

Food Security and Sustainability of Institutional Interventions in Coastal Zone in Bangladesh

Contribution to IOB Coherence Study

Date: 17-11-2023

Version: 2.0

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This study and report have been commissioned by the Policy and Operations Evaluation Department of the Ministry of Foreign Affairs of the Netherlands (IOB)

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Abbreviations, explanations, and translations of Bangladeshi words

<i>Beel</i>	A lake-like wetland with static water in a floodplain
BDT	Bangladeshi Taka
BG(P)	Blue Gold (Program)
BWDB	Bangladesh Water Development Board
CEGIS	Centre for Environmental and Geographic Information Services
DAE	Department of Agricultural Extension
DLS	Department of Livestock
DoF	Department of Fisheries
CDSP	Char Development and Settlement Project
FCD/I	Flood Control and Drainage / Irrigation
FFS	Farmer field school
FGD	Focus group discussion
<i>Gher</i>	Pond, used for shrimp cultivation and/or fish farming
GoB	Government of Bangladesh
HYV	High Yielding Varieties
IGA	Income generating activity
IOB	Policy and Operations Evaluation Department of the Dutch Ministry of Foreign Affairs
IWRM	Integrated water resources management
<i>Khal</i>	Canal
LCS	Labour contracting society
LGED	Local Government Engineering Department
LGI	Local Government Institute
MoWR	Ministry of Water Resources
O&M	Operations & Maintenance
PPATS	Participatory Performance Assessment & Target Setting
SW	Southwest Area Integrated Water Resources Planning and Management Project
SWAIWRPMP	Southwest Area Integrated Water Resources Planning and Management Project
Tk.	Taka, currency of Bangladesh
ToR	Terms of references
<i>Upazila</i>	Subdistrict; an administrative region
UP	Union Parishad
WMA	Water Management Association
WMCA	Water Management Cooperative Association
WMF	Water Management Federation
WMG	Water Management Group
WMO	Water Management Organisation

Summary

This report is the result of a study to document the connection between food security and institutional interventions in local water/polder management in Bangladesh. It follows from the investigation in December 2021 by IOB, which looked at the coherence of the food security, water, and climate agendas. On that occasion, a need was identified to understand better the institutional investments in water management organizations (WMOs) and, in particular, study the long-term performance of these local organisations and their contribution to food security. This report hence focuses on WMOs (water management organisations) that have been developed and supported under three Dutch-Bangladesh development programs in coastal Bangladesh: the Blue Gold Program (BG), the Southwest Area Integrated Water Resources Planning and Management Project (SW) and the Char Development and Settlement Project (CDSP).

The coherence questions that this short study seeks to answer concern the sustainability of these newly created institutions and their contribution to improved food security, are as follows: 1) How effectively does investing in local water management organizations contribute to the different dimensions of the food security agenda? And, 2) To what extent are the interventions aimed at water management organisations in the polders of Bangladesh sustainable, and what are the factors for a WMO to function? To deconstruct sustainability, the study looked at three aspects of WMOs, that define their performance: legality, legitimacy, and functionality.

In this study, it was found that WMOs had vital contributions to the spectacular increases in food security that were achieved the three programs, complementing the rehabilitation of polder infrastructure and agricultural support programs. With respect to the sustainability of the system there are two main dimensions, namely 1) the sustainability of the WMOs themselves and 2) the sustainability of the polder water management system.

Regarding the sustainability of the WMOs themselves, it was found that after the closure of the program, the legal requirements for WMOs are eroding, unless there is a handholding operation. WMOs are not optimistic about their continued survival. In spite of this, many new linkages and contacts have been created. Also, the WMGs were found to be anchored in the local setting – more with elected bodies than with government organizations. Especially the connection with BWDB is not assessed as strong. Over time, there is a risk that the connection with the BWDB further fades away, as there are staff rotations and no systematic platform for interaction. In this respect, the context differs from LGED, which uses a regular monitoring system, awarding best performing WMCS, and where there are regular meetings. Regarding functionality, the WMGs - irrespective of their legality - perform the different functions. In general, functionality does not depend on legality. There is much uncharted territory in local water management and other functions that the WMOs could take up. Overall, a process of institutional erosion seemed to be inevitable. But, informally, the new relations and linkages will continue, and the limited scope of functions undertaken - nowadays - by the WMO may still be performed.

Regarding the sustainability of the polder water management system, it was found that continued performance of the water management system depends not only on the continued performance but also, and possibly to a major degree, on how the BWDB is organized at the zonal level. The connection of WMOs with the BWDB are still weak compared to the engagement with the elected bodies or the local government institutions. There are several features that explain this relative disconnect. Some concern the way the BWDB is organized, with limited outreach at the district level, general understaffing in the zonal divisions, and frequent reposting. This affects the cooperation between BWDB and WMOs. There are other limitations in the operation and organization of the BWDB that have a large bearing on the sustainability of the polder water management system, including 1) unpredictable and insufficient budgets for O&M in the zonal offices of BWDB, 2) cumbersome system of emergency repairs to tackle embankment erosion at an early stage, 3) a lack of a life cycle approach, one manifestation being the use of vulnerable steel gates and non-availability of composite gates, and 4) a lack of integration of private dredging in river management planning. At the same time, the overall arrangement for O&M would need to be improved.

All these elements can be repaired and could help break the “Build, Neglect and Rebuild” cycle that characterizes the management of the coastal polders. It is also important to emphasize that the sustainability of the polder water system only to a certain (limited) degree depends on the sustainability of the WMOs. Rather the WMOs, as they are now, also contain an unfulfilled potential of a larger contribution to water management within the polders that would add to their functionality and hence continued performance.

1. Scope of the report

This report is the result of a study to document the connection between food security and institutional interventions in local water/polder management in Bangladesh. It follows from the investigation in December 2021 by IOB, which looked at the coherence of the food security, water, and climate agendas. On that occasion, a need was identified to understand better the institutional investments in water management organizations (WMOs) and, in particular, study the long-term performance of these local organisations and their contribution to food security.

