareness of farmers regarding improved feed and breed of livestock 2. Quality feed and price 3. Availability of inputs (Medicine, vaccine, feed etc.) 4. Awareness of vaccines and medicines.
Percentage of households involved in fish culture	65-70% of the households are involved in fish culture
Types of fish	There are so many fish species of fresh water fish and three species of exotic carp, one species of cat fish and two species of tilapia. There are some shell fish species of fresh water prawns, including Golda. The common open water resident fishes are Bele, Chanda, Mola, Boal, Sing, Magur, Koi, Puti, Taki, small Chingri, Baim and Kholisha fish.
Availability of inputs	Locally the inputs are not available due to absence of nurseries but the local sellers sell the fingerlings in the polder areas collecting from far places like Jessore. All fish feed sellers' products (e.g. C.P. Bangladesh Ltd, Nourish, Paragon, Quality, and Godrej Agro vet Pvt. Ltd. and Aftab) are readily available in polder area. Fish feeds and medicines are available on a credit basis for large farmers. The farmers also buy inputs from local market- Batiaghata and Gaoghara.
Important business trend in fisheries	After harvesting the fishes from their ponds/ghers they sell it in the local markets like Gaoghara and Batiaghata. But if the volume is large they sometimes carry it to the large market in Dumuria or Khulna.
Key challenges in fisheries	<ol style="list-style-type: none"> 1. Traditional practices; 2. Unavailability of quality fingerlings; 3. Introduction of modern production technologies; and 4. Seasonal ponds.
Existing extension services	There is no extension worker from the Fish dept. in the polder area. Blue Gold Program organized FFS on pond fish culture and provided training and extension services.
Name and location of markets	In polder area, mainly Gaoghara bazar, Surkhali bazar and Sukdara bazar as treated as a broader bazar between polder 30 and 31-Part. But polder dweller

	also goes to nearest market of Baroaria, Sharafpur and Batiaghata market which is located outside the polder.
Products provided	Major areas are covered by rice cultivation among both in T-Aman rice and Boro rice (in high land area) and sesame is the second crop. But in some areas covered by fish culture. Very negligible numbers of field areas as well homestead areas are cultivated different vegetable. So Rice, sesame, fish and vegetable, are the main marketable products of this Polder.
Surplus destination of products outside polder	T-Aman rice is the main agricultural products of Polder 31-Part and after family consumption; farmers sold the surplus rice through Batiaghata market and this product directly goes to Khulna or outside the polder area. Sesame is the second largest crops and farmers produced it as cash crop so that 100% products sold through Batiaghata bazar and this product directly goes to foreign market via Natural Agro Processing Center (NAPC) Khulna.
Main value chain actors	<p>T-Aman rice and Sesame was selected as value chain products. Input and output market facilities are very limited inside the polder area but polder's farmers have easily access to Batiaghata bazar for avail the all marketing facilities. So approximately 10-12 input traders (Seed & Pesticide/Medicine) are linked as value chain actor. On the others hand, output market level also very limited and most of the big market actors are not available in the polder area but in market day they are coming from out side the polder</p> <p>Among the actors someone play the supporting role and someone functioning as the main actor. Union parishad, union level government office like; DAE & DLS have been providing support services.</p>
Key challenges in marketing	<ol style="list-style-type: none"> 1. The polder is located in very distance place from Batiaghata and as a result big buyer could not easily goes to inside the polder for buying bulk amount of product. 2. Farmers' always paid high transportation cost for selling their products through Batiaghata (for sesame selling), Baro Aria bazar and Sharfpur, because of one market located in distance and another two is remote by crossing the river. 3. Farmers are prohibited to use their own seed (local variety rice seed, brown sesame seed) and it is one of the major challenges to increase production. 4. Lack of Knowledge on Improved production technology (seed rate, fertilizer use) and Post harvest technologies (timely harvest, drying).

