



Bangladesh Water Development Board (BWDB)



Kingdom of the Netherlands



Department of Agricultural Extension (DAE)

Embassy of the Kingdom of the Netherlands (EKN) Dhaka, Bangladesh



Blue Gold

Technical Report 20 Strategic Plan for Community Water Management

September 2016



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Strategic Plan for Community Water Management

September, 2016

Blue Gold Program

BWDB Office

23/1 Motijheel Commercial Area, Hasan Court, 8th Floor, Dhaka 1000
(T) +88 02 711 15 25; +88 02 956 98 43

Gulshan Office

Karim Manjil, Ground Floor, House 19, Road 118, Gulshan, Dhaka 1212
(T) +88 02 989 45 53

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Issue and revision record

Revision	Date	Originator	Checker	Approver	Description
1.0	17-2-2016	Shorab Hossain; Judith de Bruijne; and Ruud Leibbrand	Blue Gold TA staff		1 st Draft
1.1	25-4-2016	Shorab Hossain; Judith de Bruijne; and Ruud Leibbrand	Blue Gold TA staff, BWDB, DAE		2 nd Draft
2.0	12-6-2016	Judith de Bruijne; Shorab Hossain and Ruud Leibbrand	Blue Gold TA staff, BWDB, DAE		3 rd Draft
2.1	22-9-2016	Judith de Bruijne	Blue Gold TA staff, BWDB, DAE	Guy Jones	Final version for year 1 implementation

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List of Abbreviations

BARI	Bangladesh Agriculture Research Institute
BAU	Bangladesh Agriculture University
BRAC	Bangladesh Rural Advancement Committee (NGO)
BWDB	Bangladeshi Water Development Board
CBO	Community Based Organization
CO	Community Organizer
CUB	Concern Universal Bangladesh
CWM	Community Water Management
DAE	Department of Agriculture Extension
DRR	Disaster Risk Reduction
DoF	Department of Fisheries
EKN	Embassy of the Kingdom of the Netherlands
FFS	Farmer Field School
FGD	Focus Group Discussion
FHRC	Flood Hazard Research Centre Bangladesh
FO	Farmer Organizer
GAP	Gender Action Plan
HL	Horizontal Learning
HYV	High Yielding Variety
IGA	Income Generating Activities
IPSWAM	Integrated Planning for Sustainable Water Management
IRRI	International Rice Research Institute
IWM	Institute of Water Modeling
IWRM	Integrated Water Resources Management
IWMI	International Water Management Institute
LCS	Labour Contracting Societies
MFS	Market Oriented Farmer Field School
OCWM	Office of the Chief Water Management
O&M	Operation and Maintenance
PCD	Program Coordinating Director
PF	Producer-Group Facilitator
SAAO	Sub- Assistant Agriculture Officer
SO	Sectional Officer
TA	Technical Assistance
UAO	Upazila Agriculture Office
UP	Union Parishad
WAP	WMG Action Plan
WMO	Water Management Organization
WMG	Water Management Group
WMA	Water Management Association
WMF	Water Management Federation
XEN	Executive Engineer
XO	Extension Overseer
ZSE	Zonal Socio Economist

Polder Water Management Definitions

Terms	Definition	Conditions, Situation and Purpose
Community Water Management	The use of surface and ground water to ensure optimal farming (or fish culture) systems, initiated by local communities, focussed on Catchment, Agri-unit and On Farm water management	Overall water management functions well. Community has the organisational capacity and joint knowledge to optimise farming systems and related water use, and can resolve any internal conflicts.
“Levels” of Water Management		
Sub-regional	Knowledge of the functioning of sub-regional river channels throughout the year and the interaction between river flows, tidal influences and sediment deposition and erosion.	With this knowledge: (a) Understand the impact on polder embankments (e.g. as affected by erosion) and develop possible interventions (b) Understand the functioning of the rivers (e.g. as affected by siltation) and the functionality of polder outlet/sluice structures (e.g. as affected by sedimentation) and develop possible interventions
Polder	Knowledge and management of the condition and functionality of the perimeter embankment and associated structures to ensure flood protection of polder residents and assets.	With this knowledge: (a) safety and security to polder residents and assets can be guaranteed; (b) and investigating and facilitation of alternative means of internal water regulation (between catchments) becomes an option when WM infrastructure become non-functional (e.g. because of sedimentation internally or externally)
Catchment	Knowledge and management of the water requirements to support all land uses (e.g. crops, fisheries) in a catchment – in terms of supply (irrigation), storage, and removal (drainage) – as well as the condition and functionality of main khals and structures to regulate water within the catchment.	With this knowledge: (a) the need for different water levels within a catchment area becomes clear. (e.g. highland vs lowland or Boro vs Sesame) or water qualities (e.g. salt water vs fresh water) (b) and understanding on how to facilitate these different needs as best as possible with the main WM infrastructure.
Agricultural Unit	Knowledge and management of the water requirements to support all land uses in an agricultural unit – in terms of supply (irrigation), storage, and removal (drainage) – as well as the condition and functionality of secondary and tertiary khals and structures to regulate water within the agri- unit or between neighbouring agri-units.	With this knowledge: (a) the need for timely supply, storage and removal which supports the land uses of the agricultural unit (b) and understanding on how to facilitate these needs as best as possible with secondary and tertiary WM infrastructure
On Farm Water Management	Knowledge on how to manage water deliveries to crops through land preparation such as ridge and furrow, controlled flooding etc.	With these management measures optimal influence on water delivery to or removal from agricultural land is made possible. (e.g. being able to quickly irrigate or drain agricultural land if necessary)
Other Water Management Terminology		
Flood protection	Prevention of flooding by enclosure of an area using embankments and associated structures	Protection of assets during high river stages, extreme tidal levels and tidal surges
Salinity control	Excluding saline water from areas used for agricultural purposes	Applied in coastal areas where high salinity water is carried in rivers adjacent to the polder especially during periods of high tide
Tidal irrigation	Admitting brackish water by opening sluices during high tide conditions, for	Applied in tidal areas at periods when river water quality is of acceptably low salinity

	storage in khals and subsequent use in irrigation	
Local drainage	Drainage by gravity within a catchment through channels to an external outfall	To overcome drainage congestion or impeded drainage
Pumped drainage	Drainage by pumping where gravity drainage is not possible	Used in cases when the water levels at the outfall are higher than the water level in the affected area
Water level control	Use of gates or weirs to temporarily manage or regulate water levels in an area	Retention to meet water requirements of rice and other wetland crops, to prevent loss of fertilisers immediately after application, etc
Water retention	Temporary storage of water in a khal	For use for irrigation and/or aquaculture
Early drainage	Accelerated post-monsoon drainage	To allow earlier planting (and harvesting) of rabi crops
Controlled flooding	Controlled flooding of land	For fisheries/shrimp cultivation
Irrigation	Provision of water to meet crop requirements	During dry winter (boro/rabi) season

1. Introduction

1.1 Objective of this plan

This plan identifies the major lessons learnt and key factors of success of the current Community Water Management (CWM) pilot in Fultala, polder 30, and presents strategic recommendations for follow-up, upscaling and horizontal learning within the whole area of Blue Gold Program (BGP). More background on the CWM pilot in polder 30, which was part of the BGP and lead by IRRI, is provided in the next chapter.

1.2 Definition of Community Water Management

The low current and predicted crop productivity in the coastal belt of Bangladesh has been associated with increasing salinization and lack of fresh water for irrigation due to climate change. Climate change predications however show that a large part of the coastal delta (Patuakhali, Barisal and Bhola area) will not seriously suffer from salinity and another huge part (Khulna area) only of medium-salinity problems in the next 15 years. The real cause of low production rather seems to result from waterlogging and a lack of coordinated community action to ensure timely drainage. One could say that Community Water Management (CWM) has been neglected in the coastal belt.

The importance of community involvement in water management is though not new. Community-based and participatory water management can be considered as a discourse in Bangladesh since the 1990s. The idea of 'participatory water management' recognizes that, in the past, all water management efforts were purely government's responsibility - local stakeholders were not involved in planning, implementation, operation and maintenance of water management infrastructure. The government realized that it was not producing equitable and well-functioning water management practices, nor was it possible for the government to keep the infrastructure in working condition without local people's collaboration/partnership. So, the intention of the government in issuing the "Guidelines for Participatory Water Management" in 1999 was to make clear to all parties concerned that local stakeholders need to be involved in all stages of water management efforts – from planning up till operation and maintenance.

The solution has been sought in establishing democratic decision-making bodies for reaching consensus on gate settings and maintenance, often in the form of water management organisations (WMOs). However, there seems to be 'a missing middle'. A socially agreed gate setting does imply that this setting is the most beneficial for crop production and most sustainable for the structure's life time. The lack of technical and agronomic knowledge of WMOs has lead in a number of cases to rather disappointing crop production improvements. This lack of knowledge also includes aspects like the potential of improved rice varieties (and concomitant water management requirements), the identification of different water management handlings for high, medium and low lands, creating fresh water storage in khals and ponds for supplementary irrigation throughout the year, and rice-fish inter-cropping. CWM aims to build capacity of WMOs in a comprehensive manner addressing social, technical, agronomic and market challenges and stimulating collective action.

Since January 2015, IRRI, BGP and other partners have introduced CWM in a pilot project in polder 30 to put the synchronisation of existing cropping patterns, improved agricultural production strategies and drainage central. This pilot builds on the detailed community water management activities, started by Dr. Manoranjan Mondal during the Integrated Planning for Sustainable Water Management (IPSWAM) project from 2003 till 2012. The pilot's definition of CWM is 'a manner to establish resilient, productive and diverse cropping systems and to sustainably improve water governance and equity in water use'. It thus aims to combine technical and agronomic aspects with already existing approach to participatory water management in Bangladesh. More details are provided in chapter 2.

1.3 The objective of upscaling Community Water Management

In the upscaling process of CWM, the BGP aims to further develop the concept of CWM. CWM has the potential to not solely focus on production improvements for crop land cultivators but could also be a vehicle to create more market linkages and labour opportunities as well as income generation activities for women. BGP also aims to critically look what are the key ingredients and activities for CWM to sustain on its own. Given its multidisciplinary and innovative approach at the nexus of water management and agricultural development, CWM is expected to provide valuable information and insights in relation to the BGP Theory of Change.

Specifically an upscaling process of CWM may consist of:

- Definition of suitable areas for cropping synchronisation and joint water management by farmers through the WMG(s) and their WMA;
- Introduction of an all-year round cropping and water management system perspective while training and guiding WMG(s);
- Improvement of secondary and tertiary drainage and water storage infrastructure (removal of obstacles, construction of field drains, etc.) at catchment level;
- Introduction and demonstration of improved seed varieties and practices to increase yields, increase double cropping (or introduce fish culture as a viable alternative), and improve performance of second crop.

The proposed approach for upscaling is described in chapter 3 and the manner in which CWM areas have been selected in chapter 4.

1.4 Role of Horizontal and Adaptive Learning

The key part of this plan focuses on the actual upscaling of CWM, and how the BGP can stimulate the adoption of CWM by other farming and fishing communities. Water management groups (WMGs) are representing farming and fishing communities at the lowest level within the BGP working area. Horizontal and adaptive learning is considered as an effective way to stimulate adoption of CWM by WMGs.

Adaptive learning means that interactive and application based learning from teacher-to-student/extension worker-to-farmer will be provided. This training will be provided to WMG members in their fields, so that the WMG members directly can apply the learned techniques. This will be combined with horizontal learning; meaning sharing knowledge and skills from peer-to-peer / WMG-to-WMG within the CWM areas. The WMG which already adopted the CWM approach is expected to stimulate and train WMGs which do not practice CWM yet.

The adoption of farming and water management practices as a result of horizontal learning also requires adaptation to suit specific agro-ecological and drainage conditions. Thus, "adaptive learning" is needed to help farmers "walk the learning path" in adapting techniques used in one catchment and transferring them

successfully to another. In this case, the role of the BGP staff and officials (teachers) is required to support and empower WMGs to share their knowledge with other WMGs and to enable interested WMGs to “adapt” the learnt practices to their catchment.

The proposed manner of Horizontal and Adaptive learning is described in chapter 5.

1.5 Institutional strengthening and sustainability

The success of upscaling and learning trajectories around CWM depends on the institutions supporting and promoting them. As CWM is rather a new concept in Bangladesh, governmental and non-governmental institutions are not yet fully knowledgeable and skilled to transfer CWM practices to interested WMGs. The division of roles and responsibilities between institutions in this transfer process is also not defined until now.

There is thus a clear need to clarify roles and responsibilities, interlinkages and coordination between institutions involved as well as to facilitate capacity building.

The proposed coordination mechanisms are outlined in chapter 6 and the actual division of activities and their timings are provided in chapter 7.

2. CWM Pilot Project in Polder 30

2.1 Background

The current pilot project on community water management is located within the village of Fultala, which is situated in Batiaghata Upazilla, Khulna district, Polder 30 in the coastal zone of Bangladesh. It falls under the WMG Fultala and the Water Management Association (WMA) Khorla sluice. The pilot started on the 1st of January 2015, and will run for a total period of 24 months. The pilot project is led by IRRI and co-supported by the BGP, Institute of Water Modelling (IWM) Bangladesh Rice Research Institute (BRRI), International Water Management Institute (IWMI), BRAC and Shushilan.

An area of 84 ha land is cultivated under the CWM pilot, divided over 2 so called water management / agricultural units, which can be hydrologically separated from the rest of the catchment. The first unit takes up 21 ha and the second unit 46 ha. The remaining 17 ha is covered with homesteads and ponds belonging to Fultala village (see Figure 1). In the pilot project 56 farming families are involved; of which two female headed households.