This report hence focuses on WMGs (water management groups) and WMAs (water management associations) that have been developed and supported under three Dutch-Bangladesh development programs in coastal Bangladesh: the Blue Gold Program (BG), the Southwest Area Integrated Water Resources Planning and Management Project (SW) and the Char Development and Settlement Project (CDSP). Bangladesh's coastal area is marked by large exposure to climate risks, small land holdings and high landlessness, but also by dynamic economic development in the last decades.

This first chapter gives a short overview of the three programs under investigation, introduces the research questions and discusses the methodology used. The second chapter of this document is dedicated to the first main theme of the study: the contribution of water management organizations to food security in the coastal areas. The third chapter discusses the second theme, i.e., the sustainability of the newly created water management organizations and the factors that affect their long-term performance. The report ends with learnings and conclusions. Detailed background information is given in the annexes.

1.1 Introduction to the three coastal zone water management programs

Figure 1 and table 1 are overviews of the three programs reviewed for this study. All programs have been implemented at a substantial scale – together they cover over 500,000 hectares. Located in coastal Bangladesh, the programs are at the forefront of climate change, compounded by changed hydrology due to upstream water resource development and sedimentation of the main delta rivers. The coastal area is densely populated, and small land holdings proliferate – 91% of land holdings are less than 1 hectare in the Blue Gold area, for instance. Almost half of the land is share-cropped, often by landless people who make up the majority of the population in these areas.

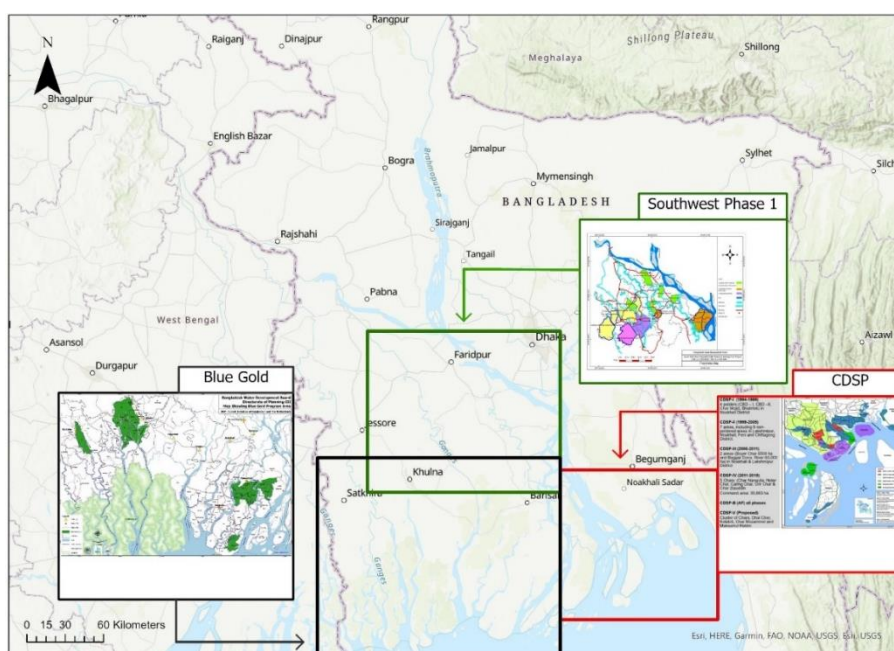


Figure 1: Program areas in coastal Bangladesh

The water management challenges in the areas of the different programs are severe yet vary in gradation. Whereas drainage congestion is a major issue in the Southwest area, the Blue Gold Program area is located closer to the coast, and river sedimentation and saline inflows are also critical challenges. In CDSP – apart from those other challenges - a main factor is land erosion. In the highly active Meghna Estuary, this comes with an active process of land loss and land accreditation. The saline environment, particularly in (part of) the Blue Gold and CDSP areas, also implies that maintenance of basic infrastructure is very demanding due to the rapid corrosion of the water control structures. What is to be noted is that these challenges are external, i.e., at the level of the coastal river system and beyond the control of the WMOs. The WMOs, however, have a large function in responding to these challenges. The different projects each employed their own strategies in setting up WMOs, even though they all follow the principles of participatory water management (PWM) (Annex 4).

Blue Gold Program

The Blue Gold Program (BG) had the overall objective of reducing poverty and increasing household income through appropriately targeted interventions for 185,000 households in the coastal districts of Patuakhali, Khulna, Satkhira, and Barguna; by helping local communities to mitigate the impacts of climate change and to develop their local economy through diversified farming practices supported by developing value chains, and supported by participatory management of local water resources (Blue Gold Program, 2021). Under this program, 511 water management groups and 36 water management associations were set up (Blue Gold Program, 2021a). The program was extended a few times and was active from June 2013 to December 2022 (Blue Gold Program, 2021a). The program invested in the rehabilitation and improvement of local water infrastructure, agricultural development, market strengthening and strengthened water management organisations and local water management. All costs were borne by a grant of the Netherlands Government and by the Government of Bangladesh.

As in the entire coastal region, small land ownership prevails in the BG area. According to the endline survey of 2020, it was found that households in the Blue Gold project area own, on average, 0.36 ha of land, of which 0.28 ha is cultivable. 47% of the cultivable land is sharecropped or otherwise rented in, enabling households owning little land to access land for crops and *ghers*. Over 90% of that land is cultivated by the 61% of households who are landless and marginal landowners. Between 2015 and 2020, there was a 29% increase in rented land, which enabled more households to cultivate land, and landless people to increase their cultivated area by 35% (Blue Gold Program, 2021b).