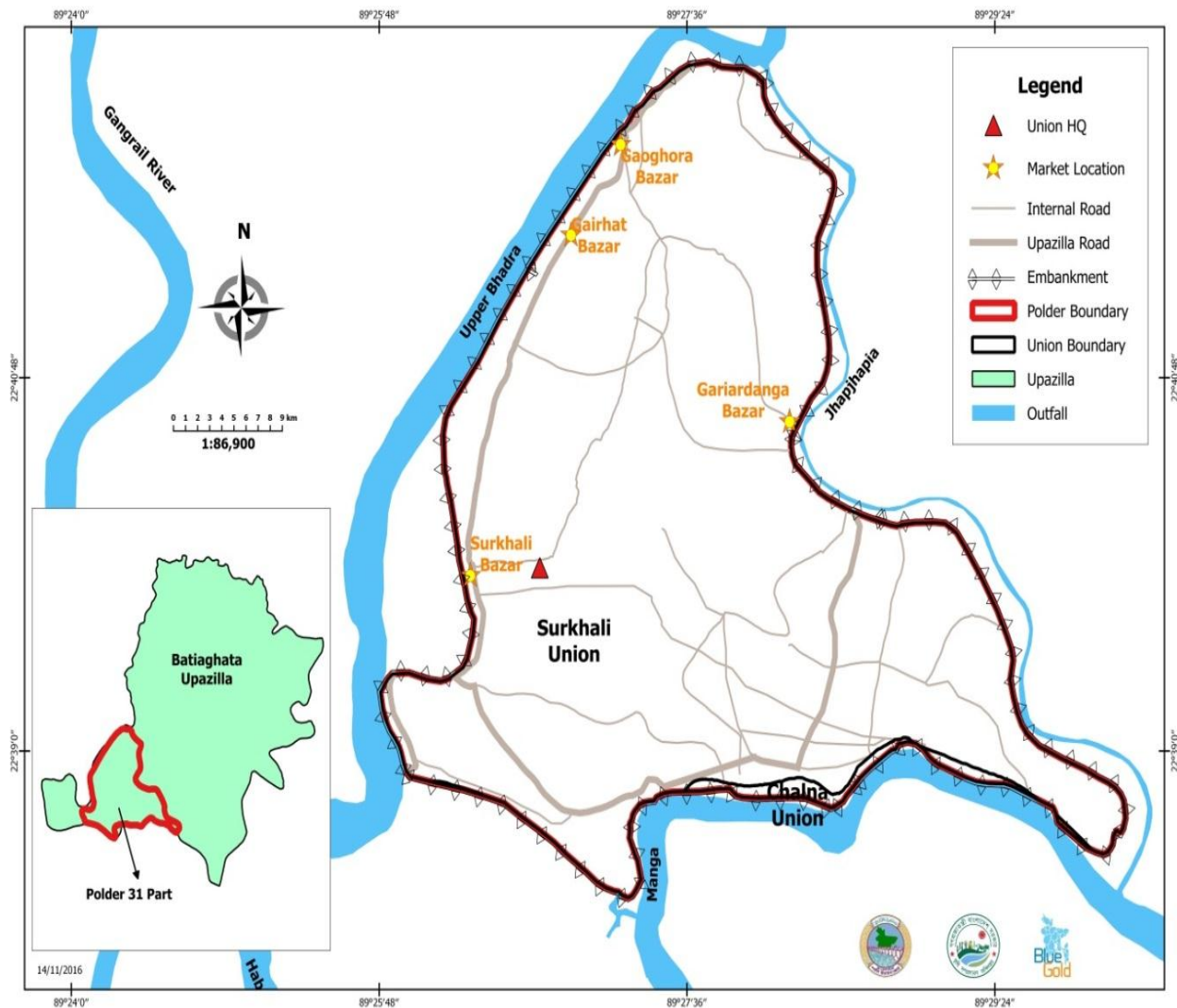


Figure 4: Markets and Union headquarters in Polder 31-Part

2.5 Environmental Sustainability and Disaster Risk Reduction

Table 5: Main environmental and DRR characteristics of polder 31-Part

Characteristics	
Existing environmental problems	<ol style="list-style-type: none"> 1. Polder 31-Part is surrounded by the Upper Bhadra (west), Jhapjhapia (east), Manga (southeast) and Mora Bhadra (southwest) rivers. Among these rivers, the Mora Bhadra has been silted up and a substantial portion has been converted into agricultural land. Most of the khals dried up in the dry season except Naddankhali khal and Gojaliala khal. 2. Presently, around 65% of the khals inside the polder (Nandankhali Khal, Surkhali Khal, Churar Khal, Boromoter Khal etc.) are affected by regular drainage congestion. 3. Saline water intrusion due to mal-functioning of regulators and/or illegal intrusion of saline water by the local people for bagda gher that ultimately hampers fresh water fish habitat in the polder area.

	4. Excessive use of pesticides such as Basudin, Furatar, Fighter, Rovral, Ridomil gold etc. to prevent pest infestation in the rice, watermelon and sweet gourd cultivation which ultimately degrading the flora and fauna at the natural habitat		
Common hazards	People are experience with number of hazards of which they could recall the devastation made during Cyclone Aila in 2009 and Sidr in 2007. Other than cyclone the polder area is prone to water logging, tidal surge and river bank erosion.		
Cyclone shelters	4 cyclone shelters among them one is under construction		
Obtained environmental clearance certificate (ECC)	Not yet received		
Formulated environmental and social management plan (ESMP)	Yes		
Formulated community based disaster risk reduction (CBDRR) plan	Yes		
Recruited WMG environment and DRR counselor	24 counselors	12 environmental counselors (female)	12 DRR counselors (male)
Members of WMOs included in UDMC	0		
Opportunities for environmental and DRR activities	<ol style="list-style-type: none"> 1. Remove the water hyacinth from the khals and discourage the use of current jal (gill net) to reduce congestion of water hyacinth in the canals. 2. To disseminate disaster related information to make local community aware about pre-disaster preparedness, during and after disaster duties in family and community level to increase community resilience and strengthening local capital. 3. Assist and empower WMG's counselors to make a strong platform in community level that will ensure strong linkage and joint collaboration with existing UDMCs. 4. To increase women's participation in DRR and environment related activities that will empower women to take DRR related initiatives and activities in case of family level. 		