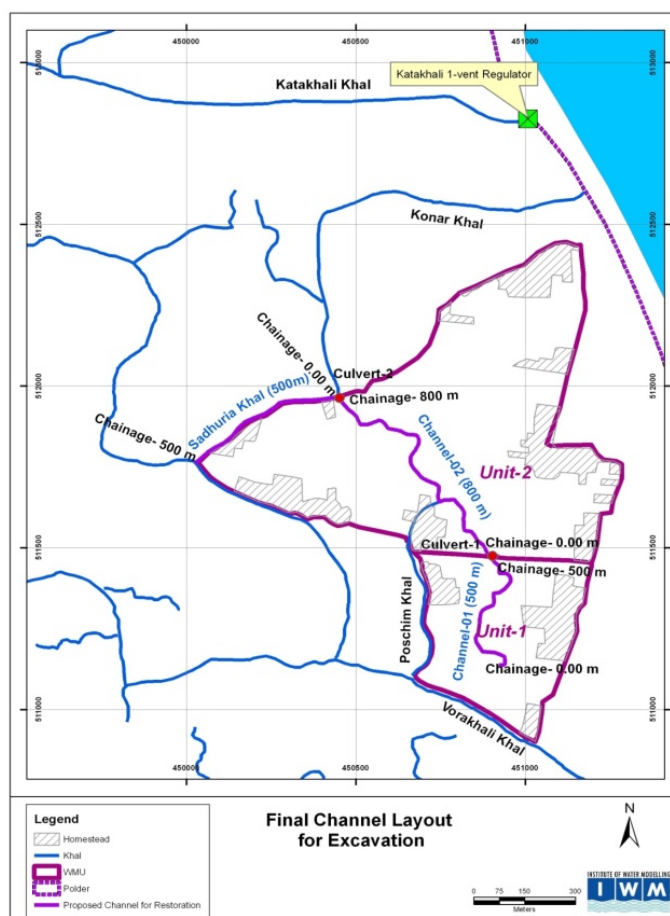


Figure 1: Location of current CWM Pilot in Polder 30

Double cropping is the standard pattern in the pilot area: T.Aman rice (mostly local varieties) in the monsoon and Rabi crops (90% sesame) in the winter. Before the pilot project, the sowing of Rabi crops was delayed by one month compared to the rest of Bangladesh, due to the inability to apply timely drainage during harvest of the Aman crop. The relatively late harvest of Rabi crops made them vulnerable to crop loss by early monsoon rains.

To overcome these cropping challenges, the following objectives were established for the pilot project:

1. Removing drainage congestion in November-December so that the sowing of sesame and other Rabi crops¹ could be advanced by 15 days to one month. This would safeguard the harvest of Rabi crops

¹ In Jan 2016, Sesame (BARI-4, 66%), Mung Bean (BARI-6, 14%), Maize (Pacific-984, 16%) and Sunflower (HYSON-33, 3%) were sown.

- before pre-monsoon rains in April/May and would enable farmers to introduce new and slightly riskier crops, like sunflower, maize and wheat;
2. Minimizing crop damage caused by potentially heavy rains during February-March through the construction of field drains;
 3. Creating scope for early Rabi crop cultivation by introducing High Yielding Varieties (HYV) of rice², which shorten the period of Aman crop cultivation and facilitate increased rice production.

The pilot project also has the objective to improve and strengthen water governance and women participation.

2.2 Key ingredients of the pilot approach

The following bullet points describe the key ingredients of the approach used by IRRI and other partners in the first year of CWM pilot near Fultala.

- IRRI supplied farmers with quality seeds and fertilizers (e.g. Urea, Potash, TSP, Zink) and provided the technical knowledge on how to apply these in the field;
- IRRI supplied a transplanting machine for the Aman rice crop, and gave trainings on how to use it. It is currently being managed by the WMG Fultala;
- IRRI supplied and released 2000 kg fingerlings in the rice-cum-fish locations and in the Saduria khal (just outside the CWM pilot area);
- IRRI and BRAC provided tailor-made practical demonstrations on farming techniques (mainly for CWM area participants only, but some were joined by neighbouring WMG members, both husband and wife);
- IRRI and BGP provided tailor-made trainings to WMG members, including executive committee members, on the importance of early drainage for polder productivity, appropriate sluice gate operation and included empowerment activities to enable WMG members to lead water management discussions at catchment level;
- Female headed households were fully involved in all trainings and within the male headed households, females were involved in seed bed preparation, weeding, harvesting and cleaning of straw in the Aman season of 2015. Furthermore during the transplanting phase 10% of the labour was done by women;
- BGP conducted additional WMG strengthening activities, and the stimulation of support from WMA and UP in conflict resolution when necessary;
- IRRI conducted water depth and salinity measurement inside the sub-polder and peripheral rivers and discussed results with WMG members;
- Under guidance of IRRI, WMG members in Unit 1 jointly constructed field channels to drain water from their plots, and small bunds to retain the water for their crops when needed³;
- BGP carried out the re-excavation of internal drainage channel 2 (800m) and plans to re-excavate channel 1 (500m)⁴;
- BGP plans to construct 2 culverts⁵;



² BRRI Dhan 51, 52, 53, 54 and 62 were provided by IRRI in 2015

³ It should be noted that the physical application of field bunds and channels was only executed in Unit 1 during the Kharif-II 2015 season and was not maintained during up following Rabi season.

⁴ Work on Channel 1 is on hold as there is social disagreement on the selected trace for this channel. Work is expected to continue in the end of 2016.

⁵ Culverts will be constructed once both channels are re-excavated.

- BGP plans to rehabilitate the Saduria khal⁶.

2.3 Lessons learnt so far

The upscaling approach, as described in the next chapter, is based on a critical evaluation of the key ingredients and lessons learnt so far from the current pilot area. BGP has defined the following lessons learnt:

1. Increased yields can be obtained in the Aman season by applying HYVs⁷. However, the adoption of HYVs is not in all communities an easy process due to differences in: market prices and linkages, or mind-sets and cultural beliefs. The current market value of HYV Aman per metric ton (mt) is lower than for local Aman varieties in polder 30. Furthermore, some members of the Hindu communities dominating the area believe that HYVs can be carcinogenic. HYVs are also considered less tasty by the majority of community members. This teaches us that CWM adoption can be more quickly realised in communities with a positive view on and better market prices for HYVs.
2. By improving local drainage and introducing HYVs varieties, the Aman season was shortened with about 15 days in 2015, and sesame, maize, sunflower and mung bean were sown earlier. This also required a mind-set change which was not easily established. A lot of WMG members opposed the early release of water, as they believed HYV rice would sustain in its final stage with sufficient water on the field or because they kept on cultivating local Aman varieties. However, those who did try were satisfied with yields and convinced. This teaches us that factual evidence of crop sustenance under drying conditions is needed to ensure a mind-set change. This starts with active communication how a full year cycle of successful cropping and water management can be realised and how gates can be operated appropriately from a technical perspective. The current level of gate operation in pilot area is sufficient.
3. The field channels and bunds constructed in Unit 1 were successful to improve on-farm water management and have resulted in better field drainage during Kharif-II in 2015, and therefore likely enhanced Aman yields. This success materialized even though main khals were not yet excavated. However the field channels and bunds were not maintained by the majority of WMG members during the Rabi season and therefore a substantial amount of crop loss occurred during unexpected heavy rains in February 2016 (which are not normal for this period of the year in Bangladesh). This teaches us that on farm water management measures can realise drainage improvements, but that active awareness raising, practical instructions and learning exchanges on drainage throughout the year are important to ensure climate resilient farming practices.
4. Farmers in Unit 2 have constructed small levees on their own plots to retain water, copying the work of Unit 1. This teaches us in the first place that CWM practices can be ideal showcases for neighbouring communities (who can easily relate to and likely have similar field conditions) to improve their farming practices. This form of horizontal learning should thus be further stimulated to make CWM successful. However, it is probable more fruitful when a two-way learning process will be applied, in which neighbouring farming WMG members come and observe CWM practices and at the same time get in field instructions and support from the practising WMG to copy CWM practices.
5. A motivated and active WMG and WMA are of major importance when it comes to implementing CWM successfully. This includes a good relationship between WMG members, and neighbouring WMG members at WMA level. The executive committee of the WMG and WMA can play major roles in mobilising farming WMG members, decision-making on water management at catchment level and conflict resolution. If the WMA gets a leading role in the facilitation of the decision making

⁶ There is disagreement between the project team and the community living next to the khal on how to keep the village accessible (by e.g. footbridges) after removal of the blockages and who should pay for it.

⁷ For the Aman crop that has been harvested in Dec 2015/Jan 2016, the maximum production results were the following: BRR1 Dhan 51= 5 mt/ha; 52= 6.5 mt/ha, 53 = 4 mt/ha; 54 = 3 mt/ha and 62 = 3 mt/ha.

process, issues can directly be solved at catchment level. Still, it is evident that not all social conflicts have been resolved and infrastructural improvements have been delayed in the case of the pilot project. Conflict resolution by intermediaries, like pilot project staff and UP members, is thus vital to keep a CWM project on track. For this reason, good relationships of the WMG/WMA with local governmental institutions (especially UP and Upazila) should be maintained for long term sustenance.

6. Though playing an intermediary role as project staff is important to smoothen communication, care should be taken to not create too much expectations and dependence. The pilot project has provided all inputs for cultivation for free and a pilot project staff member promised footbridges (which are not part of the BGP DPP) to enable accessibility of the village after the construction of an internal drainage khal. At this moment, neighbouring WMG communities are less inclined to start up CWM as they are waiting for free agricultural inputs and some WMG members are frustrated as footbridges have not been provided. This teaches us that clear communication towards the WMG on what will be done by the project and what is expected by the WMG is essential. The investment by the WMG should also be substantial to ensure sustainability.
7. The providence of free inputs also does not guarantee that they will be used only in the pilot project area. The trained WMG members adopted the proportionally use of fertilizers and pest management practices to a great extent, but cases have been reported that farmers used freely provided fertilizers for other fields outside the CWM area.
8. Employment opportunities have been created for local labourers especially targeting poor women. During the CWM pilot, women were involved in more steps of the Aman crop cultivation than normally. There is no knowledge available yet how this affected their overall income, workload and social household status⁸;
9. Rice-cum-fish culture was successfully adopted by another WMG in polder 30 under the pilot project (as the WMG Fultala did not show interest). It became clear that rice-fish culture can only be implemented at specific locations and that for every CWM intervention a tailor-made crop versus aquaculture approach is required.

Further details on the pilot project's objectives, mid-term results and lessons learnt so far on crop and water management can be found in BGP Technical report "Improved water management levels in the Community Water Management Pilot Polder 30, Batiaghata, Khulna", July, 2016.

⁸ We are awaiting a report of BAU students who conducted a gender research in the pilot project area.

3. CWM approach for new areas

3.1 Proposed Approach

Building on the successful demonstration of water management and cropping practices in the polder 30 pilot, the aim of BGP is to create a number of upscaling initiatives in other project polders. The upscaling areas will facilitate the showcasing of sustainable and successful CWM practices and provide opportunities for horizontal and adaptive learning by WMGs.

The three main envisioned results of the upscaling and horizontal learning approach are⁹:

- **Equitable water management:** Improved water management at all levels (on farm, agricultural unit, catchment and polder) is at the core of CWM. It is believed that understanding internal polder water management, its interactions and (possible) conflicts between stakeholders and letting WMOs to explore, implement and promote appropriate solutions, which benefit men and women equitably, is the key pillar of CWM. In the current CWM upscaling site in polder 30, WMG capacity is built to manage water at different levels and special attention is paid to women involvement. In the upscaling process this approach will be continued and further strengthened.
- **Partnerships for institutional sustainability:** The current CWM upscaling site in polder 30 has experts from IRRI and BRAC and TA field staff from BGP to support implementation. For the upscaling and horizontal learning of CWM, the BGP envisions to involve governmental staff which would be able on the long run to continuously support planning, implementation and monitoring (after BGP phases out). It also foresees less dependence for WMG members on external free inputs and a larger, pro-active role in spreading CWM practices.
- **Increased incomes and food security:** The current CWM upscaling site in polder 30 focuses on improved drainage and increased crop production. It is foreseen that CWM has the potential to go beyond production increase and can generate better incomes and augment food security. HYV rice production requires more labour and makes it possible to harvest earlier. This enables the timely establishment and harvest of Rabi crops and increases the chance of better market prices. If markets are analysed properly, crops are selected accordingly, WMG members act collectively and water is managed well, CWM could be a vehicle to create more employment for women and men, and better market linkages and opportunities. The successful and timely harvest of Rabi crops likely also enhances food security, as common Rabi crops, like vegetables, water melon, mung bean, are often very nutritious and can be (partly) used for household consumption. The extra income generated with higher market prices for Rabi Crops possibly also results in households buying more nutritious food.

For the first batch of upscaling, the goal is to select 10 upscaling schemes in different polder catchments¹⁰. In order to successfully scale up to ten schemes, it will be necessary have some unifying activities in all 10 areas while at the same time have the possibility to apply a tailor made approach. For this the following adjustments and new ingredients have been discussed to supplement the described CWM upscaling site approach in Fultala, polder 30 (see chapter 2).

⁹ Given its multidisciplinary approach at the nexus of water management and agricultural development, CWM is expected to provide valuable information and insights in relation to the BGP Theory of Change

¹⁰ The BGP has for the season 2016/2017, selected 10 CWM areas in 8 different polders, encompassing 9 different catchments.

3.2 The key ingredients of the CWM upscaling approach

For the upscaling process a number of adjustments are suggested to the CWM approach as described in the previous chapter. The suggested changes are the following:

1. Reduction of free input distribution, limiting free input distribution for seeds up to 1 acre of land per household¹¹.
2. Generally no supply of fertilizers or pesticides. Only in some cases a part of the total fertilizer may be supplied from project support (e.g. for very small scale farmers). Training on proper and environmental conscience usage will be provided.
3. No supply of planting machinery, but rather stimulate better use of FAO provided machinery and promote collective action and facilitation of service provision by the WMG when additional machinery is required.
4. No full reliance on external training and experimental learning by research institutes/NGOs, but rather a guaranteed active role of DAE and BWDB. Trainings on CWM will be an integrated part of existing FFS provided by DAE.
5. Better coordination with BWDB and DAE during implementation and monitoring (see chapter 6). Regular discussion on CWM during polder and zonal coordination meetings.
6. A more elaborate agreement between WMG and BGP on the full package provided and their expected contributions, as well as an O&M agreement between WMA and BWDB.