Southwest Area Integrated Water Resources Planning and Management Project

Phase 1 of the Southwest Area Integrated Water Resources Planning and Management Project (SW) was operational from January 2007 to June 2015 (BWDB, 2023) and covered 100,000 ha of FCD/I (flood control and drainage/irrigation) areas in southwest areas of Bangladesh (Southwest-Phase1, 2014). Investments in infrastructure were funded through an ADB Loan and technical assistance and community strengthening was paid for by a Dutch Government Grant. The project's objective was to enhance economic growth and reduce stakeholders' poverty by rehabilitating damaged infrastructures within the hydrological boundaries of the project. The project's overall approach was to hand over the management of implemented Sub-Unit Areas to its stakeholders for sustainable operation and maintenance (O&M) of the project (BWDB, 2023). From a broader perspective, the project also aimed to create awareness of the benefits of directly involving beneficiaries in project planning and implementation in a way that mobilizes local community support for improving the livelihood of residents. The basic assumption was that organizing beneficiaries into water management organizations and developing their collective management capacity would lead to both sustainable water management organizations and sustainable O&M of water facilities. The project, till June 2015, resulted in the formation of 14 WMAs and 102 WMGs (Asian Development Bank, 2016).

Under additional financing (AF), from November 2015 to June 2023, another 23 WMAs and 267 WMGs have been set up till to date – which equals the target (Southwest-AF, 2022). This phase was meant to expand the success of Phase 1 to nearby geographical areas in the southwest of Bangladesh. Closely aligned to Phase 1, under AF, it was aimed to enhance the livelihoods of the rural population by improving the productivity and sustainability of existing underperforming flood control, drainage, and irrigation schemes. It was also meant to address constraints on agriculture, fisheries, and livelihood development through holistic and participatory planning, development, and management of water and delivery of support services, via amongst others the development and strengthening of local water management organisations (Asian Development Bank, 2023).

Prior to the Southwest project, projects in the area, implemented by BWDB since the 1950s, were aimed primarily at agricultural enhancement without any regard for non-agriculture water use or environmental concerns. As a result, with the deterioration of the environment in the enclosed FCD/I area, people resorted to embankment-cut and prying open flap gates of regulators to drain out the water and let in fish fingerlings. Thus, the condition has deteriorated so much that thorough rehabilitation is necessary – as done under Southwest. Next to that, the sustained negligence in the upkeep of those projects over a long time has rendered the project facilities almost dysfunctional leading to severe flooding and/or drainage congestion, sometimes worse than in pre-project situation (Southwest-Phase1, 2014).

Char Development and Settlement Project

The Char Development and Settlement Project (CDSP) program is active in frontier territory. The CDSP area is in the Meghna estuary - the central and most dynamic part of the coastal zone of Bangladesh (Figure 1). There, new land is emerging from the sea and, at the same time, land is being lost to erosion. There is a net yearly accretion of around 20 km², with newly formed land of about 52 km² and less eroded land of around 32 km². The average yearly erosion of 32 km² means that, with an assumed density of 800 people per km², approximately 26,000 people (about 4,500 households) lose their land in the estuary each year. Many of them move to newly emerged lands, the so-called *chars*. These new chars, usually with a level of less than 3-meter PWD, are subject to regular flooding (CDSP-IV, 2018b). People living at the chars are moreover vulnerable to storms and saline intrusion (CDSP-IV, 2018b). They typically depend on low-yielding wet season Aman rice crops and, to a limited degree, on dry season Rabi crops. In addition to farming, fish is collected from ponds and open waters. Some income is derived from tending, often share-owned, cattle. Generally, the land is very saline, which affects the scope of agriculture (CDSP-IV, 2018b)

CDSP initially started in 1994 as a successor of the Land Reclamation Project, that was implemented by the BWDB from 1979-1991. Its overall objective is reducing poverty and hunger for char dwellers living on the newly accreted coastal chars. CDSP has had multiple phases (I-IV), in addition to a bridging phase from July 2019 to June 2024 (CDSP, 2023). As a result of its efforts, currently, 57 WMGs (all registered under BWDB), 3 WMAs and 1 water management federation are active. CDSP I to IV ran in different areas, while the current bridging phase is in all areas from those phases. In the latter two phases, the investments in infrastructure and land development were supported by IFAD whereas the social development and technical assistance were funded by a grant from the Netherlands Embassy. In the first phases, the Netherlands government funded the entire program.

Initially, no formal institutions were present at the chars, except *samaj* (local communities), and mosque and madrasa committees (CDSP-IV, 2018b). The reality was that the area was much controlled by local strongmen who assumed control over the new land and exercised exploitative power over the men and women living in the area. From there, the project started working. The WMOs, as initiated under CDSP, were more than farmer organizations: they were the nascent local government and the platform to defend the rights of the otherwise vulnerable settler communities. Under CDSP, the newly accredited land, formally belonging to the Ministry of Land, is allocated directly to the settlers under a 99-year lease. Moreover, the CDSP policy of [giving land titles to wives and husbands both, with the women registered as first owner, created an enormous social change too.](#) (see more about the blogs in Annex 2).

Table 1 Coastal area development, their abbreviation(s), short summaries, and water management challenges in the project areas

Program	Abbreviation	Summary	Water management challenges in project area
Southwest Area Integrated Water Resources Planning and Management Project	SW	Phase 1 ran from 2007 to June 2015: 102 WMGs and 14 WMAs were set up. In the additional financing phase (AF, from November 2015 till June 2023), another 267 WMGs and 23 WMAs have been set up, whereas earlier WMOs are still being contacted.	<ul style="list-style-type: none"> - Remove drainage congestion - Control inflow, irrigation - Water storage - Less demanding O&M than in other project areas
Blue Gold Program	BG	Ran from March 2013 to December 2021 and worked in 22 polders. 511 WMGs and 36 WMAs have been set up under the project.	<ul style="list-style-type: none"> - Remove drainage congestion - Control (saline) inflow - Water storage - Saline and tidal environment - Demanding O&M
Char Development and Settlement Project	CDSP	Started initially in 1994 with Phase 1. Currently in its bridging phase, after 4 phases, till June 2024, after which phase 5 is proposed. Currently, 57 WMGs, 3 WMAs, and 1 Water Management Federation are active	<ul style="list-style-type: none"> - Remove drainage congestion - Control (saline) inflow - Water storage - Saline and tidal environment - Demanding O&M - Erosion - Emergency preparedness

1.2 Research questions

The coherence questions that this short study seeks to answer concern the sustainability of these newly created institutions and their contribution to improved food security, as follows:

- How effectively does investing in local water management organizations contribute to the different dimensions of the food security agenda?
- To what extent are the interventions aimed at water management organisations in the polders of Bangladesh sustainable, and what are the factors for a WMO to function?