3. Activities as of November 2016

The activities which achieved as of November 2016 on the area of Water Resources Management and Infrastructure, Institutional Framework for Participatory Water Management, Agricultural and Marketing Services, and Environmental Sustainability and Disaster Risk Reduction is summarized below in the table-

Sl. No	Activities	Time Frame	Present Status	Remarks
A. Water Resources Management and Infrastructure				
A-1	Embankment Re-Sectioning	2014-2016	1.050 km completed and 10.27 km on going	
A-2	Embankment Retired	2014-2016		Nil
A-3	Khal Re-excavation	2015-2016	2.40 km completed and 19.52 km on going	
A-4	Infrastructures Rehabilitation			Not yet done
A-5	Formation of Labour Contracting Societies (LCS)	2014-2015	12 WMGs and 39 LCS formed and trained and mobilized	
5.1	Formation and Registration of WMGs			
5.2	Formation and Training of LCS			
5.3	Mobilize for earthwork			
B. Institutional Framework for Participatory Water Management				
B-1	WMO (WMG & WMA) Formation & strengthening Activities Arrange registration with BWDB and conduct new elections	2014-2015	Two WMAs was formed in 2015 as well as 12 WMGs already registered.	
1.1	Form Ad Hoc Committees			
1.2	Review and update/amend by-laws in accordance with Participatory Water Management Rules 2014			
1.3	Update records/books/ ledgers			
1.4	Firming-up membership list and membership enrolment with at least 55% households represented and increase female membership to at least 40%			
1.5	Prepare and conduct new elections for Executive Committee			
1.6	Register WMGs & WMAs with BWDB			
B-2	Organize various training for WMO Strengthening: Organizational Management and Leadership, Financial management, O&M, Ensure the formation of sub-committees after training: O&M, Business, Audit.	2015-2017	Gender and Leadership training and Participatory monitoring training is on going.	
B-3	Stimulate women participation in elections of WMA and WMG committees and increase their membership to at least 33% of which at least one in key-position through Gender & Leadership training for males and females	2014-2015 Next elections, regular follow-up	42% women has enrolled	

B-4	Organize orientation training for UP and stimulate WMG members to participate in various UP committees to advocate for financial and in kind support	2016-2017 UP orientation September 16, with regular follow-ups	Done	
4.1	Union Development and Coordination Committee			
4.2	UP Standing Committees			
4.3	Ward Shova (contribute in planning and budgeting)			
4.4	Union Disaster Management Committee			
4.4	Also stimulate UP members to participate in WMO meetings			
B-5	Support WMGs with WMG Action Plans (WAPs) formulation and implementation	Jan-Jun 2015 onwards	Done	
5.1	Formulation of WAPs			
5.2	Ensure incorporation of WMG strengthening plan, O&M plan, Gender action plan, Business development plan,			
5.3	Organizes regular meetings with WMGs to update WAPs.			
5.4	Invite UP members to attend meetings.			
B-6	Stimulate as much as possible participation of WMG members in Farmer Field Schools (FFS), especially females and vulnerable members, ask regular feedback on preferred FFSs.	2015-2016	Done	
C. Agricultural and Marketing Services				
C-1	Tree plantation at homestead garden for utilization of homestead area through farmers field school	2014-2017	Vegetable seeds and fertilizer already provided	Planned to provide saplings for 50 participants, 2 saplings for each participants
C-2	Activities to improve crop production	2014-2017	Done	
2.1	FFS on homestead garden (vegetables), poultry and nutrition.			
2.2	Demonstrations / trials on			
2.3	Winter vegetables and poultry			
2.4	Demonstration and trial on potential crops and vegetables			
2.5	Field day			
C-3	Activities to increase fish production	2014-2016	Done	
3.1	Pond fish FFS			
3.2	Trial on fish culture			
3.3	Organize Field days			
C-4	Activities to improve livestock production	2014-2016	Done, Poultry learning session is on going	
4.1	Poultry and nutrition FFS			
4.2	Livestock vaccine at WMG/WMA level			
4.3	Community Animal Health Worker training			
4.4	Polder level fodder trial			
4.5	Polder level beef fattening			
4.6	Field day on livestock activities			
C-5	Select or prioritize value chains for analysis (VCA) and consult the actors for VCA	2014-2015	Relevant Stakeholders	
C-6	Business related capacity building for TA- Staff, extension staff and Field Trainers (FTs)	2015-2016	Done	Refresher will be organized
C-7	Training on Savings and Credits management	2015-2016	WMGs	