To make sure Horizontal Learning will be applicable, the following ingredients are proposed (see also chapter 5):

7. Curriculum development materials to be developed for and with SAAOs (DAE) and XOs/SOs (BWDB), and skill training to be provided to make sure they can take the lead in implementation and upscaling.
8. The selection of neighbouring WMGs within catchment, which could adopt CWM too. It is envisioned the selection will be led by WMA representatives of the involved CWM upscaling site with support of polder and zonal teams and Union Parishad (during year 1).
9. A leading role for WMG members who adopted CWM to roll out a two-way process of Horizontal Learning. This entails inviting neighbouring WMG members to their fields and showcasing their CWM practices. At the same time, visiting the fields of neighbouring WMG members and providing practical guidance and orientation how they could apply CWM practices (after 1 year).

3.3 Agreement with WMGs

In the upscaling of CWM upscaling site, the BGP intends to develop a more elaborate agreement between the WMG and BGP on the full package provided and their expected contributions, as well as an O&M agreement between WMA and BWDB. The agreement between the involved WMG and BGP is intended to not solely focus on LCS work, but could include expectations towards the WMG on:

- a. their voluntary contribution to the construction of field & plot channels and adjustments of minor structures;
- b. their contribution towards emergency maintenance of structures in relation to CWM implementation
- c. their responsibility for infrastructure operation based on community needs
- d. their responsibility for conflict resolution among the members in relation to CWM and as well as other WMGs/WMA

¹¹ Only in polder 43/1A, Daskin Sonakhali WMG, DAE did not follow the guideline of CWM-FFS “transfer of technology for agricultural production under Blue Gold Program” and distributed twice as much HYV Aman seeds in July 2016.

- e. their responsibilities to ensure close coordination with their WMA at catchment level for successful implementation of CWM
- f. their responsibility to develop linkages with UP/Upazila/BWDB/DAE and other development agencies for successful implementation of CWM
- g. their acceptance towards and stimulation of women involvement, both as farmers and as wage labourers or service provider
- h. their stimulation to ensure as much as possible collective input buying and output selling
- i. their contribution to the selection of new CWM areas (see also chapter 5)
- j. their responsible for initiating and executing Horizontal Learning in two ways (see also chapter 5)

3.4 Role of cross-cutting issues

Gender

In the current upscaling site in polder 30 women have been provided extra employment opportunities in field crop production activities. Women receive additional roles in seed bed preparation with the introduction of the planting machine, and in weeding and harvesting. It assumed (not investigated) that they have created additional income in this way¹².

In all BGP areas, there is scope of extra women involvement in field crop production and water management. This especially holds true for Patuakhali area in were women merely have a role in threshing of rice during Kharif and pulling of pulses in Rabi season. Women do have a more active role in homestead gardening, poultry and aquaculture in all BGP areas. However those activities are separate from the field crop activities (which is the focus of CWM). Ways to incorporate them could be explored.

In the upscaling process we intend to identify areas in which women can have a more active role and generate additional income, but taking into consideration aspects like an increase in overall workload and socio-cultural aspects around the acceptability of their new roles in field crop production. The ultimate goal should be social and economic empowerment of the women involved.

If women do prefer a higher involvement in field crop production, the following ideas to give them that opportunity have been identified so far:

- Make sure that women farmers who are involved in (managing) field crops in the selected catchment areas are invited to participate in trainings and meetings, and that organizations as UP/Upazila/BWDB/DAE consider these women as farmers.
- Agree with WMG members that priority should be given to women for LCS work and hired labour opportunities, like the construction of field and plot channels / small levees.
- Agree with WMG members on additional roles women will receive in field crop production.
- Actively encourage women involvement in decision-making on water management and O&M activities.

If homestead based production is highly preferred by women, the following suggestion has been made:

- Identify in the CWM area whether khals used for field crop production are used for homestead gardening (vegetable and fruit cultivation) too. If yes, then ensure active women participation and consider to provide additional training and orientation on water management and irrigation for homestead gardening and/or aquaculture to women, with the goal of improving nutrition.

Other ideas

¹² In June-July 2016, the BGP has requested BAU students to conduct research in the current polder 30 pilot area whether women prefer more income generating activities (IGA) related to field crop production or rather prefer homestead based IGAs. We are awaiting the results.

- Give women a very active/leading role in the information dissemination process as part of Horizontal Learning.
- Explore the role of women in conflict resolution.

Environment and DRR

From an environmental point of view, the CWM upscaling site in polder 30 pays special attention to the reduction of fertilizer and pesticide use, as well as proper maintenance of khals and water management structures. The BGP will actively continue these activities in the upscaling and horizontal learning process.

In the selection of CWM areas, the BGP aims for the moment to select areas with minor water safety issues (e.g. erosion of main embankment sections). For this reason, DRR will not have a central role in the CWM upscaling areas, but it will stay on the agenda in regular WMG and WMA meetings.

Water Governance

In the current CWM pilot site in polder 30, there has been a strong involvement of UP leaders in motivational trainings provided by the project. This successfully led to the resolution of particular water management conflicts.

The BGP will actively continue this approach in the upscaling and horizontal learning process and will stimulate a link with the UP Standing Committee on Agriculture, Livestock and Fisheries. Additionally, the WMGs will be stimulated to involve the WMA from the start and also regularly inform the Upazila Parishad. The BGP aims to pay attention to transparent fund management of CWM interventions too.

The active involvement of BWDB, DAE and other relevant governmental departments will be evident and described in more detail in chapter 5. Other possible institutional linkages will be investigated as well.

4. Selection criteria for new CWM areas

The CWM pilot project in polder 30 has demonstrated successes regarding crop diversification and water governance. For the upscaling process, the BGP has re-evaluated selection criteria for the CWM areas and included aspects which especially fit the BGP approach (as described in the previous chapter).

4.1 Selection criteria

The BGP has developed a long list of potential areas for CWM in Feb-April 2016. In order to make a final selection from the list of about twenty locations, the areas were visited by so called 'CWM selection teams' in April-May 2016, existing of representatives from different disciplines, including UP members, field staff of BWDB, DAE and TA staff. Together they assessed how substantial the impact would be to the suggested location when rolling out the CWM approach. The following main criteria were applied for the selection of new CWM areas:

1. Statistical aspects

To make it possible to compare the different suggested areas on the longlist a few basic statistic aspects were considered. The size of the catchment and the agricultural unit as well as the number of WMGs and WMG members being part of it, is of influence to the ease in which water levels can be adjusted. The larger the size of land and the group depending on one sluice, the smaller the possibilities of adjusting water levels without it having a negative effect on other locations.

The landholdings should be more or less similar in size. In this way there will be no influential larger landowners pressuring small-scale farmers. With extreme small land sizes the number of farmers that will have to cooperate will increase, so preferably such an area is not selected. Furthermore the number of sharecroppers should be minimal, because often absentee landowners do not agree to changes in cropping variety or type (especially when it concerns Rabi cultivation).

Also the ownership of khals should be studied in advance; if an influential landholder is blocking a particular khal already for a long time and not willing to move, there is a low potential CWM will be quickly successful.

2. Agricultural and marketing aspects

Present cropping patterns, investment costs and market prices need to be compared with benefits of possible/potential cropping pattern costs and benefits for the Rabi, Kharif-1 and Kharif-2 seasons. The analysis of the complete cropping system is essential to assess the overall financial benefit. Are the extra investment costs justifiable considering the extra production and expected market price? The intention is to select only CWM areas which will clearly benefit from a cropping change and increased income for the WMG members concerned.

3. Water management aspects

The main challenge for farmers in the coastal polders is the lack of control over water intake and drainage to their lands. Due to the current condition of the khal system full on-farm water management throughout the year is in most cases still not possible. Inquiry into the existing/planned water resource management infrastructure and its condition will give an indication of the current situation, and gives the opportunity to

reflect of where possible adjustments can be made to improve the farmers' possibility to execute proper on farm water management.

The assumption is that there is no BGP budget for large scale investments in CWM upscaling. So the existing main water infrastructure should be in a relative good condition and no major water safety issues should exist (e.g. erosion points). The minor infrastructural investments which might be necessary should be assessed regarding estimated costs and extra command area that will benefit from the intervention. The intention is to select areas which will serve as much as possible extra command area at low additional investment costs.

4. Social aspects

It is important to know the contemporary water management status of the area and what the roles of the WMGs are. The O&M committee of the WMA should be operating the water management structures in a sound manner with the input of all WMGs within the catchment (or at least to some extent). Especially the different stakes and relationships between different land levels (high lands vs. lowlands) and shrimp farmers vs. fresh water cultivators are of importance to understand, as they have different operational needs. The conflict resolution practices, the relations between the WMGs in the same catchment and the relation with LGIs need to be studied to make a judgement whether a WMG can join a CWM project.

The WMG should also be open to new cropping interventions, ready to accept change and motivated to mobilise a uniform unit of members for this purpose. A WMG demonstrating unity, cooperation and collective actions is likely to be a strong partner in a CWM project. It is believed that it is essential the WMG already exists for at least one year and has developed a routine in facilitating cooperation between the members. Registration of the involved WMA with BWDB will ensure that an O&M agreement can be put in place.

For final selection, it is also an imperative to understand accessibility of the location, women positions, rights and mobility and the outlook of men about women in the area.

5. Overall assessment

To draw an overall conclusion regarding whether a WMG is fit for CWM project, it required to discuss the main challenges and opportunities for success.

4.2 Weighting of criteria

For the final selection of the areas, the above presented overview of selection criteria were differentiated and weighted. Certain aspects critical for the final selection, like the expected productivity and profitability of crops under the proposed CWM adjustments, the motivation and cooperativeness of WMGs and the existing condition of WRM infrastructure, were ranked higher than aspects which are important to consider but not likely influence possible failure of CWM interventions, e.g. exact landholdings sizes, present-day women involvement, existing market linkages and current on farm water management practices.

4.3 Selected areas

For the season 2016/2017 the following 10 CWM areas have been selected:

Khulna area:

- | | |
|--------------------|----------------|
| 1. WMG Gopipagla | Polder 22 |
| 2. WMG Fulbaria | Polder 22 |
| 3. WMG Bakultala | Polder 29 |
| 4. WMG Ghater Khal | Polder 31 part |

Patuakhali area:

5. WMG Dakshin Bighai Dakshin Polder 43/2A

- | | |
|----------------------------|--------------|
| 6. WMG Daribaher Char | Polder 43/2B |
| 7. WMG Uttar Soilabunia | Polder 43/2B |
| 8. WMG Dakshin Sonakhali | Polder 43/1A |
| 9. WMG Dakshin Atarogachia | Polder 43/1A |
| 10. WMG Purbo Morichbunia | Polder 43/2D |

In Appendix 1 the selection criteria questionnaire and the scoring of the CWM areas can be found.

5. Horizontal and Adaptive Learning

5.1 Learning Approaches

To ensure the upscaling of CWM within the whole BGP area, cross-learning is seen as an essential ingredient. The BGP aims to work with a mixed learning strategy: the traditional Vertical learning from teacher-to-student/expert-to-farmer as well as Horizontal learning from peer-to-peer / farmer-to-farmer.

So far, no learning or communication materials around CWM, like practical booklets, videos, or posters, have been developed during the pilot project in polder 30. Only 3 times practical experimental learnings (on general cultivation practices, field channel construction and pest management) have been provided to in total 40 families of 8 neighbouring WMGs, but this low frequency of orientations has had only a limited effect on CWM adoption beyond the border of the WMG Fultala area.

The BGP aims to set higher ambitions in this regard by developing the current upscaling site area and future CWM areas into 'good practice' locations with frequent practical field experimental learning and learning materials about the site that will inspire other farmers to apply the same practices. The BGP also recognises the need to help visiting farmers to adapt practices seen at demonstrations to the specific requirements of their catchments.

The first year, as described in chapter 3, the upscaling of CWM in a number of areas will take place by means of assistance/investments of BGP resources in water management interventions, input supply and vertical learning. Vertical learning will be facilitated by DAE, BWDB and BGP TA staff. In the second year, extensive horizontal learning between WMGs will start. In this part of the program the practising WMG members together with DAE and BWDB will be in the lead.

The following sections describe the Learning process and activities.

5.2 Development of promotion and learning materials

To ensure a proper horizontal learning process on CWM, the BGP believes it essential to develop special promotion and learning materials. The materials are aimed to facilitate two aspects:

1. The ability of WMGs to promote and share their knowledge and skills on CWM to other WMGs not practising yet. The intention is to develop a mix of promotion and practical learning materials.
2. The ability of SAAOs, XOs and SOs to guide not practicing WMGs in establishing CWM. Special attention will be paid to integrate Water Management and Collective Market Action in the curriculum development of already planned Farmer Field Schools (FFS) of DAE in the BGP. The intention is to both train SAAOs and BGP field staff to implement the adjusted CWM-FFS curriculum. Also XOs and SOs will be oriented.

Promotion and learning materials for WMGs

Promotion materials should depict a recognizable picture of the cropping pattern and water management in the area, so people feel the connection with their own livelihood strategy and possible changes. (So, it is advisable to develop separate materials for Khulna and Patuakhali zones.) When preparing the materials,

both male and female farmers will be depicted in pictures and/or case studies. Community radio, posters, leaflets and newsletters are perceived as most appropriate for promotion purposes¹³.

The practical education materials should be developed in such a way that they are applicable for main cropping systems and cycles in the coastal belt, giving descriptions and images of every on farm step in CWM. Separate materials need to be developed for each single crop or crop-fish system, and for different cropping seasons. It is believed video is most appropriate medium for this purpose¹⁴.

In the first year promotion and learning materials tailored to the WMGs will be developed, while SAAOs, XOs, SOs, and TA field staff will introduce CWM in the area of the selected WMGs. The following years the selected WMGs and can use the materials to promote and train CWM to other WMGs.

Learning materials for SAAOs and (XOs and SOs)

To effectively prepare SAAOs and (XOs and SOs) for executing vertical learning, it proposed to co-develop a curriculum with DAE (and BWDB) and take the existing DAE Farmer Field School (FFS) materials as a starting point¹⁵. During the first year the adjusted curriculum will be facilitated by oriented SAAOs with regular support from BGP TA field and senior staff¹⁶. During critical sessions on Water Management, XOs and SOs will be involved too. Gender sensitivity will be considered in development.