These questions relate to the programs in Bangladesh and are part of a larger study by IOB. They are also of generic importance: to what extent is an investment in local institutions as such effective in achieving food security, what does the contribution look at, what are the costs of such investments, and what is their lifecycle? These generic questions are addressed in the last section of the report. The next (second) chapter of this document is dedicated to the first main theme of the study: the contribution of water management organizations to food security in the coastal areas. The third chapter discusses the second theme, i.e., the sustainability of the newly created water management organizations and the factors that affect their long-term performance. The report ends with learnings and conclusions. Detailed background information is given in the annexes.

Apart from answering the two key questions, we hope that this report addresses two gaps. The first gap is the general absence of professionalism in local institutional development. Within externally funded projects, the development of WMOs is often a routine element. The precise approach towards forming these local organizations, however, is hardly given a thought the topic of discussion: what to achieve, how to most effectively achieve this, how to organize such, where to be cost-efficient and how to be effective in the long run? In general, these questions are often not answered. The second gap is the lack of interest within organizations such as BWDB to see local institutional development, as a means to achieve goals of water and food security. After all these years, there is still a strong tendency to treat local institutional development peripherally and not to mainstream it in operations. This has several reasons, but it may be useful to better understand what WMOs can do and what not and how they are best stimulated.

Detailed questions as elaborated upon in the Terms of Reference (Annex 9) are elaborated upon in chapter 4.1.

1.3 Methodology

In this study, the two main research questions are approached from different angles to get more depth and triangulate the findings. We also made an effort to quantify the results as much as possible. Four different methods were used:

- Interviews with key stakeholders, in particular from the Bangladesh Water Development Board (BWDB), Local Government Institutions (LGIs), the Department of Agriculture Extension (DAE), and the Local Government Engineering Department (LGED).
- Field survey among 45 WMOs, randomly selected from the data basis and distributed equally over the three programs, including 20% informal organizations in non-project areas.
- Literature and data analysis of WMO monitoring programs as in place in the different coastal programs. These monitoring programs provided valuable insights, although they were in general not standardized and covered only relatively short periods of the entire programs.
- Interviews with project staff of the three programs.

The questions covered in this study and the methods used are elaborated upon in Annex 1.

2. Local water management organisations and food security

This section addresses the extent to which the development and strengthening of WMOs, supported under the three coastal development programs, contributed to food security.

The three programs had spectacular impacts on increased food security – in terms of higher crop intensity, the yields of main crops and additional crops, the diversity of food production, the quality of diets, income, and access to food. Table 2 is a summary of the impact, based on the reports of BG, SW and CDSP. Some highlights:

- Crop intensity increased by 18% (SW) or with 23-91% (BG)
- Yields per ha of main paddy crop increased by 75% (SW)
- Cultivation of high-value crops increased by 16-25% (BG)
- Egg production increased by 3.5 times, milk production by 2.7 times (CDSP-IV)
- Net incomes increased by 31% (CDSP); net farm income increased by 131% (SW)
- Households with five months or more of food shortage reduced from 46% to 23% (CDSP-IV).

All projects shared a similar investment approach in infrastructure, promoting better agriculture, fisheries and marketing, and the strengthening of local organizations, in particular WMOs. This section assesses the contribution of WMOs in these overall results, as far as this can be separated. It should namely be noted that not all (positive) developments can be attributed to the development programs or the WMOs, as also in areas without a coastal development program or/and without the establishment of WMOs, (positive) changes can be observed (see Annex 3). The next chapter answers the question of the long-term sustainability of the WMOs.

Table 2 Summary of the impacts on food security and income for the three projects