D. Environmental Sustainability and Disaster Risk Reduction				
D-1	Conducting Environmental Impact Assessment (EIA)	2015-2016	Done	Through Outsourcing
D-2	Formulation of Environmental and Social Management Plan (ESMP)	2014-2015	Done	
D-3	Orientation to LCS Leaders, contractors & WMA leaders regarding Env. Safeguards & Conditions of Env. Clearance certificates.	2015-2016	Done	
D-4	Formulation of Community Based Disaster Risk Reduction (CBDRR) plan	2014-2015	Done	
D-5	Recruitment of WMG's Environment and DRR Counselors	2016- 2017	Done	

4. Development Action Plan

On the basis of the present situation and its key challenges as presented in chapter 2, a Development Action Plan has been prepared by the Blue Gold program, and is presented in this chapter.

4.1 Water Resources Management and Infrastructure

A planning meeting with local elites and UP of polder 31-Part was held on 26 August 2014 in Surkhali UP hall room. After thorough discussion and arguments with the local stakeholders the following infrastructures were identified and validated for inclusion in the Blue Gold implementation program. Embankment re-sectioning and repair/reconstruction of structures with gates were considered as priority-1 work. Re-excavation of major khals for drainage was considered as priority-2 work while re-excavation of branch khals to improve irrigation and drainage, and construction of new structures along with other works were considered as priority-3 works².

4.1.1 Summary of Rehabilitation Works

SL.	Name of Work	Units	Quantity	Total Cost, BDT	
1.0	Priority 1	Re – sectioning of Embankment	Km	8.922	28456318.00
2.0		Repair of Sluice	Nos.	02	4434697.27
3.0		Construction of Nondankhali Sluice DS – 3v	Nos.	01	25770829.00
4.0		Construction of Goriardanga pipe Inlet	Nos.	01	2966851.00
5.0		Re – excavation of khal	km	21.92	28765583.00
6.0		Chararkhal Outlet	Nos.	01	6000000.00
7.0		450 mm pipe (Diameter)	M	400	800000.00
8.0		Repair of pipe Inlet	Nos.	01	2000000.00
Total cost for Priority 1				9,91,94,278.27	
1.0	Priority 2	Re – sectioning of Embankment	km	2.400	5223982.00
2.0		Re – excavation of khal	Nos.	5.000	6561492.00
3.0		Construction of keshorabad Sluice 2v	Nos.	01	20000000.00
4.0		Repair of Sluice	Nos.	02	4691754.48
5.0		Culverts over different Khals	Nos.	03	12000000.00
Total cost for Priority 2				4,84,77,228.48	
1.0	Priority 3	Retired Embankment	Km	2.000	20000000.00
2.0		Culverts over different Khals	Nos.	05	12000000.00
3.0		Pump House	Nos.	01	5000000.00
Total cost for Priority 3				3,70,00000.00	
Total cost for Rehabilitation Works in Polder 31-Part				18,46,71,506.00	

A map showing proposed rehabilitation plan is given in Figure 5

² Actually all works are needed for efficient water management and to reduce health and environmental hazards in the polder. However, since fund is limited, prioritization will give a scope for phasing out the work depending on DPP provision and availability of fund. Priority-1 works include activities that are related to the safety/ immediate problem solution of the polder. Priority-2 works include activities that are required for proper functioning of the polder. Priority-3 works are not immediately needed but are desired for further improvement of the water management and environmental conditions in the polder. If DPP allows and fund is available all works will be done.

4.1.2 Operation and Maintenance and Internal Polder Water Management

After rehabilitation the Water Management Association (WMA) will play an important role in operation and maintenance, on the basis of an agreement between the WMA and the concerned BWDB field Executive Engineer, to be finalised before the execution of the rehabilitation works. The O&M agreement will identify all operation and maintenance activities in the polder and delineate sharing of the responsibilities between BWDB and WMA. Small routine maintenance works will be implemented by WMA; and larger routine and periodic maintenance works implemented by BWDB. However, the real sharing can be anything according to the terms of agreement and mutual concurrence. The O&M agreement may also identify BWDB resources in the polder that can be used by WMA to partly or wholly mobilize resources for operation and maintenance. Technical knowledge will be provided by Blue Gold through training.