At the end of the first year, it is expected that SAAOs (and XOs and SOs) have the trained capacity to scale up, and have a package of communication and learning materials to work and provide to WMG members for horizontal learning.

5.3 Selection of upscaling CWM areas

It is believed that Horizontal learning is most effectively applied within one WMA area or maximum within one polder area. In the second year, it will thus be of importance to select the best suitable locations within the vicinity to become informal established CWM units. A suitable location should have roughly the same characteristics (social cohesion, water management, cropping patterns, etc.) as the original CWM.

It is proposed that WMA/WMG representatives (through the polder coordination committee) and UP are in the lead of selecting new CWM areas after year one. They will be supported by the zonal coordination committee, existing of TA zonal staff, BWDB and DAE. The pre-selected WMA representatives should then convince the new WMG members to participate, with possible assistance of the zonal or polder team.

5.4 Exposure visits

The WMG members who have been found willing to adopt the CWM practices will have frequent exposure visits during the second year to see and learn from every step of the cycle. The already practising WMG members will also frequently visit the WMGs willing to adopt CWM within their catchment or polder, to further orient and train them. Exceptions are the interested WMGs in polder 30, who already in the first year will join two-way exposure visits organised by WMG Fultala.

¹³ From September 2016 onwards all CWM areas have signboards attracting the attention of WMG members and other interested stakeholders. There is a 1-page leaflet in Bangla available on CWM. Community radio will start in October 2016.

¹⁴ Videotaping will start in the beginning of October 2016.

¹⁵ Curriculum formulation and preparation workshops and technical trainings have been provided in April to June 2016 to SAAOs and (XOs and SOs) on a CWM-FSS T.Aman. The curriculum was jointly formulated in this way.

¹⁶ From July 2016 onwards, regular monthly coaching meetings are organised for SAAOs providing the CWM-FFS T.Aman. The main topics are Water Management and Collective Market Action.

We thus request the practising WMG members to receive and visit motivated farmers that want to adopt CWM to teach them their methods. They will thus take an educational role in this peer-to-peer setting. A few examples of what they could promote through horizontal learning:

- The effect of adopting new HYV crops;
- On time drainage and improved water management practices;
- Fertilizer/pest management – applying an environmentally sustainable dose;
- Extra income generation for women.

With the continued exposure visits in two ways, WMGs can slowly adopt CWM practices in their own fields. Extra attention will be paid that women farmers and/or (active) women WMG members participate in exposure visits, given that such women are there. Some extra support for women to participate in an exposure visit (e.g. select two women instead of one) may be needed.

Support to WMGs during Exposure visits

Furthermore, for actual Horizontal Learning activities it is of importance that a good match between demand and supply is made: what a specific WMG is lacking in relation to certain knowledge, skills and attitudes should only be provided by a WMG who has mastered those skills and has the right mind-set.

To make sure good matches are made BGP will assist, through ongoing works of the selected COs/PFs, SAAOs and XOs in planning preparation of WMGs two-way exposure visits, and the focus of activities during a visit. The involved SAAO and XO can for example provide extra training on a subject if necessary to the already practising WMG to strengthen the success of the Exposure visit.

The WMGs, through the WMA, will be stimulated to step-by-step more independently initiate good learning matches.

5.5 Other Horizontal Learning Activities

Next to Exposure visits, it envisioned it would be good to explore other forms of Horizontal Learning during the upscaling of CWM:

1. A one day workshop for about 5 WMGs practising CWM discussing their WMG Action Plans (WAPs) bi-annually and giving each other suggestions for improvements;
2. A half day workshop with WMG representatives presenting their CWM practices and O&M/WM plan to governmental officials (UP, Upazila, BWDB) and possible interested NGOs for discussion. It is also recommended to do this bi-annually.

6. Staffing, Partners and Coordination Mechanisms

6.1 The importance collaboration and coordination for CWM

The upscaling of CWM and integrating horizontal learning within this process is a challenging task. It is believed that this will require the integration of new knowledge and this capacity is not fully available within the current BGP TA team considering the short timeline in which we would like to start the upscaling process. Moreover, sustainability and continuation of CWM after the BGP by the Government of Bangladesh and possible other collaboration partners is essential.

6.2 Vital collaboration and coordination themes

BGP foresees collaboration and coordination between different institutions is especially important for the following themes:

- ensuring common understanding of the CWM concept by a wide range of WMGs/WMAs;
- providing technical and practical skills training to farming WMG members;
- developing promotion and learning materials;
- ensuring collective activities are possible, and being undertaken;
- initiating horizontal learning activities;
- establishing linkage with development actors;
- acting as intermediary in case of conflict.

The current CWM upscaling site in polder 30 has experts from IRRI and BRAC and TA field staff from BGP to support implementation. For the upscaling and horizontal learning of CWM, the BGP envisions to involve staff which would be able on the long run to continuously support planning, implementation and monitoring (after BGP phases out). The next sections make a distinction between the institutions and staff who are expected to take the lead and execute the core activities (section 6.3), and collaboration partners which will be requested to perform a specific supporting activity (like M&E, producing promotion materials), give now and then technical inputs (advise on fishery systems) or introduce new concepts (like local service providers) (section 6.4).

6.3 Main Staffing

It is believed that the government of Bangladesh, through BWDB and DAE, should have a main role in promoting and upscaling CWM. Field staff from those departments, namely Sub-Assistant Agricultural Officers (SAAOs) of DAE and Extension Overseers (XOs) and Sub-assistant Officers (SOs) of BWDB, will be extensively involved and trained in the new CWM areas. The SAAOs of DAE could provide day to day technical knowledge to the farmers at field level in relation to developing field channels, fertilizer use and pest management and action monitoring while providing their FFS modules on a regular basis. Extension Overseers (XOs) of BWDB could organize WMG meetings and focus group discussions for duly

implementation of CWM together with COs of the BGP TA team. Section officers (SOs) of BWDB could execute regular water level monitoring and sluice operation & maintenance together with WMGs.

During the first year, staffing in the new CWM areas will also exist of BGP TA field staff as well as now and then inputs from senior experts from the BGP TA team and other collaboration partners (see section 6.4).

It is believed that in the second year, focussed on Horizontal Learning activities, the interference of BGP TA staff will be reduced substantially. BGP TA staff will at most assist in the planning process and making sure the needs of the WMGs are served well. The WMGs/WMA are envisioned to take the lead in the creation of the next batch of CWM areas and organising exposure and horizontal learning visits, supported by BWDB and DAE field staff. Other collaboration partners might have a role as well in the second year.

6.4 Other (potential) collaboration partners

The following other (potential) partners are proposed to ensure a successful upscaling of CWM and horizontal learning trajectories. The roles and activities are suggested based on the current responsibilities and activities of the organisations involved and linkage with CWM activities.

Governmental partners

- **UP:** An active role will be allocated to Union Parishad (UP) to provide support for conflict resolution on various issues: conflicts between high lands and low lands, conflicts on structures' operation & maintenance, conflicts on land and general WMG/WMA conflicts. UP is also expected to provide inputs/cash if required and ensure the availability of extra funds in certain CWM areas.
- **LGED:** The Local Governmental Engineering Department (LGED) is responsible for planning, developing and maintaining local level rural and urban roads and small scale water resources infrastructure throughout the country. LGED is expected to be a supporting partner to deliver small scale water resources infrastructure.
- **DoF:** It is advised to involve DoF to provide technical knowledge to the farming and fishing WMG members for open fisheries in channels and/ or rice-cum-fish in cultivation areas.

Research partners

- **IRRI:** Taking the lead in the current pilot site in polder 30 (and two other polder areas outside of the BGP working area), IRRI is an expert in managing, monitoring and researching a small CWM area. Their intensive technical monitoring of activities and results for scientific purposes has been valuable to demonstrate its successes and challenges. It is envisioned that IRRI will be BGP main advisor for any technical or monitoring issues (e.g. buying of seeds)¹⁷, support in research and monitoring activities done by universities¹⁸ and co-facilitator in the provision of trainings to field staff¹⁹.
- **BAU:** Bangladesh Agriculture University (BAU) is interested to provide internship or thesis students for research purposes¹⁵.
- **Khulna University** has study programs in fields which could be beneficial in strengthening CWM, like Agro-technology, Marine and Fisheries Resources and Soil Science. The University is close to the polder areas and visits by professors and students can be easily facilitated. Their motivation to involve students in data collection on CWM and support with data analysis is high. Also IRRI has experience working with students and professors from Khulna University in polder 30.
- **Patuakhali Science and Technology University (PSTU)** has study programs in field of agriculture and fisheries, including Agronomy, Entomology, Soil science and Agricultural extension. The

¹⁷ In June 2016, IRRI provided advice on the type of HYV seeds required for the 10 CWM upscaling areas.

¹⁸ In June-July 2016, IRRI guided two students from Bangladesh Agricultural University (BAU) to conduct a research on gender participation in the pilot project area in polder 30.

¹⁹ In May-June 2016, Dr. Manoranjan of IRRI co-facilitated two technical FFS preparation trainings on CWM for SAAOs and TA BGP field staff.

University is close to the polder areas and visits by professors and students can be easily facilitated. Traditionally most internship and thesis work done by students is executed on the university campus. Further discussions are required whether a feasible set up can be facilitated in which students could do part of the monitoring and research work.

Other (potential) external service providers

- **BRAC** has extensive experience in Monitoring & Evaluation of development projects in Bangladesh (and beyond) and has a well-established division for this purpose. It has a special interest to enlarge its expertise in the water sector. At the moment, BRAC's water expertise is mainly focussed on WASH, water for agriculture (irrigation), fisheries, food security, and DRR programs, but there is an interest to expand to water resources, drainage and flood management. BRAC is therefore seen as an ideal partner for the M&E of this project²⁰. BRAC could also be a partner in other respects of this upscaling trajectory. Its division for Education and Learning has experience in developing training materials for and providing trainings to both local communities and governmental staff and has many training facilities throughout the country. Moreover, BRAC could potentially be an additional exit strategy partner which could facilitate the WMG groups in CWM after BGP phases out. They could also provide seeds and knowledge on seeds through its Seed enterprise development agency.
- **FHRC** has vast knowledge and experience with supporting and empowering Community Based Organisations (CBOs) in micro level water management, creating adaptive learning networks, developing linkages between CBOs and UP/Upazila/District government by means of policy fora and providing legal support to CBOs. They could help us to strengthen WMG networks to learn from each other and play a role in motivating farmers to change their mind-set on improved varieties and drainage practices. As a start, they will run a similar micro-level water management in two BGP areas to demonstrate their approach and organise exchange visits between WMGs and learning events for field staff.²¹
- **Concern Universal** and its NGO implementation partners have technical knowledge and experience in micro-level community water management. Concern Universal is also known for its local service provider (LSP) concept and small group fund management for agriculture and livelihood support. They could be a partner in ensuring technical and financial sustainability of CWM. They also have experience in women livelihood improvements through Income Generating Activities and Collective Action Planning and providing legal support related to women rights²².

Other partners which have been considered are listed in Appendix 2.

6.5 Coordination

As the upscaling and horizontal learning trajectory of CWM request inputs from different institutions and partners it is vital to have a proper coordination mechanism in place. In Figure 2 a proposal is provided how the implementation could be coordinated.

²⁰ BRAC has been developing a proposal for M&E and submitted a first draft in the beginning of August 2016

²¹ FHRC has submitted a proposal under the BGP Innovation Fund, which has been approved and the contract was signed on 17 July 2016. The implementation of their 1-year project is expected to start on the 1st October 2016.

²² Concern Universal has been informed about BGP's CWM upscaling project and requested to develop a concept note for the BGP Innovation Fund.

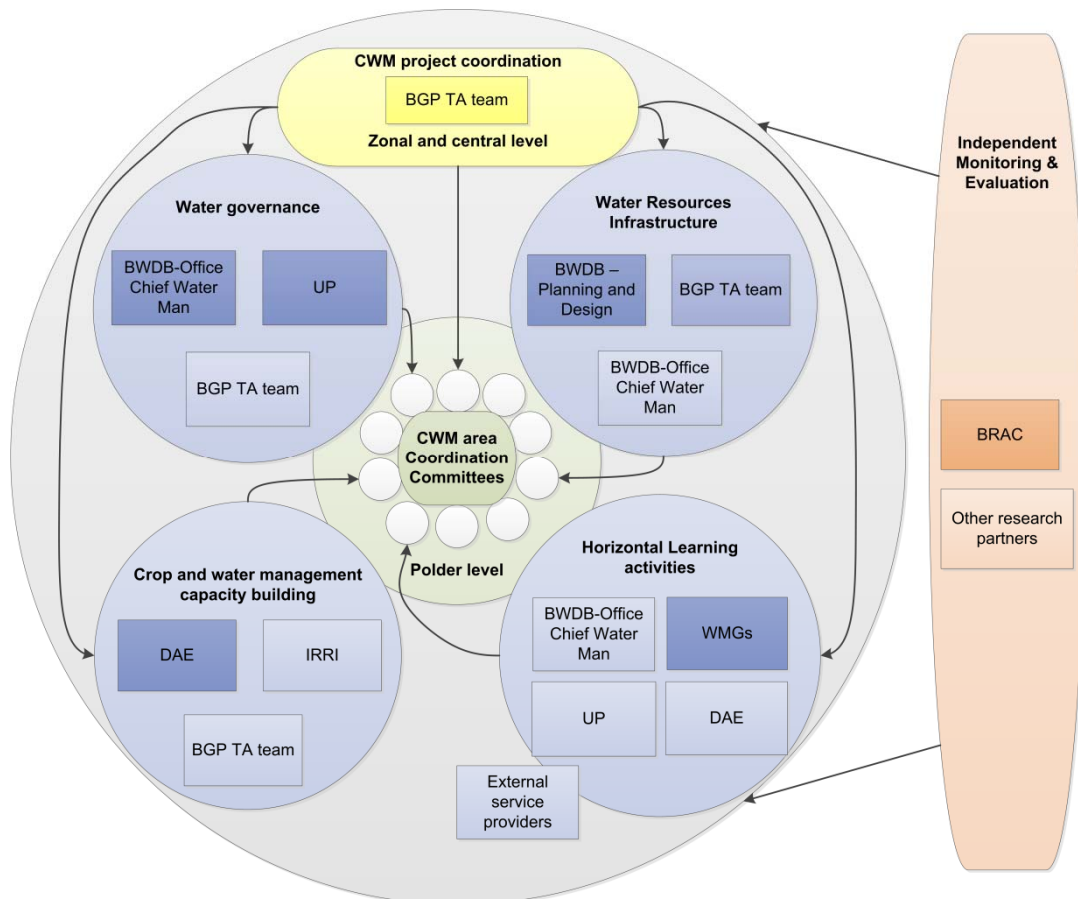


Figure 2: Coordination mechanism for CWM upscaling

For the purpose of coordination, it is suggested to split up the CWM upscaling trajectory in 4 core activity areas:

- **Water Governance**, which encompasses the process of CWM group formation, institutional strengthening, creating linkages with development actors, conflict resolution and all other aspects ensuring that the involved WMGs/WMA are empowered to continue and promote CWM. It is expected that BWDB-Office Chief Water Management and local Union Parishads take the lead in this process, which should enable WMGs/WMA to move on their own in the long run. BGP TA team polder and zonal staff can provide support where necessary.
- **Crop and Water management Capacity building**, which focuses on ensuring that the involved WMG members in the CWM areas have sufficient technical and adaptive expertise to manage their crops and water with improved technologies and from crop cyclic perspective. It is envisioned that DAE takes the lead in providing training through its Farmer Field Schools and local SAAOs being available to WMG members for questions and trouble shooting in the field. As many aspects around CWM are still new to SAAOs, the BGP TA team and IRRI experts will provide capacity building to SAAOs in the first year and be very regular present in the CWM areas to deliver direct support. It is anticipated that DoF will also be requested to provide technical support regarding fishery systems.
- **Water Resources Infrastructure**, which involves the actual identification of necessary (micro) water resources management interventions to realise CWM, as well as the necessary follow up in terms of planning, design, implementation and operation & maintenance. It is expected that BWDB staff will approach WMGs to jointly identify the necessary adjustment in water management infrastructure and support the WMGs in mobilising the required funds. This likely requires close contact with LGED, UP and certain NGOs who could provide additional sources of funding. BGP TA Service team WRM Infrastructure and other TA staff can provide support where necessary.

- **Horizontal Learning Activities**, which encompasses the activities to promote CWM on a large scale from peer-to-peer/ WMG-to-WMG and with additional adaptive vertical learning support. The expectation is that WMGs/WMA can lead this process themselves, assuming they have received the necessary promotion and learning materials, developed by audio-visual service providers, and are supported well by UP, DAE and BWDB. External service providers which are experienced in horizontal learning and adaptive learning networks at grassroots level, like FHRC, could play an additional supporting role to make sure this process will take off quick.

The overall CWM project coordination is expected to be facilitated by the BGP TA team during the first year of implementation. The lead will be with a TA Community Organisation Expert, reporting to the TA Team Leader. He will be working with a TA Drainage/WM expert, who will be the main advisor and coordinator for the technical aspects, and with the TA Zonal Socio-economists overseeing the performance of field staff at polder level, which will be in direct contact with the involved WMGs/WMA.

For the coordination of each CWM area, it is suggested to establish a small coordination committee with the involved Sub-Assistant Agricultural Officer (SAAO) of DAE, Extension Overseer (XO) of Chief Water Management Office and Sub Assistant Engineer (SO) and TA field staff (Community Organisers (COs) and Producer Group Facilitators (PFs)). Every coordination committee will select its own leader for direct communication with zonal level.

An independent partner, BRAC, has been appointed to ensure detailed monitoring and evaluation of 4 CWM areas and compare their performance with non-CWM areas in the coastal belt having similar cropping conditions (both polder and non-polder areas).

In the future other research partners or independent consultants might be involved to ensure sufficient systematic documentation of all CWM areas.

7. Activity Planning

7.1 Activity planning

The main activities, timeframes and lead responsible staff required for the introduction of CWM in new areas for the coming 2 years are given below. It is assumed that the CWM areas have been selected and involved WMGs have agreed to collaborate before the activities start.

	Activity	Time frame	Lead responsible
Year 1			
1	Identification and delineation of Water Management Unit (WMU) [20 ha] within selected CWM area, incl. detailed catchment investigation	Apr- June 2016	CWM selection team
2	Development of CWM-FFS curriculum to be used as learning for SAAOs (and SOs/XOs) to teach WMGs on CWM	Apr-June 2016	DAE, BGP TA
3	Orientation and technical trainings for SAAOs, SOs, XOs, and TA field staff on CWM implementation	May-June 2016	BGP TA, IRRI
4	Development of agreement with WMG members of WMU	Jun- Aug 2016	BGP TA, BWDB
5	Planning and design of minor WMI interventions	Jul – Oct 2016	BWDB, BGP TA
6	Orientation meetings for WMG members on CWM – preparation for Aman cultivation.	Jun - Jul 2016	DAE, BGP TA
7	Selection and distribution of required seeds for HYV-Aman	Jul-Aug 2016	DAE (IRRI for advice)
8	Construction of minor WMI interventions by women LCS	Nov-Dec 2016	WMGs
9	Ongoing field experimental learning on improved crop and water mgt by means of CWM-FFS; implementation by WMGs members.	Aug-Dec 2016	DAE, BGP TA
10	Development of promotion and learning materials for horizontal learning by WMGs	Jul 2016 – Jul 2016	Outsourcing
11	Implementation of CWM practices and first HL visits by neighbouring WMGs	Aug-Dec 2016	BGP TA, FHRC
12	Selection and distribution of required seeds for Rabi crops	Dec 2016	DAE (IRRI for advice)
13	Ongoing field experimental learnings on improved crop and water management by means of CWM-FFS; implementation by WMGs members	Dec 2016 – Apr 2017	DAE, BGP TA
14	Implementation of CWM practices and first HL visits by neighbouring WMGs during Rabi season	Dec 2016 – Apr 2017	BGP TA, FHRC
15	Monitoring of implementation	Jul 2016 – Jul 2017	BRAC
Year 2			
A	Vertical Learning by SAAOs and XOs to new adopters	Apr 2016 – Apr 2017	DAE, BWDB
B	Ongoing Horizontal Learning Activities in two-ways (inviting	Apr 2016 – Apr	BGP TA, FHRC

	Activity	Time frame	Lead responsible
	new adopters for exposure visit and visiting new adopters)	2017	
C	WMGs sharing WAPs	Jun 2017 and Dec 2017	BGP TA, ?
D	WMGs presenting WM/O&M plan towards governmental actors	Jul 2017 and Jan 2018	BGP TA, ?
E	Monitoring of implementation	Jul 2017 – Jul 2018	BRAC

8. Monitoring of CWM areas

As CWM is still a new concept and BGP's has set upscaling as one of its priorities. Therefore it is indispensable to closely monitor the actual process, outputs and outcomes. Regarding monitoring and evaluation the following is suggested.

8.1 Monitoring

Base-line and end-line surveys may be conducted to identify land use, productivity and profitability of the prevailing agricultural and aqua-cultural practices in the target scheme and in a comparison area. Monitoring could be conducted throughout the period of implementation of farmers' management practices, yields, costs and returns, water management, attitudes and perceptions.

8.2 Evaluation

Based on this data, an economic analysis could be undertaken to determine the costs and benefits of the drainage/water management system improvements. The analysis will include the capital cost, the estimated cost of proper maintenance and the value of the increased production.

An evaluation of the extent and results of horizontal learning could also be carried out.

8.3 Methodology

How the actual monitoring should take place and the intensity of monitoring, is not yet defined. Some preliminary ideas have been formulated, which potentially could also be combined.

1. **Participatory monitoring.** The idea is to give an active role to practising WMG members to monitor their own inputs and outputs of the process. The advantage is ownership of the process and its outcomes.
2. **Technical monitoring.** The current upscaling site in polder 30 makes use of measuring devices to monitor crop growth and water levels. Similar devices could be used in the upscaling areas. It is advised then to also monitor fertilizer input. This gives concrete scientific results, which can promote the acceptance of CWM by the government of Bangladesh, research institutes, donors and others. This type of monitoring is however more resource intensive from financial perspective.

A specific and detailed M&E plan for the CWM initiative is under development by BRAC.

9. Tentative budget for CWM

9.1 Budget Year 1

Table 1: Budget Year 1 in BDT

Serial No	Type of Cost	Unit				Costs (in BDT)	TOTAL (in BDT)	TA team Costs (in BDT)	Key TA staff responsible
BUDGET 1st YEAR									
	INFRASTRUCTURE					Cost per unit			
1	Infrastructural impr. (incl design)	10				900,000	9,000,000	9,000,000	MA
	AGRICULTURE			No. HHS		Cost of seeds			
2	Inputs Aman season	10	1	50		700	350,000	150,000	SH
3	Inputs Rabi season	10	1	50		1,400	700,000	500,000	SH
	TRAINING		No. seasons	No. participants	No. sessions	Cost per unit			
4	Provide CWM-FFS training through DAE	10	2	60	20	60,000	1,200,000	0	AI
5	Horizontal learning visits of neighbouring WMGs to CWM area within polder	10	2	20	5	200	400,000	400,000	AK
6	Development of promotion and learning materials	1					1,541,000	1,541,000	AP
7	Training facilitation and curriculum development field staff (SAAO, XO, etc)	1	2				NA	0	

Serial No	Type of Cost	Unit				Costs (in BDT)	TOTAL (in BDT)	TA team Costs (in BDT)	Key TA staff responsible
BUDGET 1st YEAR									
8	Training costs for venue, food, honorarium and travel	4	2		2	50,000	800,000	800,000	AK
	EXTRA STAFFING			Days		Honorarium			
9	XO/ SO	4	12	11		300	158,400	158,400	SH
10	SAAO	30	2	5		450	135,000	135,000	AI
	MONITORING					Cost per unit			
11	Participatory monitoring	10	2		2	1,000	40,000	40,000	JM
12	External M&E						4,350,000	4,350,000	JM
13	Freelance support in BGP baseline and outcome study reports on CWM areas		2			1,740,000	3,480,000	3,480,000	JM
	MISCELLANEOUS						2,000,000	2,000,000	SH
	TOTAL						24,154,400	22,554,400	
	AVERAGE per CWM area						2,415,440	2,255,440	

*MA = Mofazzal Ahmed; SH = Shorab Hossain; JM = John Marandy; AI = Ashrafur Islam; AP = Anis Pervez; AK = Abul Kashem

Assumptions underlying the proposed budget

Below an explanation is provided for the various serial numbers of the budget. It is also indicated which budget items could be outsourced or paid from other budget heads.

0. Total area of Community Water Management experimental learning site in Polder 30 is 22 ha. For the upscaling of every CWM area, we assume a similar intervention area of 20 ha (50 acre).

Budget Year 1

1. This is an estimated infrastructural design and implementation budget, which likely varies strongly per CWM area. (For 4 studied potential CWM areas, the budget estimations varied between BDT 300,000 and BDT 1,200,000 (incl. design costs))

2. The budget is based on only providing high quality HYV T.Aman seeds up to 1 acre, not fertilizers and pesticides. It concerns a direct transfer of seeds which will be for BDT 200,000 per season financed by DAE out of 10 Farmer Field School (FFS) budgets.
3. The budget is based on only providing high quality Rabi crop seeds up to 1 acre, not fertilizers and pesticides. Seed cost estimation is based on 25% Sesame + 25% Mung Bean + 25% Sunflower + 25% Maize. It concerns a direct transfer of seeds which will be for BDT 200,000 per season financed by DAE out of 10 Farmer Field School (FFS) budgets.
4. The budget is based on the cost of a standard FFS (incl. 20 participants), which is BDT 60,000 excluding staffing. As most CWM areas contain more than 20 households, it has been decided that every CWM will have 2 FFS running simultaneously. The FFS will be fully paid for by DAE out of their allocated BGP budget.
5. For Horizontal Learning visits of neighbouring WMGs to CWM area we propose to only subsidise Travel Costs. We estimated the travel costs a bit on the high side, but that gives the neighbouring WMGs the opportunity to buy snacks as appreciation towards the practising CWM.
6. For development of promotion and learning materials for WMGs a lump sum amount for 1 year is counted for. This includes the replication costs of the materials (e.g. video DVDs, leaflets, posters). We expect this can be outsourced. We anticipate two sets of materials will be prepared, one for Aman season and one for Rabi season. A more detailed budget is available with the Blue Gold TA communication expert Anis Pervez.
7. The development of a curriculum for the SAAOs, XOs/ SOs and the actual training facilitation to make SAAOs and other field staff familiar with teaching the curriculum, will be done by BGP TA staff as part of regular activities (and thus regular salary payments). We expect two sets of curricula and trainings, one for Aman season and one for Rabi season. Trainings will be provided in Patuakhali and Khulna.
8. We budgeted separately for the accommodation, food and venue costs of the training session under 7. Expectation is that BGP TA staff will organise these through our Training department. An honorarium for high level DAE or BWDB staff is included.
9. Expected is that in the 1st year it may be necessary to provide honoraria for (4) XOs/SOs to ensure their time will be made available to visit the CWM areas regularly.
10. With agreed with DAE that an honorarium for (30) SAAOs will be made available to ensure they will attend extra biweekly CWM preparation and training meetings.
11. Expected is that participatory monitoring can be done at low cost during existing WMG gatherings. There is budgeted for materials to do mapping exercises only.
12. External M&E of 4 CWM will be outsourced for a maximum budget of € 50.000,-. This includes crop cutting measurements and required materials for that.
13. It is recommended that results of all 10 CWM areas will be documented well. For this we require freelance support in baseline and outcome study reports.