Blue Gold	<p>Main crop</p> <ul style="list-style-type: none"> - Increase in cropping intensity varied from 22.6% to 91.2% (depending on the project zone (Khulna, Sathira, Patuakhali), and method of assessment (lower scores under remote sensing (comparing avg. 2011-2015 to 2018) than in surveys (comparing 2013 to 2019), because remote sensing does not consider fish cultivating gher) (Blue Gold Program, 2021b). - Farmers' preferences for these land uses have changed over the Blue Gold period (2012/2014 to 2020/2021). Of the total area of all crops, paddy accounts for 45%, fish 29%, and non-rice crops 26% after Blue Gold; the area of paddy has increased by 10%, with the area under both fish and non-rice crops increasing by around 50% (Blue Gold Program, 2021b). - Significant move from LV to HYV paddy for Aman and Aus, and from HYV to hybrid for Boro. At the start of Blue Gold, over half of paddy was local varieties, while in the end HYVs and hybrids account for 79% of the area (Blue Gold Program, 2021e). - Overall, more land being utilised and less left fallow (though differences per season) and higher yields, when comparing pre and post project situation (Blue Gold Program, 2021). <p>Additional products</p> <ul style="list-style-type: none"> - Expansion of high value crops between 2013/2014 and 2020/2021 including vegetables and watermelons in Khulna (+25% expansion of non-rice crops) and of mung bean in Patuakhali (+62% in expansion of non-rice crops) (Blue Gold Program, 2021e). <p>Income</p> <ul style="list-style-type: none"> - The net farm income has more than doubled (up 131% in total) between 2013/2014 and 2020/2021 (calculated using crop budgets and WMG data on crop areas) (Blue Gold Program, 2021e). - More specifically, it rose 158% for paddy, 136% for other crops, and 94% for fish (Blue Gold Program, 2021e). <p>Food security</p> <ul style="list-style-type: none"> - 8.2% of households reported food shortages in terms of being unable to have at least two meals per day at some point in the last 12 months (2020 survey) compared to 7.2% in the 2017 survey. This slight increase may be linked to the poor rice crops in 2019 and 2020 (Blue Gold Program, 2021b). - Food security improved between 2019 and 2020, with more fish, meat, and eggs consumption, especially by poorer households (Blue Gold Program, 2021b).
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Southwest	<p>Main crop</p> <ul style="list-style-type: none"> - In Phase 1 (2004/2005 – 2012/2013), the cropping intensity increased from 190% (2004) to 208% (2014) (Southwest-Phase1, 2014). - In Phase 1 (2004/2005 – 2012/2013), the yield per ha of HYV rice, jute, wheat, oilseed, pulses, and vegetables increased significantly (see table below) (Southwest-Phase1, 2014). 																																																																																																																					
	<table border="1"> <thead> <tr> <th rowspan="2">Crops</th> <th colspan="3">Year 2004-2005</th> <th colspan="3">Year 2012-2013</th> </tr> <tr> <th>Area (ha)</th> <th>Yield (T/ha)</th> <th>Production (T)</th> <th>Area (ha)</th> <th>Yield (T/ha)</th> <th>Production (T)</th> </tr> </thead> <tbody> <tr> <td>B. Aman</td> <td>8622</td> <td>1.2</td> <td>10346</td> <td>4512</td> <td>1.46</td> <td>6588</td> </tr> <tr> <td>L.T. Aman</td> <td>2635</td> <td>1.57</td> <td>4137</td> <td>116</td> <td>1.60</td> <td>186</td> </tr> <tr> <td>HYV T. Aman</td> <td>5946</td> <td>2.35</td> <td>13973</td> <td>7776</td> <td>3.04</td> <td>23639</td> </tr> <tr> <td>Local Boro</td> <td>581</td> <td>1.85</td> <td>1075</td> <td>31</td> <td>1.68</td> <td>58</td> </tr> <tr> <td>HYV Boro</td> <td>8661</td> <td>3.60</td> <td>31180</td> <td>12205</td> <td>3.90</td> <td>47600</td> </tr> <tr> <td>Hybrid rice</td> <td>-</td> <td>-</td> <td>-</td> <td>8655</td> <td>5.40</td> <td>46737</td> </tr> <tr> <td>Aus</td> <td>7803</td> <td>1.46</td> <td>11392</td> <td>3960</td> <td>1.70</td> <td>6732</td> </tr> <tr> <td>Aromatic rice</td> <td>-</td> <td>-</td> <td>-</td> <td>425</td> <td>4.15</td> <td>1764</td> </tr> <tr> <td>Total rice</td> <td>34,248</td> <td></td> <td>72,103</td> <td>37,680</td> <td></td> <td>133,304</td> </tr> <tr> <td>Wheat</td> <td>1221</td> <td>1.92</td> <td>2344</td> <td>1255</td> <td>3.14</td> <td>3941</td> </tr> <tr> <td>Jute</td> <td>2784</td> <td>2.37</td> <td>6598</td> <td>9817</td> <td>2.75</td> <td>26997</td> </tr> <tr> <td>Pulses</td> <td>6229</td> <td>0.6</td> <td>3737</td> <td>7219</td> <td>1.22</td> <td>8807</td> </tr> <tr> <td>Oil seeds</td> <td>3272</td> <td>0.6</td> <td>1963</td> <td>2962</td> <td>0.98</td> <td>2903</td> </tr> <tr> <td>Vegetables</td> <td>1105</td> <td>17</td> <td>18785</td> <td>1805</td> <td>14.70</td> <td>26534</td> </tr> <tr> <td>Cropping Intensity</td> <td></td> <td>190%</td> <td></td> <td></td> <td>208%</td> <td></td> </tr> </tbody> </table> <p>- In Phase 1, the rice cultivation area grew from 34,248 ha to 37,680 ha and production from 72,103 MT to 133,104 MT, which is in line with an increase from 2.1 to 3.5 MT/ha (Southwest-Phase1, 2014).</p> <p>Additional products</p> <p>- In Phase 1 (2004/2005 to 2012/2013), the total fish production increased from 9,212 MT to 12,115 MT (Southwest-Phase1, 2014).</p> <p>Income</p> <p>- Between 2009 and 2013, in Phase 1, the weighted monthly average income per family increased from Tk 3107 to Tk 4070 (Southwest-Phase1, 2014).</p>	Crops	Year 2004-2005			Year 2012-2013			Area (ha)	Yield (T/ha)	Production (T)	Area (ha)	Yield (T/ha)	Production (T)	B. Aman	8622	1.2	10346	4512	1.46	6588	L.T. Aman	2635	1.57	4137	116	1.60	186	HYV T. Aman	5946	2.35	13973	7776	3.04	23639	Local Boro	581	1.85	1075	31	1.68	58	HYV Boro	8661	3.60	31180	12205	3.90	47600	Hybrid rice	-	-	-	8655	5.40	46737	Aus	7803	1.46	11392	3960	1.70	6732	Aromatic rice	-	-	-	425	4.15	1764	Total rice	34,248		72,103	37,680		133,304	Wheat	1221	1.92	2344	1255	3.14	3941	Jute	2784	2.37	6598	9817	2.75	26997	Pulses	6229	0.6	3737	7219	1.22	8807	Oil seeds	3272	0.6	1963	2962	0.98	2903	Vegetables	1105	17	18785	1805	14.70	26534	Cropping Intensity		190%			208%
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Comparing with the counterfactual

In assessing the impact of the WMOs on food security, it is also good to compare the development of the WMOs with the counterfactual – the traditional organizations in the polders. The field survey investigated nine such non-project traditional organizations, three in or close to each project area.