Based on this, in the first year after completion of rehabilitation, WMA's along with BWDB and TA Team will make operation and maintenance plans, implementation budget and resource mobilization plan. The WMGs will develop Internal Polder Water Management plans as part of their WMG Action Plans. All plans will be implemented by WMOs and BWDB with direct assistance from TA Team. In the second year after completion, as part of the exit strategy, WMOs and BWDB will make their plans as usual, but TA team will provide only backstopping support as and when required. At the end of the second year, there will only be TA support for monitoring of O&M and internal polder water management, and WMO's along with BWDB will continue the O&M activities in line with the agreement.

In the meantime, the TA team will continue to work with the BWDB at different levels to find an institution basis which will encourage effective commitment to and action for fulfilling the BWDB commitments under the O&M agreement with the WMA.

No.	Activity	Time Frame	Responsible Actors	People to involve
1.0	Implementation works like Embankment Re-sectioning/Construction, Khal Re-excavation and Repair/Construction of Structures	2014-2019	BWDB, TA-Engineering staff	LCS, WMA Monitoring Committee, WMA and WMG Executive Committee, BWDB
2.0	Support the monitoring of implementation works by LCS/Contractor and issue Satisfactory Completion Certificate by WMA's regulation after completion of the works.	2014-2019	TA- Engineering Staff, Socio-Economists, COs	WMA Monitoring Committee
3.0	Participation in routine O&M	After implementation of O&M works	BWDB, TA-Socio-Economists, COs and Engineering staff	WMA and WMG Executive Committee, BWDB
3.1	Signing of O&M agreement			
3.2	Follow up O&M training			
3.3	Polder inspection and identification of O&M requirements			
3.4	Plan O&M activities			
3.5	Resource mobilization for O&M			
4.0	Internal Polder Water Management	After main WRM infra is implemented: 2016-2019	SAAOs (DAE), XOs (BWDB), TA-Socio-Economists, Engineering staff COs, FOs and PFs	WMA and WMG Executive Committee
4.1	Identify WMGs interested to work along Community Agricultural Water Management (CAWM) model.			
4.2	CAWM planning			
4.3	CAWM implementation			
4.4	Monitoring of CAWM			
5.0	Back-up support in the yearly joint polder inspection and assessment of O&M requirements, CAWM by BWDB and WMA	2016-2019	BWDB, TA-Socio-Economists, COs, FOs & PFs and Engineering Team	WMA and WMG Executive Committee, BWDB

4.2 Institutional Framework for Participatory Water Management

Activities to strengthen the Institutional Framework for PWM have been planned with multi-fold objectives: (i) to help the WMOs to become active and sustainable organizations, and able to participate responsibly in polder development activities (ii) stimulate effective women's participation (iii) to orient Union Parishads and other relevant stakeholders to support planned activities effectively.

No.	Activity	Time Frame	Responsible Actors	People to involve
1.0	WMG & WMA strengthening Activities Arrange registration with BWDB and conduct new elections	2014-2017	OCWM, TA-COs, ZSEs	WMOs, BWDB
1.1	Update records/books/ ledgers			
1.2	Firming-up membership list and membership enrolment with at least 55% households represented and increase female membership to at least 40%			
1.3	Prepare and conduct new elections for Executive Committee			
1.4	Register WMAs with BWDB			
2.0	Organize various training for WMO Strengthening: Organizational Management , Gender and Leadership, O&M, Ensure the formation of sub-committees after training: O&M,	2014-2017	TA-COs, ZSEs. Training Team, Engineering Staff	WMOs, BWDB,
3.0	Gender & Leadership training for males and females	2016-2017	TA-COs, Gender Expert and Training Team	WMOs, OCWM
4.0	Support WMGs with WMG Action Plans (WAPs) formulation and implementation	2015-2018	OCWM, TA-COs and ZSEs Gender expert	WMGs, UP, DAE, BWDB
4.1	Updating the WAPs once in a year			
4.2	Ensure incorporation of WMG strengthening plan, O&M plan, Gender action plan, Business development plan,			
4.3	Organizes regular meetings with WMGs to review WAPs			
5.0	Organize Horizontal Learning Program with WMG members, FFS members and UP members.	2016-2018	DAE, TA-COs and FOs	WMGs, DAE
6.0	Organise regular discussion / coordination meetings with other organisations working in polder area	2014-2018	TA-Zonal team	WMOs, UP, BWDB, DAE
7.0	Up-scaling of CAWM	2016-2018	WMOs, UP, BWDB, DAE	TA-Zonal team
8.0	Participatory monitoring	2016-2018	TA-Zonal team	WMOs, UP, BWDB, DAE
9.0	WMG Audit	2016-On going	BWDB and WMG	TA

4.3 Agricultural and Marketing Services

The agricultural production and business development aspects of the Development Action Plan focus on the development potentials and required actions in relation to crops, fisheries and livestock while taking into account development potentials of specific value chains.