9.2 Budget Year 2

Table 2: Budget Year 2 in BDT

Serial No	Type of Cost	Unit				Costs (in BDT)	TOTAL (in BDT)	TA team Costs (in BDT)	Key TA staff responsible
BUDGET 2nd YEAR									
	TRAINING		No. seasons	No. participants	No. sessions	Cost per participant			
A	Horizontal learning visits of neighbouring WMGs to CWM area within polder	10	2	20	10	200	800,000	800,000	SH
B	Horizontal learning visits of CWM area members to neighbouring WMGs	10	2	3	15	200	180,000	180,000	SH
C	WAP dialogue sessions between WMGs	10	2	25	1	500	250,000	250,000	SH
D	WM/O&M plan dialogues sessions with GoB/NGOs	10	2	20	1	300	120,000	120,000	SH
E	Duplication costs promotion and learning materials	10					50,000	50,000	AP
	MONITORING					Cost estimate			
F	Participatory monitoring	10	2		2	1,000	40,000	40,000	JM
G	External M&E						4,350,000	4,350,000	JM
H	Freelance support in BGP baseline and outcome study reports on CWM areas		2			1,740,000	3,480,000	3,480,000	JM
	MISCELLANEOUS						500,000	500,000	
	TOTAL						9,770,000	9,770,000	
	AVERAGE per CWM area						977,000	977,000	

Assumptions underlying the proposed budget

O. Assumed is that in every polder, about 5 WMGs will be interested in year 2 to also adopt CWM. The Horizontal Learning sessions will be organised in two ways. 1) Representatives from the 5 interested WMGs will visit a CWM area (2 times per season). 2) WMG representatives of the respective CWM area will visit new adopters and support them with advice in implementation (3 times per season). Assumption is that one visit per week takes place on a rotational basis between the WMG representatives (total 50 per year).

It is also assumed that governmental staff from BWDB and DAE does not require additional honoraria.

A. Visits to a CWM area by 5 neighbouring WMGs (max 25 participants) will take place 2 times per season. Only travel costs will be paid for.

B. Visit to new adopters by already practising WMG members (max 3 representatives) will take place 3 times per WMG per season. Only travel costs of WMG members to new adopters will be paid for.

C. Planning is to organise whole day WAP dialogue sessions. The project will provide transport costs and lunch, to let WMGs exchange their WAPs and coach each other on improvements. Facilitation possibly outsourced.

D. Planning is to organise half day sessions on WM/O&M plans, providing transport costs and lunch. Facilitation possibly outsourced.

E. Once materials are developed in year 1 they need to be duplicated for Horizontal Learning purposes. A lump sum amount is incorporated.

F, G, H. Expectation is that monitoring & evaluation costs will stay the same. The new adopters will not be intensively monitored.

Appendix 1 Selected CWM areas

1.1 Selection criteria

Below the questionnaire to select CWM areas is depicted.

1. Statistical aspects

1.1. Catchment size

What is the size in hectare of the catchment the potential CWM area is in?

1.2. WMG's in catchment

What is the number of WMG's in the catchment/WMA?

1.3. WMG members

How many members WMG consist?

1.4. Agro-unit size

What is the size in hectares of the agro-unit we are considering for CWM?

How many plots are there? And how many farmers will be involved in this CWM area?

1.5. Landownership

How is landownership organised in the area?

What percentage of land is for 'full land owners'?

What percentage of land is 'leased out to others'?

What percentage of sharecroppers?

1.6. Average land size

What is the average land size in the area?

What are the smallest plots, and how many are there?

What are the biggest plots, and how many are there?

This step includes recording the exact CWM area location with GPS.

2. Agricultural and marketing aspects

2.1 Cropping pattern

What is the current cropping pattern in the area? What are the current investment costs of this cropping pattern?

What are the current market prices of this cropping pattern? What is the overall net benefit/profit for the farmers?

2.1. Possible cropping pattern

Based on expectation, what would be possible cropping patterns that CWM could promote?

2.2. Tentative improvement

What would be the indicative crop improvement when applying a new cropping pattern/HYV?

What are the extra (estimated) investment costs of this new cropping pattern?

What is the extra (estimated) expected market price of this new cropping pattern?

What would be the net benefit/profit for the farmers?

2.3. Market linkages

What are the current market linkages for the farmers?

Are there any agricultural cooperatives in the area?

Is there any MFS group active in the catchment area of which the WMG is part?

Is there motivation to establish more market linkages collectively?

2.4. Potential Market Linkages

Is there room for improvement of market linkages?

How can this be improved? What are the needed efforts to accomplish this improvement?
And what will be the effect of this for the farmer?

3. Water management aspects

3.1. **Disaster risk reduction & Environment**

What are the intensity and frequency disaster occurrence and damage to crops (bench mark)?

Are there salinity problems?

What is the duration of water-logging and monsoon flooding (month – month)?

Is there a risk of embankment erosion?

3.2. **Existing WRM infra condition**

What is the current water resource management set up? [drawing / sketch]

And what is the general condition of it?

Are there already any BWDB activities (or other institutions (UP, LGED, BRDC)) planning to improve the catchment infrastructure (including BGP activities)?

3.3. **Proposed WRM infra improvements for CWM**

What are the possibilities(s) within this area to improve sub-catchment water management? (Describe multiple options if possible)

What are the tentative cost(s) of the defined intervention(s)?

And what will be the (estimated) command areas (both drainage and irrigation areas) of these interventions?

3.4. **Most realistic WRM infra option**

Out of the different options, what is the one with the biggest impact for the lowest costs?

3.5. **On-farm water and crop management**

What are the on-farm water and crop management improvements that can be carried out by the farmer?

What will be the expected effect of this?

4. Social aspects

4.1. **Quality of Water Management by WMG** [according to BGP functionality assessment]

Rank low/medium/high. Including explanation

4.2. **Unity and Cooperation within WMG**

Rank low/medium/high. Including explanation

4.3 **Unity and cooperation at WMA level**

Rank low/medium/high. Including explanation

4.3. **Conflicts**

Is there a main conflict of any nature in the area? Clarify

What is the conflict resolution practice?

Are there any water related conflicts? Clarify.

Are there any conflicts between the WMGs leaders (chairmen vs. secretary/others)? Clarify

Are there any conflicts between highlands vs low lands; farmers vs fisheries? Clarify

What is the process of confliction resolution?

4.5. **Cooperation with UP**

What is the role of UP chairman in conflict resolution?

4.6. **Motivation/ open mindness**

Rank low/medium/high. Include arguments

4.7. **Women involvement**

What is the current women involvement in field crop production (incl. fish culture in field or khals)?

Is there a trend that women become more involved because men take up other employment and/or are seasonally absent due to migrant labour?

Is the mobility of women accepted by the society?

Is there scope and willingness to improve women's skills and knowledge on field crops and water management? And how could this practically be done?

And what would be the benefit for female landholders and female agricultural labourers to be involved in water management?

4.8 Accessibility of location

What is the main communication with the Upazilla and District (highway)?

The location is accessible in all seasons of the year?

5. Overall assessment

To draw an overall conclusion regarding the CWM, the following questions will be addressed.

5.1 Main problems challenges

What are the main challenges for water management?

What are the main challenges for current and potential crops?

5.2 Main opportunities

What are the main opportunities for water management?

What are the main opportunities for current and potential crops?

1.2 Selected CWM areas

Khulna

Characteristic	WMG Gopipagla	WMG Fulbaria	WMG Bakultala	WMG Ghatar Khal
1. Statistics aspects				
Polder	Polder 22	Polder 22	Polder 29	Polder 31 part
Catchment Size	122 ha; Gopipagla 60%, Hartbati 20%, Telikhali 20%. Only Gopipagla area will implement CWM.	180ha. Water drains through Fulbari outlet (90%) and 10% through Durgapur Sluice. In this catchment 90% area under Fulbari WMG and 10% area Beghadana WMG.	17 ha. Land owners all belong to Bakultala WMG. Full area will be under CWM.	99 ha. The proposed catchment small part (30%) of Ghatar WMG named as Charar beel. Catchment is separated from other area. Water drains through Kallyan Sree Sluice.
WMG members/farmer	187 members of 140 HHs; 130 farmers.	147 members of 150 HHs; 100-150 farmers, 50% landless	Only one WMG, members 63 of 73 HHs.	532 members out of 657 HHs
Agro-unit size	40-50 farmers. Total no. of plots around 70. Around 50-60 farmers will be involved in this CWM	50-60 farmers. Total no. plots around 90.	Full agro-unit (40 farmers) will be under CWM.	60-70 farmers. Smallest plots up to 2 acre = 60%, biggest plot up to 5 acre = 20% and other sized plots = 20%
Landownership	Almost 100% cultivated by landowners	100% cultivated by landowners	70% cultivated by landowners and 30% is shared land. Land type is flat and high and it is good for CWM.	70% cultivated by landowners and 30% is shared land
Average land size	5+ acre = 10%, 2-5 acre = 30%, Up to 2 acre = 60%.	5+ acre = 1 farmer, 2.5- 5 acre = 3 farmers, Up to 2.5 acre = 50 farmers	Maximum 2.5 acre = 30%, 0.50-2.00 acre = 65%. Other = 5% (homestead, ditch etc.)	5+ acre = 1 farmer, 2.5- 5 acre = 74% and 1-2.5 acre = 25%.
2. Agriculture aspects				

Characteristic	WMG Gopipagla	WMG Fulbaria	WMG Bakultala	WMG Ghatar Khal
Current cropping pattern	Local T.Aman = 25%, BR11 23 = 75% Rabi: Sesame (dominant), Mung Bean, Water melon, Vegetables;	BR11 23 =90%, Local T. Aman= 5%, Other = 5%. Rabi: Sesame, Mung Bean, Water-melon, Vegetables;	Local T. Aman = 95% , BR11 23 = 5%. Most of the years single cropped area. Last year sesame 90% and other crops cultivated, however due to late harvest of Aman rice, Rabi crops were damaged by heavy rain.	BR11-23 = 80% and local T. Aman = 20 %. Single cropped area normally, but previous year sesame cultivated. This year not cultivated due to heavy rain.
Net benefit based on production cost and market price (mostly same for all polders)	Production cost for local T.Aman is Tk. 5000 average(33 decimal); Expected yield 12 mounds. Market price average Tk.800/mound Net benefit Tk.4600	Production cost for local T.Aman is Tk. 5000 average(33 decimal); Expected yield 10-12 mounds; Market price average Tk.750-800/mound Profit Tk.4000-4600	Production cost for local T.Aman is Tk. 6000 (33 decimal); Expected yield 10-12 mounds. Market price average Tk.700-800/mound local T. Aman and average Tk. 500-550/mound for HYVs Profit Tk. 4000-4500	Production cost Tk.4000-5000 (33 decimal). Expected yield 12-13 mounds. Market price Tk.600/mound for BR11-23 and average Tk 800-900 for local varieties. Profit Tk 4000-4500
Possible cropping pattern	Sesame, Sunflower, Water melon, Mung Bean; Boro; T.Aman (HYV).	Rabi: Sesame, sunflower, Water melon, Mung Bean; Boro (HYV); T.Aman (HYV).	Rabi: Sesame, Sunflower, Mung Bean, Maize, Mustard, winter vegetables; Jute, Aus; T.Aman (HYV)	Rabi: Sesame, Sunflower, Mung Bean, Maize, Mustard, winter vegetables; Jute, Aus; T.Aman (HYV)

Characteristic	WMG Gopipagla	WMG Fulbaria	WMG Bakultala	WMG Ghatar Khal
Tentative improvement (* Crops production cost and market prices are mostly same in all over the Polders)	T. Aman double production, early start, earlier harvest cropping intensity may increase HYV production cost averageTk. 6000/33 decimal, production 20 mounds, Market price Tk. 550, net benefit Tk.4900/bigha. BARI Mug-6/bigha production cost Tk.2000, Production 100 kg. Market price Tk 70/kg, net benefit Tk.5000/acre. Sesame *Production cost Tk.2000/bigha, production 120kg/bigha, market price average Tk58/kg, net benefit Tk. 4960/acre. Sunflower production cost Tk.6000/bigha, production 1300kg/bigha, market price Tk14/kg, net benefit Tk12200/bigha.It is noted that main benefit of marginal and smaller farmers will consume rice over the year otherwise they have to purchase rice form market with high price.	Early start, earlier harvest cropping intensity may increase HYV production cost averageTk. 6000/33 decimal, production 20 mounds, Market price Tk. 550, net benefit Tk.4900/bigha. BARI Mug-6/bigha production cost Tk.2000, Production 100 kg. Market price Tk 70/kg, net benefit Tk.5000/acre. Sesame *Production cost Tk.2000/bigha, production 120kg/bigha, market price average Tk58/kg, net benefit Tk. 4960/acre. Sunflower production cost Tk.6000/bigha, production 1300kg/bigha, market price Tk14/kg, net benefit Tk12200/bigha.It is noted that main benefit of marginal and smaller farmers will consume rice over the year otherwise they have to purchase rice form market with high price.	T. Aman double production, early start, earlier harvest. Cropping intensity may increase. HYV production cost averageTk. 6000/33 decimal, production 20 mounds, Market price Tk. 550, net benefit Tk.4900/bigha. BARI Mug-6/bigha production cost Tk.2000, Production 100 kg. Market price Tk 70/kg, net benefit Tk.5000/acre. Sesame *Production cost Tk.2000/bigha, production 120kg/acre, market price average Tk58/kg, net benefit Tk. 4960/acre. Sunflower production cost Tk.6000/bigha, production 1300kg/bigha, market price Tk14/kg, net benefit Tk12200/bigha.	Early start, earlier harvest cropping intensity may increase HYV production cost averageTk. 6000/33 decimal, production 20 mounds, Market price Tk. 550, net benefit Tk.4900/bigha. BARI Mug-6/bigha production cost Tk.2000, Production 100 kg. Market price Tk 70/kg, net benefit Tk.5000/acre. Sesame *Production cost Tk.2000/bigha, production 120kg/bigha, market price average Tk58/kg, net benefit Tk. 4960/acre. Sunflower production cost Tk.6000/bigha, production 1300kg/bigha, market price Tk14/kg, net benefit Tk12200/bigha
Disaster risk reduction & Environment	No erosion. High lands need to retain water through field channels.	No erosion. The area is mostly drained but needs re-excavation of khal. Outfall river Badra condition is good.	No erosion. The area is well drained. Outfall river Salta condition is good.	No erosion. The area is besides the outfall river.
Market linkage	Fulbari Bazar	Fulbari Bazar	Koya Bazar, Dumuria, main 7km far from CWM area. Fish market-Dumuria, Kharia and Mostofapur.	Koya bazar
Potential Market linkage	Linkage with larger market through collective planning.	Baroari Bazar to Koya Bazar. Linkage with larger market through collective planning.	Khulna	Koya bazar well connected to Khulna.
3. WM aspects				