In the field survey (2023), it was found that almost all WMOs reported that agricultural production during the project period has grown a significantly or a lot during project support – or in the past 10 years for the control groups (Figure 2). Only for the control groups, two SW control groups and one CDSP control group mentioned that it only grew a bit. One CDSP control group mentioned that it did not grow at all. This overview hints towards a big role for the WMOs in the increased agricultural production (Figure 2).

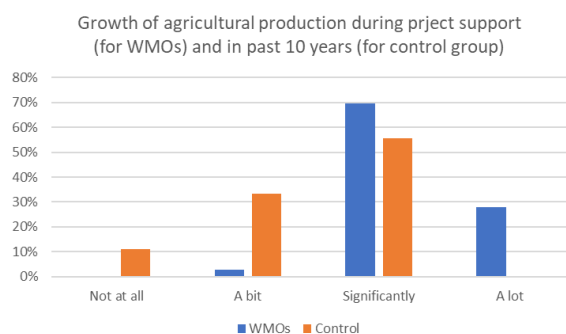


Figure 2 Growth of agricultural production during project support (for the WMOs) and in past 10 years (for the control group), results from field survey March 2023

From the survey, it was found that the traditional organizations are mainly concerned with managing the lowest section of the polder areas, i.e., the *beels*, not the entire area. Their remit is in most cases the balancing of different interests around the usage and management of the *beel*. Their internal organization depends on local leadership, and they are not connected to government programs. Table 3 makes a comparison with the organized WMOs as supported under the three coastal water management programs. In general, the WMOs cover, in principle, the entire polder area, have accountability mechanisms next to leadership, have female membership, interface with government programs, and have a broader remit. In the case of the CDSP area, the role of the WMGs has been much larger – they were the prime local organizations that united against land-grabbers and constituted the community/ local government. Even now, the WMGs are still called into mediating local conflicts, divorces, and family affairs.

Table 3 Comparison of the characteristics of traditional water management organisations and formal water management organisations

	Traditional water management organisation	Formal water management organisation
Area coverage	Section of polder (<i>beel</i>) – limited reach	Entire polder
Functions	Regulating access (few mention excavation, and one mentions sluice operation) Maintenance and repairs Limited room for independent choices	Operation Maintenance Oversee LCS Local water management Micro-credit and IGA Development activities Room for independent choices
Cooperation	Poor to reasonable relation to other organisations	Cooperation with other WMGs (horizontally) and WMA (vertically) Reasonable to good relation to other organisations
Interaction with government programs	Informal linkages Relationships with UP, LGIs, BWDB often described as poor or reasonable, seldom good	Interface with government programs Relationships with UP, LGIs, BWDB often described as reasonable or good, seldom poor
Organization	Leadership Volunteerism Risk of interference by powerful interests and powerful individuals Decision-making is informal, often by few members, and not democratic Lack of plans	Formal cadre Accountability Contract party Decision-making follows democratic processes, and discussion with members Making plans
Agriculture (Table 2)	Limited growth in agricultural production	Larger growth in agricultural production.
Gender	Limited participation of women	39-50% participation of women in committees

Generally, WMOs are well known outside the area and in control areas in the field survey, there was large interest to set up WMOs. The traditional water management organisations also point towards specific problems and challenges that need to be solved, such as dredging of a river which will increase crop production for a large area, the need for a catchment committee to properly manage a sluice. Some groups also mention that WMGs would be helpful for their agricultural and social development.

Below (figure 3 and sections 2.1 to 2.4) the contribution of the formal WMOs to the often-spectacular gains in food security is constructed. In understanding the role of the WMOs in the different aspects of food security, we look at four angles, that are discussed subsequently:

- Contribution to increased food production (section 2.1)
- Contribution to diversity of food production (section 2.2)
- Contribution to access to food (section 2.3)
- Contribution to food safety (section 2.4)



Figure 3 The different elements of food and nutrition security

2.1 Contribution to increased food production

In Blue Gold, Southwest, and CDSP, considerable progress was made in the quantity of food production. In all three programs, tremendous increases are observed (Table 2). This increase in food production is manifest in three dimensions: (1) increase in the area cultivated; (2) increase in the area having several crops (2 or 3) in a year and (3) increase in crop yields, i.e., the production per ha.

It appears that the three programs made strides in all these three aspects of increased quantity of production, as elaborated upon in Table 2. In CDSP, the increase in the area of land cultivated is most pronounced, as is the nature of CDSP. In CDSP, in particular, the recently accredited land is converted into regular farmland. In the other two programs, the opportunities to increase farmland were limited, and it is more common to see a conversion in either direction of cropland and fish ponds.

In CDSP, there has been a strong role of WMGs in new land development. In the pioneer areas characteristic for CDSP, WMGs facilitated the land settlement and the planning of water systems and road infrastructure. The default was that access to the new lands was controlled by local power interests and outright goons. The WMGs provided the counterweight in these local struggles being the platform of all smallholders and the interface between the local government, the project, and the numerous small farmers. The WMG helped to implement the land settlement with the land title in the name of the women in the households as first owners and their husbands as second owners. The land titling was done according to official rules, something that, in the absence of CDSP, would not happen, as is elaborated upon [in this blog](#). In twenty years, the CDSP land titles were prepared for almost 34,000 couples, covering 18,000 hectares of land, with the process still ongoing in newly developed land, such as Oro (Urir) Char. In the other two coastal programs, the area under cultivation also increased, but far more modest – and there was no clear role of the WMOs in this.

In all areas, crop intensity increased, as well as crop yields. The most significant driver was the introduction of new, improved aman (wet season) rice varieties. These new BR varieties achieve two essential benefits: higher yields and shorter cultivation seasons. This short cultivation season releases land in time to cultivate a second, sometimes even a third crop. The new varieties require more water management than the traditional varieties, in particular systematic retention and drainage of water. Improved internal water management can take many forms depending on the specific polder: controlling water levels in both high and low-lying areas; ensuring timely drainage to free up land for rabi crops; temporary drainage to apply fertilizer to rice crops; supplementary irrigation to ensure yields in the kharif season; creating freshwater storage in *khals* and ponds. The in-polder water management by farmer groups is a prerequisite for increased production under the BR varieties and the cultivation of an additional crop. The higher degree of organization that came with the WMG was, therefore, a significant contributing factor in the spread of the new rice varieties and hence in contributing to higher crop yields and increased cropping intensities. In particular, in the Blue Gold areas, this effect was pronounced.