Sl. no	Activities	Time frame	Responsible actors	People to involve
	Agricultural Services			
1.0	Currently total 12 FFS are running and that will be continue up to December 2016 At the moment a total of 2 FFS of FFS cycle 8 are implementing in polder 31-Part and it will be continue up to 2017.	2016-2017	TA-FO, Master Trainers, Agriculturist	WMA, WMG, CO and PF
	Business Development			
2.0	Economic development of WMG members through implementation of MFS (Production, technology adaptation, market linkages) for Sesame, and T-Aman rice VC.	2015-2018	TA-PFs, and BDCs	WMGs, DAE, DLS,
3.0	Promote farmers level rice seed production technology (BR-23) for improve cropping system	2016-2018	TA-PFs, and BDCs, RFs	WMG
4.0	Establish demonstration for introduce alternative crops (Bottle gourd, sweet gourd, watermelon, mung bean) to improving the cropping pattern	2015-2018	TA-PFs, and BDCs, RFs	WMG
5.0	Promote proper record keeping by producer/ farmers in MFS sessions	2015-2018	TA-PFs, BDCs	MFS members, RFs
6.0	Promote Gender equality in market access and all steps in production through sessions in MFS	2015-2018	TA-Gender experts, PFs, BDCs	MFS members, WMG
7.0	Promote collective actions by MFS (WMG members) to overcome problems related to low quality inputs (seed, fertilizer, tillage etc.), and ensure higher price to selling products (sesame).	2015-2018	TA-PFs, BDCs	WMG, private company
8.0	Market orientation capacity building training for market actor (RF, input-output actor)	2015-2018	TA-PFs, BDCs	RFs, IPs, PTOs
9.0	Follow-up agricultural and business activities on the basis of farmer's needs by RF/Actor/WMG	2017-2018	DAE, TA-Project Extension Staff, Project Value Chain staff	WMG and MFS members
10.0	Market Linkage building w/s with different stakeholder (RF, PTO, Paiker, input retailer, WMG, etc.)	2017-2018	DAE, TA-Extension Staff, Project Value Chain staff	WMG and MFS members

4.4 Environmental Sustainability and Disaster Risk Reduction

The environmental sustainability and DRR aspects of the Development Action Plan focus on: i) compliance with social and environmental management regulations; and ii) strengthening DRR activities.

SI	Activities	Time frame	Responsible actors	People to involve
1.0	Obtaining Environmental Clearance Certificate from DoE	2016-2017	CEGIS	BWDB, DTL and Env.Expert
2.0	Environmental compliance monitoring and quarterly reporting to DoE	Three months interval after obtaining ECC	TA-Polder Team and Env.Expert	BWDB, DTL
3.0	Reconstitution of UDMCs and provide them capacity building support on disaster management	Jan-June, 2017	Hired SPs	TA- Env. Expert, ZSEs
4.0	Disaster preparedness and implementation of CBDRR plan	July 2016 to June 2018 (during cyclone seasons)	DRR Counselors, WMG and WMA	TA- Env. Expert, ZSEs
5.0	Training to Env. and DRR Counsellors and UDMCs on Env Safeguard and Dis.Mgt.	Jan-June, 2017	Hired SPs	Training Team, TA-Env. Expert, ZSEs
6.0	Awareness raising program	March 2016 to June 2018	Env. and DRR Counselors, TA-Polder Team	Env. Expert, Zonal Socio-Economists
6.1	Discussion on using fertilizer and pesticide use, and reducing indiscriminate fishing practices from the natural wetlands at WMG meeting, FFS & MFS session and FFD			
6.2	National and International Day observance related to environment and DRR (i.e. World Environment Day, National Disaster Preparedness Day, International Day for Disaster Reduction etc.)			
6.3	Discussion on use of clean drinking water (arsenic free tube-well water, treated/filtered pond/canal/river water and rain water tanks or sand filtered water) and the prevention of water borne diseases			
7.0	Integrate ESMP and CBDRR with the WAP, Annual Polder Action Plan and UDMC's DRRAP	March 2015 to June 2018	Env. and DRR Counselors, TA-Polder Team	TA-Env. Expert, ZSEs, COs

6. Polder Budget

The overview of the estimated allocated budget for the polder activities in polder 31-Part is presented in Table 6.