Characteristic	WMG Gopipagla	WMG Fulbaria	WMG Bakultala	WMG Ghatar Khal
Existing WRM infra condition	Drainage outfall Marabadra through Gogarkhal to Gopipagla outlet. In general condition is good: Gopipagla outlet is already improved by BWDB. There are no BWDB plans in the catchment presently.	Water drains through Fulbari outlet to Badra river. Outlet operation by Fulbari WMGs. Fulbari linkage khal partially silted and this khal needs to link with Pashkhali khal. BWDB has no re-excavation planned.	Main outfall is Bakultala sluice to Salta river (active river) Bakultala sluice is improved by BWDB. Operation of sluice by Bakultala WMG and connected khal condition is good. No further plans by BWDB.	Water is draining through Kallyan sree sluice. Land levelling is flat. Water drains, but not very quickly due to siltation around sluice.
Proposed WRM infra improvements for CWM	To enable quick drainage, re-excavation of Gogarkhal (300m). branch khal (500m) (tentative) are proposed. Command areas are 60 ha and 35 ha.	The WMG proposed re-excavation of Pashkhali khal (around 400m length and wide 4-5m) and the re-excavation of main khal of the Fulbari outlet to connect to Pashkhali khal. Also proposed one culvert for water storage and irrigation purposes near Pashkhali khal culvert. Benefited area = 150ha for drainage and irrigation.	Between agri-lands and the Khishimishi river (khal) a small gated pipe needs to be installed (1 feet diameter) for retaining /drainage water, because existing pipe is not sufficient. Also cross dam (40-50 feet length, height 3-4 feet) for storage of water for community fish culture and irrigation needs to be constructed.	Main khal of the sluice needs re-excavation (300-400 feet) for proper drainage.
Tentative cost intervention	Exact cost will be provided by WRM Infra Service team	Exact cost will be provided by WRM Infra Service team	Exact cost will be provided by WRM Infra Service team	Exact cost will be provided by WRM Infra Service team
On-farm water management	No field channels for crops. They are cleaning main khals and do O&M of outlet.	Field channels are not available. WMG is maintaining the outlet well, but water drains insufficiently due to the siltation of the linkage khal connected to the outlet.	Khishimishi river/Khal pipe well maintained for drainage purposes and able to retain water, but the pipe is insufficient for irrigation and drainage. No field channels are constructed for crops.	Few farmers are using underground water for crops by means of shallow tube wells (60-80 deep) and through field channels. In future farmers would like to use it for HYV production.
Proposed on-farm water management	Farmers will develop field channels and micro-level water management for crops. Effect will be production and cropping intensity will be increase.	Farmers will develop field channels and micro-level water management for crops. Effect will be production and cropping intensity will be increase.	Farmers will develop field channels and micro-level water management for crops. Effect will be production and cropping intensity will be increase.	Farmers will develop field channels and install shallow tube wells for irrigation of HYV. Effect will be production and cropping intensity will be increase.
4. Social aspects				

Characteristic	WMG Gopipagla	WMG Fulbaria	WMG Bakultala	WMG Ghatar Khal
Quality WM in WMG	WMG controlling Gopipagla outlet for field level water management. Overall quality is medium.	WMG Fulbaria managing water for field level. Quality of water management is medium.	Bakultala WMG controlling the Bakultala sluice gate. 4 WMGs drain water through the sluice and in the majority of the catchment area (except proposed CWM area) the cropping pattern is fish-paddy (Boro)- vegetables.	Separated small catchment and linked with Kallyan Sree Slice. The sluice is operated by the local landowners and they are members of the Gatherkhal WMG. Quality of water management is okay.
Unity and Cooperation within WMG	Good relation with WMGs/WMA; They also maintain relationship with BWDB-XO, DAE SAAO and UP. UP is very much cooperating, but XO and SAAO are most of the time not available.	The WMG members are united and they have some knowledge about improved rice varieties cultivation and their area has to a certain extent an improved drainage system.	Very good relation with WMGs/WMA; They also maintain relationship with BWDB-XO, DAE SAAO and UP.	Very good cooperation within WMG and with UP.
Unity and Cooperation at WMA level	High	High	High	High
Conflicts	Almost no conflicts. Only conflict for 300m re-excavation of khal with 2-3 land owners. Presently WMG is trying to resolve this.	No conflicts	No conflicts. Only for community fish culture a discussion between 2 WMGs is required.	No conflicts
Highlands vs low lands; farmers vs fisheries; cooperation with UP	No conflicts	No conflicts	No conflicts	No conflicts
Motivation/open mindness	They like to change their current cropping pattern by water management and improved varieties.	They like to change their current cropping pattern by water management and improved varieties.	They like to change their current cropping pattern by water management and improved varieties.	They like to change their current cropping pattern by water management and improved varieties.
Women involvement	Women are mainly involved in Rabi crop cultivation and would like to be involved more	Poor women are involved in agricultural works	Women are little involved in agricultural works but their movement is very widespread e.g. bazar, meetings, leadership and involved IGAs	Women are mainly involved in Rabi crop cultivation and would like to be involved more
Road communication	Communication is good but roads are narrow and not suitable for heavy transports	Communication is good but roads are narrow and not suitable for heavy transports	Communication is good and very well connected with Upazila and District	Communication is good and very well connected with Upazila and District
Location accessible	Accessible by van, motorcycle and other local transports	Accessible by van, motor cycle and other local transports	Accessible by any local transports	Accessible by any local transports

Characteristic	WMG Gopipagla	WMG Fulbaria	WMG Bakultala	WMG Ghatar Khal
Main problems challenges	Improved seeds, technical knowledge and minor structures	Improved seeds, technical knowledge, minor structures and capital	Improved seeds, technical knowledge and minor structures	Improved seeds, technical knowledge, minor structures and capital
Main opportunities	Unity of group and cooperation with WMGs/WMA and UP	Unity of group and cooperation with WMGs/WMA and UP	Unity of group and cooperation with WMGs/WMA and UP	Road communication, Unity of group and Cooperation with WMG/WMA and UP

Patuakhali

Characteristics	WMG Dakshin Bighai Dakshin	WMG Daribaheer Char	WMG Uttar Soilabunia	WMG Dakshin Sonakhali	WMG Dakshin Atharogachia	WMG Purbo Morichbunia
1. Statistical aspects						
Polder	Polder 43/2A	Polder 43/2B	Polder 43/2B	Polder 43/1A	Polder 43/1A	Polder 43/2D
Catchment Size	343 ha. 5 WMGs (Paschim Titkata, Purba Titkata [main], Patukhali, Dakshin Titkata [minor])	400 ha. 6 (Daribhahir char, Uttar Amkhola, Myddha Amkhola, Daskin Amkhola, Chiguria Daskin Balikhati, Ramdhola)	56 ha. 5 WMGs water draining through Nosishil Sluice.	120 ha. Dakshin Sonakhali and Pashim Sonakhali WMGs water draining to Amtala sluice	99 ha. The proposed catchment small part (30%) of Ghatar WMG named as Charar beel. Catchment is separated from other area. Water drain through Kallyan Chawla Sluice.	121 ha. Water draining through Nilkhola sluice.
WMG members/farmer	395 members of 539 HHs; 200-250 farmers.	487 members of 670 HHs	164 Members 320 HHs; 180- 200 farmers.	228 members of HHs 367	HHs 657, Member 531, Farmers 60-70.	316 Members of 314 HH, 1400-1500 farmers
Agro-unit size	40-45 farmers will be involved in CWM.	Around 50-60 farmers will be involved under CWM from one WMG.	70-80 farmers will be involved under the CWM from one WMG	Dakshin Sonalkhali WMG will be involved under the CWM and total 60-70 farmers.	Smallest plots up to 2 acre 60%, biggest plot up to 5 acre 20% and other size plots 20%	Only 35-40 farmers will be involved in the CWM.
Landownership	80% cultivated by landowners. 20% share cropped lands.	85% cultivated by landowners and 15% is shared land	80% cultivated by landowners and 20% is shared lands	90% cultivated by landowners, 10% shared lands	70% cultivated by landowners and 30% is shared land	60% cultivated by landowners and 40% shared crops lands.
Average land size	Up to 5 acre land holding 2/3 farmers, Other lands holding are small and marginal farmers.	Maximum 8-10 acre land holding 3/4 persons. 1-5 acre lands holding small and marginal farmers.	5+ acra 20%, 2.5-5.00 acre 50% other 10%, .50-2.49 acre 30%	Up to 2.5 acre 50%. 2.5- 5. acre 45%, 5+ acre 5%.	5+ acre land hold one farmer. 2.5- 5 acre land hold 70% and 1-2.5 acre land hold 35%.	1-3 acre 50% and up to 9 acre 30% for - 1 acre 20%
2. Agriculture aspects						

Characteristics	WMG Dakshin Bighai Dakshin	WMG Daribaheer Char	WMG Uttar Soilabunia	WMG Dakshin Sonakhali	WMG Dakshin Atharogachia	WMG Purbo Morichbunia
Current cropping pattern (*Production cost and market price mostly same all over the Polders)	Local paddy Aus (30%) – Local Aman (100%) – Rabi Sesame & Mung bean (100%) Rabi- Mung Bean 80% 20% fallow, Local T.Aman 100%	Rabi- Mung Bean 30% Aus-Fallow. Aman BR-23, BR-11 60% Local Aman 40% Rabi- Mung Bean 40%, fallow60% Aus-fallow. Aman BR-23 and 11 60%. Local T. Aman 40%	Mung Bean, Chili-Fallow - T.Aman. Mung Bean 80% Chilli, Sweet potato etc.10%-Fallow-T.Aman (local 80% (mulata, Mota, Dudkolom, Balam). HYV -BR-11 and BR22 -20%.	Rabi-Water Melon, vegetables, Mung Bean-Local - Aus-T. Aman(local) Water Melon 90%, Mung Bean 10% . Aus 70% and T.Aman 100% local e.g. Kuti Agti, Dudkolom (70-80%). Other local 20%	Mung Bean-Aus-T.Aman. T. aman Mung Bean 80%, others 20%, local Aus 70% , Fallow 30% and local T. Aman 100 %	Mung Bean, Chili 100% - Fallow - Local T. Aman100%,
Net benefit based on production cost and market price (mostly same for all polders)	Production cost for local Aman Tk. 5000 average(33 decimal); yield 10-12 mounds. Market price average Tk.750-800/mound, Profit Tk.4000-4600. Mung Bean investment Tk.4000/33 decimal. Production 5 mound/33 decimals. Market price Tk.2500.00/mound.Profit: Tk. 8500.00	Production cost :Rabi-Mung Bean Tk. 4000.00/bigha. Aman-BR 23 and 11 Tk.6000.00/Bigha,. Yield production Mung Bean 3 mound/Bigha. Rice BR-23 & 11 16 mound/Bigha. Market price Mung BeanTk. 3000.00/mound Rice rice Tk.650.00-700.00/mound, . Profits: Mung Bean Tk.5000.00 Rice Tk. 5200.00	Production cost Tk. 4000/ 33 decimal, yield 10-12 mound/33 decimal. Market Price is Tk.avage700.00 /mounds. Profit Tk. 4400. Mung Bean production cost Tk. 2000.00/33 decimal. Production 100kg/33 decimal, market price Tk.70 x 100 kg=Tk.7000.00. Profit Tk 6000.00	Production cost for Water Melon 15000/acre and profit Tk.60,000.00 - 70,000. Aus production cost Tk. 5000.00 , yield 12 mound/Bigha, Market price Tk. 700.00, Profit-Tk. 3400.00/Bigha. Local T.Aman production cost Tk. 4000.00/33 decimal; yield 10 mounds. Market price average Tk.600/mound local profit Tk.2000.00	Production cost Tk. 2000.00/Bigha. Yeild 4 mound/ Bigha, Market price Tk 2500.00/Mound, Profit Tk.8000 .00. Aus production cost Tk5000-6000/bigha. Production 12 mound/Bigha, Market price Tk.600/mound' Profit Tk. 1200.00. T. Aman production cost Tk 5000.00 Production 10 mound/Bigha, Market price Tk. 600.00, Profit Tk. 1000.00	Production cost for T. Aman Tk. 4000/ 33 decimal, yield 10-12 mound/33 decimal. Market Price is Tk.avage700.00 /mounds. Profit Tk. 4400. Mung Bean production cost Tk. 2000.00/33 decimal. Production 100kg/33 decimal, market price Tk.70 x 100 kg=Tk.7000.00. Profit Tk 6000.00
Possible cropping pattern	Sesame, Sunflower, Water-Melon, Mung Bean; Boro (HYV), T.Aman (HYV).	Sesame, Sunflower, Mung Bean, Maize, Mustard, Winter vegetables; Aus; T.Aman HYV.	Mung Bean Bari-6, Sunflower, Wheat, Watermelon- Aus/Jute-T.Aman (HYV). Besides the CWM area Nashishil khal is in very good condition for community fish culture.	Early Water Melon, Mung Bean- Aus and T.Aman HYV.	Sesame, sunflower, Mung Bean, Maize, Mustard, winter vegetables; Jut, Aus; T.Aman (HYV)	Sesame, sunflower, Mung Bean, Maize, Mustard, winter vegetables; Aus; T.Aman (HYV)