A third factor in the increased yield was the role of local operations of the sluice gates. This is arguably the pivot in water management in low-lying areas. The sluice gates' opening and closing determines water inflow and outflow and hence the polders' water levels. The inflow of fresh water serves as a source of supplementary water and controls the salinity of the water. This function is often contested, particularly in areas with divergent interests of crop farmers and shrimp/fish cultivators. The local operation – with accountability to a large number of farmers – is essential to capitalize on the benefits that infrastructure improvement brought, in particular in case of replacement of non-functional sluice gates and the deepening of local drains (*khal*). As also explained in chapter 3, this sluice operation is almost uniformly taken care of by WMGs – either by the WMG in which the sluice is located or by a group of WMGs dependent on the sluice. The type of water management depends very much on the location of the polder (saltwater boundary, land levels, tidal effects, sedimentation processes).

On the questions to what extent the increase in agricultural production and production per unit area increased and by what that was caused (infrastructural rehabilitation and WMO establishment), it became clear that both factors were pivotal (Table 4).

Table 4 Frequency of reporting on the impact of infrastructural rehabilitation and the establishment of WMOs on the increases in agricultural production per unit area during and after project support, as reported in field survey (2023)

	Blue Gold		Southwest		CDSF	
	Impact of infrastructural rehabilitation	Impact of establishment of WMOs	Impact of infrastructural rehabilitation	Impact of establishment of WMOs	Impact of infrastructural rehabilitation	Impact of establishment of WMOs
Not at all	0	0	0	0	0	0
A bit	2	1	1	0	0	1
Significantly	8	8	5	9	6	9
A lot	2	3	6	3	6	2

2.2 Contribution to diversity of food production

The three programs also had an important impact on the quality and diversity of food of the population. In CDSF the results are most significant, related to the conversion of the vulnerable new land to regular production areas and the improved and more diversified production. In CDSF, it is documented how the quality of food consumed has improved – with more vegetables, eggs, meat, fruit, and fish being eaten. Over one-third of homestead vegetables and fruit are consumed by producers' households. Virtually all households keep poultry and consume an average of 200 eggs and 14 birds annually. Impact survey data shows that, on average, each household also consumed 44 Liters of milk (35% of production) and 80 kg of fish (53% of production). It showed the importance of introducing additional agricultural activities, such as home-yard poultry and nutrition programs. Another positive development, particularly in CDSF, was the lowered cost of food and consumer goods purchased in the chars due to reduced transport costs. It led to a significant reduction of 25% in the number of children stunted and number underweight.

Similarly, in Blue Gold, there were important gains – with more production and consumption of mung beans and high-value vegetables - though, at the same time, problems persisted. Over 90% of households report consuming fish, meat, and eggs at least once in the preceding month (and the same month in 2019). The average number of times households consumed fish (+10%), meat (+15%), and eggs (+9%) increased between 2019 and 2020. Even so, a considerable number of households (78-81%) keep reporting food shortages, even at the end of the program. There is a strong correlation between land ownership and food shortages, with households owning less or no land more likely to report shortages.

The number of households involved in homestead production of vegetables, fruit, poultry, livestock, and fishponds declined slightly between 2017 and 2019. However, this has been more than offset by larger poultry flocks, more productive livestock, and larger ponds (Blue Gold Program, 2021b). Livestock production has increased since the start of BG. Better water management has improved the availability of grazing and straw, and BG has introduced fodder crops (Blue Gold Program, 2021b).

In all programs, also the production of fish increased – adding more protein to the diet, though at the same time, much of the fish was grown for commercial purposes. In SW (Phase 1), before implementation of the project (2004/2005), the area for culture fisheries production area was 2,527 ha, divided over pond culture (1263 ha), gher (1159 ha), and borrow pits (105 ha). The total production of fish was 5,749 MT annually. The area of capture fishery for the production of fish was 29,883 ha, divided over *khals* (122 ha), *beels* (1130 ha), and floodplains (28,631 ha). The total fish production was 9212 MT annually.

Due to the implementation of the SW phase 1, the area for culture fish production increased a lot. In 2012/2013 the area for culture fisheries production was 2,656 ha, divided over pond culture (1299 ha), gher (1252 ha), and borrow pits (105 ha – no change). The total fish production from culture fish production was 10,400 MT annually. The area of capture fishery production area, on the other hand, decreased significantly. It was 7580 ha, divided over *khals* (142 ha), *beels* (662 ha), and floodplains (6776 ha). The total fish production from capture fishery production was 1715 MT annually. Those developments together lead to a total fish production increase of 32% over the course of SW phase 1 (Southwest-Phase1, 2014). For both agriculture and fisheries, new technologies, better varieties, training, and better water management all contributed to these improved production levels (Southwest-Phase1, 2014).

The question is, to what extent were these autonomous processes, facilitated by the improvement in infrastructure mainly, and to what extent the functioning of the WMOs facilitated them? In introducing new crops and facilitating fish cultivation, the mediating role of local water management organizations is essential. From the surveys, it appears that in many cases WMOs made these processes easier by agreeing on sluice operations and removing obstacles in the *khals*. This made it possible to have more flexibility in what was being cultivated.

Beyond resolving conflicts between different groups of producers, the WMGs also served as the conduit for agricultural extension programs. The Department of Agricultural Extension introduced various new practices in the three areas and made use of the WMG platforms to do so. According to Blue Gold surveys, WMG members are more involved in agriculture than non-members, and more likely to join other community institutions and attend non-BG training.