Table 6: Polder 31-Part Budget

S.N	Task Name	Total Amount	
		BDT* ^{x100000}	EUR** ^{x1000}
1.0	<i>Institutional Framework for Participatory Water Management</i>	3.0	3.4
2.0	<i>Main Infrastructure</i>	2185.8	2483.9
3.0	<i>Internal Water Management</i> <i>(Polder-wise budgets are based on an average amount per CWM-site. In reality budgets will vary per CAWM-site)</i>	18.0	20.4
4.0	<i>Agriculture & Marketing Services</i> <i>(Actual polder-wise budgets will be higher as exact #FFS per polder will be determined later, estimated DAE contributions have been included in these estimations)</i>	10.6	12.0
5.0	<i>Environmental & Social Management / Disaster Risk Reduction (DRR)</i>	24.5	27.8
6.0	<i>Training</i>	30.0	34.0
	TOTAL	2271.9	2581.5

Note: Exchange rate is 1 EURO=88 BDT

Appendix 1. PDP Formulation Process³

The Blue Gold Program makes use of the 6-step planning approach described in the Guidelines for Integrated Planning for Sustainable Water Resources Management (IPSWARM) that was adopted by the BWDB in 2008 for its medium sized existing Flood Control and Drainage schemes. Polder Development Plans are the 4th step which follows after the participatory data collection and needs assessment (step 2) and the formation of WMOs (step 3). In the PDP Formulation Process one can distinguish the following activities/tasks and their outputs (see Figure 6)

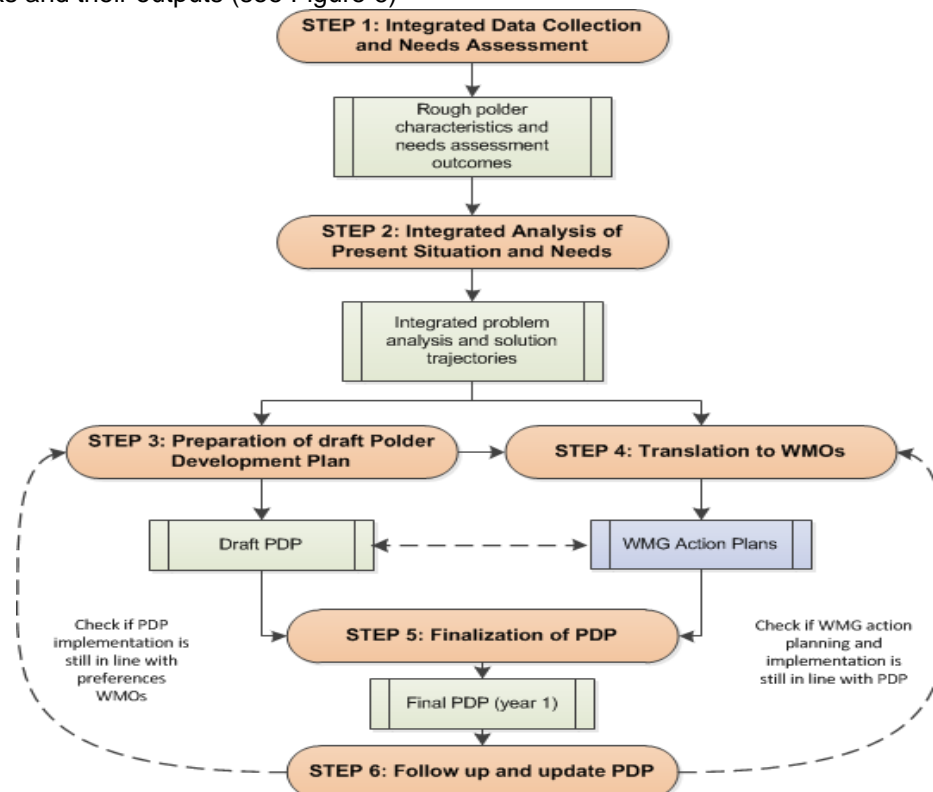


Figure 7: The steps of the PDP Formulation Process

Explanation of the different steps:

STEP 1: Integrated Data Collection and Needs Assessment: For the purpose of planning, data is collected through various methods: collection of existing information from governmental departments, observations in the field, informal interviews with people living in the polder area and key stakeholders, focus group discussions, consultation meetings, engineering surveys, agricultural surveys and value chain mapping and analysis. The various components do their field data collection individually, but coordinate their work to avoid overlap, gaps and misunderstanding among WMOs. The results and outcomes of each field visit, meeting, interview or focus group discussion are recorded. Data among others includes the Integrated Needs Assessment executed by component 1 and 2 (WMO strengthening); engineering survey details collected by component 2 and data collected by component 4 in relation to the value chain selection and analysis. The rough data are managed by the GIS specialist and used to generate specific geo-information maps or figures, which are published on an open source website (Lizard Portal)⁴.

³ This is this PDP formulation process as used in the former IPSWAM polders and polders 2, 26 and 31-part. For the polders later on selected within the BGP and after the TA team reorganisation, the process as described in Unified Working Processes is applied.

⁴ For the preparation of this PDP, no specific data sharing and internet platform was available yet. A so-called Master file has been developed to integrate data from different sectors for the development of value chain mapping and analysis. This has been used together with data collected by other components. By now, a part of the data has been uploaded on the internet platform.