Characteristics	WMG Dakshin Bighai Dakshin	WMG Daribaheer Char	WMG Uttar Soilabunia	WMG Dakshin Sonakhali	WMG Dakshin Atharogachia	WMG Purbo Morichbunia
Tentative improvement (* Crops production cost and market prices are mostly same in all over the Polders)	Early start, earlier harvest. Cropping intensity may increase. HYV production cost averageTk. 6000/33 decimal, production 20 mounds, Market price Tk. 550, net benefit Tk.4900/bigha. BARI Mug-6/bigha production cost Tk.2000, Production 100 kg. Market price Tk 70/kg, net benefit Tk.5000/Bigha. Sesame *Production cost Tk.2000/bigha, production 120kg/bigha, market price average Tk58/kg, net benefit Tk. 4960/Bigha .It is noted that main benefit of marginal and smaller farmers are to be consumed rice over the year otherwise they have to purchase rice form market with high price.	T.aman double production, early start, earlier harvest. cropping intensity may increase. HYV production cost averageTk. 6000/33 decimal, production 20 mounds, Market price Tk. 550, net benefit Tk.4900/bigha. BARI Mug-6/bigha production cost Tk.2000, Production 100 kg. Market price Tk 60/kg, net benefit Tk.4000/acre. Sesame *Production cost Tk.2000/bigha, production 120kg/acre, market price average Tk58/kg, net benefit Tk. 4960/acre. Sunflower production cost Tk.6000/bigha, production 1300kg/bigha, market price Tk14/kg, net benefit Tk12200/bigha.	Crops production and cropping intensity increase (Sesame, Mung Bean, Mustard,Water-Melon, Sunflower) BARI Mug-6/bigha production cost Tk.3000, Production 100 kg. Market price Tk 70/kg, net benefit Tk.4000/acre. Sesame *Production cost Tk.2000/bigha, production 120kg/acre, market price average Tk58/kg, net benefit Tk. 4960/acre. Sunflower production cost Tk.6000/bigha, production 1300kg/bigha, market price Tk14/kg, net benefit Tk12200/bigha.	Advance Water Melon production and cost will Tk 15000/acre, Profit could be in beginning of the season Tk. 100000-120000.00/acre. T. aman HYV production cost will be Tk. 18000.00/acre, Yield will 60 mounds/acre and market price will be Tk. 500/mound. Total profit will be Tk. 12000.00/acre.	Early start, earlier harvest cropping intensity may increase HYV production cost averageTk. 6000/33 decimal, production 20 mounds, Market price Tk. 550, net benefit Tk.4900/bigha. BARI Mug-6/bigha production cost Tk.2000, Production 100 kg. Market price Tk 70/kg, net benefit Tk.5000/Bigha. Sesame *Production cost Tk.2000/bigha, production 120kg/bigha, market price average Tk58/kg, net benefit Tk. 4960/Bigha. Sunflower production cost Tk.6000/bigha, production 1300kg/bigha, market price Tk14/kg, net benefit Tk12200/bigha	HYV Aus and HYV T. Aman wii be introduced. Aus: Production cost:Tk. 5000.00/Bigha. Production 16 mounds, Market price Tk. 500.00, Profit: Tk. 3500.00. T.Aman production cost Tk. 6000.00/Bigha. Production 18 mounds/Bigha. Market price Tk.700.00/mound, Profit: Tk.6600.00/bigha.
Disaster risk reduction & Environment	No erosion. The area is mostly drained but need re-excavation of khal. Outfall river Paira condition is good.	No erosion. The area is well drained. Outfall river Lohalia condition is good.	No erosion. The area is mostly well drained. Only need one inlet on the Embankment	No erosion. The area is well drained. Outfall river condition is good.	No erosion. The area is besides the outfall Chawla khal	No erosion. Outfall khal is good. Community fish culture implementing by Blue Gold.
Market linkage	The area is very remote area. Weekly Khatashia Bazaris the nearest market for purchases and selling of agricultural goods. Local small market is Titkata.	Amtala Bazar and Galachipa Upazilla. Also Badura bazar and Pauakhali assessiable.	Badura Bazar, Patuakhali	Gazir hat and Galachipa.	Small Bazar Shakharia Bazar. Thera linked to Badura Bazar	Khasharhat bazar is near. Patuakhali also well connected.

Characteristics	WMG Dakshin Bighai Dakshin	WMG Daribaheer Char	WMG Uttar Soilabunia	WMG Dakshin Sonakhali	WMG Dakshin Atharogachia	WMG Purbo Morichbunia
Potential Market linkage	Weekly Khatashia Bazar is the nearest market for purchases and selling of agricultural goods. Kathashia market linked with Patuakhali	Badura and Patuakhali	Badura Bazar, Patuakhali	Gazir hat and Galachipa.	Baduraia- Patuakhali	Well connected to Patuakhali and Dhaka
3. WM aspects						
Existing WRM infra condition	Excavation of Chakhbari khal already part of BGP/BWDB plan. Due to non-functioning of Khatashia Sluice WMG/farmers constructed X-dam for separation between Khatashia and Titkata catchment. Titkata sluice is working. Farmers are cleaning water hyacinths from the main khal.	Amkhola Sluice are in good condition. Water drains through Lohalia river. Amkhola Sluice operating by this WMG but mainting is not so well. River site of the Amkhola sluic business boat and wood log creating barriers of water flows and along with sluicgate on BWDB lands constructed saw mill and other business houses which is damaging for sluice sustainability.	Nosishil sluice is operating by influence people with the cooperation of UP for main purpose of catching fish. Need Inlet on the embankment but CWM area not very much affected because water retained in the khal.	Amtala sluice under reconstruction by BWDB. Outfall River Galachipa is in good condition. Water drains properly only needs repair of gated culvert to retain water for irrigation. WMG/farmers are currently irrigating lands by the using homemade wooden gat/mud.	Water is drainage through Chawla sluice. Land level is flat. Water draining due to sluice. WMG is operating the sluice. Farmers are using LLP and Sluice is working.	Main Sluice is far from tis catchment but no problems. WMA chairman is elected from this WMG. Very few farmers are use LLP for irrigation.
Proposed WRM infra improvements for CWM	Titkata sluice linked main khal need re-excavation of about 4 km and branch khal named Kalisuta need re-excavation for draining low lands for about 1 km.	Only need one inlet/pipe get for high land near the embankment and minor re-excavation of branch channels Daribahirchair khal 1 km. Pipe/outlet is to be installed at the lower site of the location.	Nashishil outlet already planned by BWDB/BG. WMG proposes one inlet for high land for CWM area.	Re-excavation of Patabunia khal 1km and repair of gated culvert to retain water for irrigation.	Re-excavation of khal Sutakhali is in BWDB/BG plan.	Re-excavation of khal Sutakhali is in BWDB plan.
Tentative cost intervention	Tentative cost for khal Tk. 10,00000.00. Command area will be 200 ha. Branch khal cost may be Tk. 300000.00	Tentative cost of Inlet Tk. 800000.00 and 1 km khal 500000.00	Not known yet	Patabunia khal vetted by BWDB. Repair of gated culvert to retain water for irrigation.	NA	NA

Characteristics	WMG Dakshin Bighai Dakshin	WMG Daribaheer Char	WMG Uttar Soilabunia	WMG Dakshin Sonakhali	WMG Dakshin Atharogachia	WMG Purbo Morichbunia
	Command area will be 100 ha.					
On-farm water management	Field channels are not available. Well maintaining Titkata Sluice. Water draining insufficiently due to the siltation of drainage linked khal to sluice	Field channels are not available. Farmers installed one pipe for water management. Inlet is properly maintaining. Farmers also maintaining field level water. We found plot wise small dam to keeping water if necessary but not with perfect planning.	Field channels are not available. Water drains Nashishil khal. In Aman season farmer's keeping water for rice by construction of small dyke surrounding the plots.	The WMG is controlling the gated culvert. WMA are operating/controlling Amtala sluice but they have good relation with WMA. Field channels are constructed by mostly women for water Melon.	Medium. No O&M committee active. WMG leaders operating Sluice. In Aman season they develop small dyke for keing water.	Medium, O&M committee is now active (because chairman is active, the chairman is also WMA chairman and very influential with in the WMG/area, sometime difficult to handle him. Need strong CO here) In this catchment very few farmer use LLP for irrigation.
Proposed on-farm water management	Farmers will develop field channels and micro-level water management for crops. Effect yield and cropping intensity will be increased.	Farmers will develop field channels and micro-level water management for crops. Effect will be production and cropping intensity will be increase.	For Rabi farmers will develop field channels for water Melon etc. and micro-level field water management for crops. Effect will be production and cropping intensity will be increased.	In the rabi Rabi season they already develop field channels for Water Melon. They will develop field channel for T Aman HYV for CWM. WMG propose repair of the gated culvert for irrigation.	Farmers will develop field channels and installation of shallow for irrigation of Water Melon.. Effect will be production and cropping intensity will be increase.	Farmers will develop field channels and installation of shallow for irrigation of HYV.. Effect will be production and cropping intensity will be increase.
4. Social aspects						
Quality WM in WMG	Quality of water management is medium level. WMG managing water for field level through sluice. Farmers are cleaning water hyacinths from the main khal.	Water management is medium level. WMG managing water for field level through sluice and installation of pipe/inlet.	Field level water management by the farmers, but sluice farming WMG members have not much control over the sluice.	WMG controlling water through field channels and use of gated culverts. Some time they use river water by LLP.	Quality of water management is medium level. WMG managing water for field level through sluice .	Medium, O&M committee is now active. In this catchment very few farmer use LLP for irrigation. Water stored in the khal and community fish culture is being implemented.

Characteristics	WMG Dakshin Bighai Dakshin	WMG Daribaheer Char	WMG Uttar Soilabunia	WMG Dakshin Sonakhali	WMG Dakshin Atharogachia	WMG Purbo Morichbunia
Unity and Cooperation within WMG	The WMG members are united, but they have no knowledge about improved rice varieties cultivation.	Very good relation with WMGs/WMA; There are also maintaining relations with BWDB-XO, DAE- SAAO and UP	Very good relation with WMGs/WMA; They are also maintaining relations with UP, but UP is not operating Nashishil sluice according to the preference of farming WMG members.	Very good relation with WMGs/WMA; There are also maintaining relations with BWDB-XO, and UP.	Very good cooperation with WMG, UP	Good linkages with the WMG members , the chairman is also WMA chairman and he is a political leader. He is very influential within the WMG/area, sometimes difficult to handle him. Need strong XO/CO here.
Unity and Cooperatin at WMA level	High	High	High	High	High	High
Conflicts	No conflicts	No conflict, only for community fish culture a discussion between WMGs is required.	Conflicts between WMGs and influential persons who are catching fish near sluice and block operation.	No conflicts	No conflicts	No conflicts
Highlands vs low lands farmers vs Fisheries cooperation with UP	No conflicts	No conflicts	No conflicts	No conflicts	No conflicts	No conflicts
Motivation/open mindness	They like to change their current cropping pattern by water management and improved varieties	They like to change their current cropping pattern by water management and improved varieties. But some farmers like to keep BR-11 and 23. They also informed us that their land is always wet due to a big river besides the land and this is main reason why Rabi crops are late established.	They like to change their current cropping pattern by water management and improved varieties	This is a progressive WMG when it comes down to women involvement. They like to change their current cropping pattern by water management and improved varieties	They like to change their current cropping pattern by water management and improved varieties	They like to change their current cropping pattern by water management and improved varieties
Women involvement	Poor women are willing to be involved in agricultural works. Currently they are involves in LCS works.	Women are little involved in agricultural works but their movement is very widespread e.g. bazar, meetings, leadership and	Women mainly involved in homestead gardening but willing to be involved in agricultural works	Women mainly involved in Rabi crops, but willing to be involved in other agricultural works	Women are involved in Rabi crop production and women are inspired to be involved in other agricultural works.	Women mainly involved in Rabi crops, but willing to be involved in other agricultural works

Characteristics	WMG Dakshin Bighai Dakshin	WMG Daribaheer Char	WMG Uttar Soilabunia	WMG Dakshin Sonakhali	WMG Dakshin Atharogachia	WMG Purbo Morichbunia
		involved IGAs				
Road communication	Communication is good but it is last part of the Polder (25 km far from Patuakhali) on the way Bashtala point embankment is erosion started. In monsoon it become difficult for communication with the location.	Road Communication is good and well connected with Upazila and District head quarter.	Communication is good and well connected with Upazila and District	Road communication is good but the area is so far from main road and Upzila.	Road communication is good and connected with Upazila and District	Road communication is good and well connected with Upazila, District and Dhaka.
Location accessible	Accessible to all local transports.	Accessible to all local transports.	Accessible to all local transports.	Accessible but difficult in monsoon.	Accessible to all local transports.	Accessible to all local transports.
Main problems challenges	Improved seeds, technical knowledge, minor structures and capital.	Improved seeds, technical knowledge and minor structures	Improved seeds and technical knowledge	Improved seeds and technical knowledge	Improved seeds, technical knowledge, minor structures and capital.	Improved seeds, technical knowledge and proper cooperation with Chairman and WMG members.
Main opportunities	Unity, cooperation with WMGs/WMA and UP	Unity, cooperation with WMGs/WMA and UP	Unity, cooperation with WMGs/WMA and UP	Unity, cooperation with WMGs/WMA and UP	Good road communication. Unity, Cooperation is very good with WMG/WMA/UP	Good road communication. Unity, Cooperation is very good with WMG/WMA

Appendix 2 Other potential partners

While setting up this plan, a number of potential collaboration partners have been considered and consulted. Below a list of partners, we do keep in mind, but will not involve intensively during the first year of implementation:

- **DLS:** DLS could provide technical knowledge to the women for improved varieties poultry and livestock activities (Note: current focus of upscaling of CWM is on field crop & aquaculture production, but livestock support might be considered in a later stage).
- **BRR:** Just like IRRI, Bangladesh Rice Research Institute (BRR) is a current collaboration partner in the upscaling site area in polder 30. They could be an advising partner on required inputs, especially for rice, and could assist in trials, experimental learnings and technical monitoring.
- **BARI:** Bangladesh Agricultural Research Institute has knowledge of water management and trial sites at Dacope and Amtoli, so can provide advice from their experience in both areas.
- **BUET:** Bangladesh University of Engineering and Technology (BUET) and especially its Institute for Flood and Water Management (IFWM) could be another partner providing students for research purposes. Traditionally, IFWM is rather engineering oriented, but in the last years they have developed some socio-technical courses, learning materials and practical field orientations. A substantial number of professors and students have experience in the coastal belt of Bangladesh.
- **ULAB:** University of Liberal Arts Bangladesh (ULAB) has a Sustainable Development Institute which also conducts research in the polder areas from a sociological and gender perspective. They might be partner in developing gender and community empowerment related learning materials or providing students for research on this topic.