Outputs:

- Rough data of polder characteristics
- Needs assessment report

STEP 2: Integrated Analysis of Present Situation and Needs: The integrated data collection and needs assessment is used to describe the present situation of the polder by summarizing the collected info in tables, figures, pie charts and maps with supporting text, as one of the core chapters of a PDP. The present situation in combination with the Needs Assessment is an input for a joint SWOT (strengths, weaknesses, opportunities, threats) analysis workshop within the Blue Gold Team. The outcomes of this SWOT exercise are used in a second workshop at polder level to formulate solution trajectories and activities for polder development. Extra attention is paid to address the severity of problems and the potential of opportunities while selecting activities. The fact that Blue Gold has a limited scope and budget, and cannot address all needs, only those connecting to program objectives and those financially feasible are taken in consideration.

Output:

- An integrated problem analysis and solution trajectories

STEP 3: Preparation of draft Polder Development Plan: After the integrated analysis, a draft Development Action Plan (including actions related to strengthening WMOs; water resources management; agricultural production; business development; sustainable environmental management; community based disaster risk management; gender and institutional strengthening) is developed. The Blue Gold Team organises an internal meeting to make sure the planned activities across components are coherent and support each other and cross-cutting issues are integrated well (avoid overlaps and gaps). The draft Development Action Plan is integrated with the present situation and the integrated problem analysis and solution trajectories to result in a draft PDP.

Output:

- Draft PDP

STEP 4: Translation to WMOs: While the draft PDP is being developed, WMG Action Plan (WAP) meetings are organised for all WMGs. The proposed PDP activities of Blue Gold are presented and the potential actions for the community are discussed. The Blue Gold staff support the WMG to prepare a WAP on the basis of their preferred actions and the draft PDP.

Output:

- WMG Action Plans (WAPs)

STEP 5: Finalization of PDP: On the basis of feedback provided by the WMA and possibly other stakeholders like UP, the Blue Gold Team finalises the PDP. The PDP is forwarded to interested stakeholders and a limited campaign for awareness creation at local level is planned and carried out.⁵

Outputs:

- Final PDP

STEP 6: Follow-up and update of PDP: Field staff of Blue Gold initiates the implementation of activities with WMOs. Regular follow-up meetings are held, participatory monitoring to keep track of implementation is stimulated and the WAPs are regularly updated by the WMGs. Furthermore the developments of specific value chains, gender issues, disaster risk reduction and environment actions, which are to be incorporated in the WAPs, are discussed. If required, PDPs are updated after 1 or 2 years.

⁵ In the case of polder 31-Part, no special meeting has been organised for the WMAs and UPs to react on the draft PDP. At the time the PDP was compiled, already 60% of the selected activities were under implementation.

Appendix 2. Water Management Infrastructure of Polder 31-Part

Embankment

Total length of the embankment around polder 31-Part is about 26.672 km. The entire embankment is an interior embankment with a crest width of 4.27m, crest level 8.922 km. of 4.50m PWD and 17.75 km. of 4.27m PWD

Sluices

There are 10 nos. sluices in this polder. These are:

S.N.	Name of Sluices	Number of Vents	Size, (mxm)	Location, km
1.	Kesorabad Drainage Sluice (DS-1)	1	1.50 mx 1.80 m	0.000
2.	Gaoghara Drainage Sluice (DS-2)	1	1.50 mx 1.80 m	7.955
3.	Raipur Flushing Sluice	1	0.90 mx 0.90 m	2.720
4.	Surkhali Flushing Sluice	1	0.90 mx 0.90 m	4.812
5.	Kallayanshree Drainage cum Flushing Sluice	1	1.50 mx 1.80 m	6.220
6.	Gazalia Drainage Sluice (DS-3)	1	1.50 mx 1.80 m	10.648
7.	Goriardanga Drainage Sluice (DS-4)	1	1.50 mx 1.80 m	15.004
8.	Sapa Drainage Sluice (DS-5)	1	1.50 mx 1.80 m	17.585
9.	Barobhuyan Drainage Sluice (DS-6)	1	1.50 mx 1.80 m	20.230
10.	Nandonkhali DS Cum FS Regulator(New)	3	1.50 mx 1.80 m	24.497

Drainage Outlets

There is one outlet in this polder. This is:

Sl. No.	Name of Outlet	Size, mm	Location, km
1.	Charar khal Outlet (Private)	900 mm	22.368

Irrigation Inlets

There are three inlets in this polder. These are:

Sl. No.	Name of Inlet	Size, mm	Location, km
1.	Gajalia Inlet	600 mm	12.152
2.	Gariardanga Inlet (Private)	600 mm	14.325
3.	Bunarabad Inlet (Private)	600 mm	23.253

Khals

There are about 17 recognizable khals with 1 or more branches and having a total length of about 50.0 km, which are shown in Figure 2