Finally, in CDSP, there has been much emphasis on healthy nutrition, more than in the other two programs. Special nutrition awareness activities and events gave this shape. The WMGs played a facilitating role here, being the platform for training on agriculture, fish, gender, and nutrition. As the BWDB was short in extension staff for providing trainings, especially in CDSP-IV, the responsibility of training shifted to the TA team, resulting in a reduction of training in that phase. Also, the training on different income-generating activities has contributed to food security and nutrition (CDSP-IV, 2018).

2.3 Contribution to access to food

The evidence on the correlation between the development of WMOs and access to food – the third component in food security - is partly factual, partly anecdotal.

Overall, in the three programs, overall incomes and farm incomes increased significantly (see also Table 2). In Southwest overall incomes increased by 25% in 4 years. In Blue Gold, farm incomes more than doubled. In fact, the cumulative increase in net farm income in two years equalled total Blue Gold expenditures: on this parameter alone, the payback for the investment would be less than two years (Blue Gold Program, 2021). Much of the increase in income is due to the increase in yield, higher crop intensity, expanded fish cultivation (increase in area and productivity), and the introduction of additional crops. There was also a significant move LV to HYV paddy for Aman and Aus, and from HYV to hybrid for boro. This change was not exclusive to the polders where the project was active – so not all the gains should be accredited to the projects.

The increase in income had a knock-on effect. The larger disposable income made it possible to spend more on house construction and education, which created additional local income opportunities.

The three programs also improved the landless and marginal farmers' access to income and food. Wages, for instance, increased during the implementation of the program. This was partly because of the opportunities

directly created by the three programs, particularly the policy that 25% of the construction work should be allocated to Labour Contracting Societies. This target was not necessarily achieved, but 15% of the work was still awarded to the LCS, comprised of landless and marginal farmers. They are to be contracted through the WMGs, a practice strictly followed in CDSP but less in Blue Gold and SW.

The intensification of agricultural activities created opportunities for landless people, who increasingly rented land. The landless people make up an important part of the membership of the WMGs – and they were an equal part of the decision-making and the channelling of the program. The WMG was directly involved in facilitating Income Generating Activities (IGAs). In the SW area, 2500 people took part in these activities.

In all programs, women have been specifically targeted through the WMGs. For landless women farmer field schools were set up on poultry, animal fattening, and vegetable home-stead gardens, which helped to increase the production of milk and eggs, for instance, but also caused a shift in the household economy, with women now having an independent source of income – which empowered them and [for instance reduced the risk of domestic abuse](#). An anecdotal point is that the programs increased the exposure and visibility of women. According to some interviews, this changed household dynamics (the extent of this to be verified) and changed family food consumption. Combined with the larger availability of food, women were no longer the last in line, eating only once other family members had had their share of food.

2.4 Contribution to food safety

The fourth dimension of food security is food safety. This could be an important concern with the still rising use of agrochemicals in farming, including zinc-oxy sulphate contaminated by cadmium, lead, and non-degradable pesticides such as DDT. Similarly, using agrochemicals and genetic manipulation in coastal aquaculture constitutes a hazard too.

There was only limited attention to addressing harmful agricultural practices, particularly toxic agri-inputs such as pesticides and herbicides. This was not addressed in BG and CDSP; only in SW there was a program on IPM, implemented with the engagement of WMGs. As with other agricultural programs, the WMGs formed a convenient mechanism for introducing new practices.

2.5 Summarizing

WMOs play a role in fostering improved food security in the coastal programs in various ways, as summarized in Figure 4. The importance of WMGs is manifest in three broad categories of functions:

- By making it possible to balance interests between competing water users, in particular farmers and fishermen, and by introducing local water management; in the special case of CDSP, by being a countervailing power for individual land and water grabbing in char development.
- By being a forum where also women and landless/ marginal farmers are represented and programs targeted at women and marginal farmers can be implemented.
- By being a conduit for introducing new agricultural and aquaculture practices in a broad community of farmers (rather than through elite contact farmers, for instance), resulting in higher crop intensity, higher productivity, and larger crop diversity.

Comparing the structure of the WMGs with the counterfactual (see Chapter 3) informal water management organizations, it is safe to say that the WMGs played a critical instrumental role in the spectacular gains in food security under all three programs. Had there not been formal WMGs, it would have been difficult to reach all farmers, difficult to access women and improve their standing in the farming community, difficult to engage landless and marginal farmers, impossible to have targeted programs. There had been a higher risk of elite capture in the absence of a mechanism to safeguard the interest of all farmers, including those with no political connection, nor had there been a mechanism to introduce better local water management and make the operations of the critical sluice gates on the polder's boundary accountable to a large group of water and land users and to achieve a balance of interests.

Figure 4 visualizes these different functions. Most of these functions were common through all three coastal programs, but some were specific to particular programs. Land settlement – in particular, the registration of land titles in the names of wife and husband – was done in CDSP only. Similarly, nutrition programs were only implemented through WMOs in CDSP. Improved local water management was introduced through WMGs in BG only, whereas safe farming practice was only promoted in SW. This suggests, at the same time, that there were unused options to support food security on all the programs.



Figure 4 The contribution of WMOs to food and nutrition security

Some of these WMG functions are supposed to be long-lasting, in particular, improved water management and balancing divergent interests in gate operations. In other functions, the WMOs are more of a temporary vehicle: in introducing better practice, for instance, as practices once introduced are anchored in individual skills.

The next chapter discusses the sustainability of the WMO, including how they are able to continue delivering services in increased food security beyond the duration of the program. It also addresses WMOs' factors of functioning.

3. WMO sustainability and factors of functioning

This chapter discusses the sustainability of the WMOs and whether the investment in formal organizations in water management in the three major programs is making a long-term impact on food security beyond the closure of the programs. The previous chapter discussed the contribution of the WMOs to the significant increase in food security in all three coastal development programs. This section is focussed on the sustainability of the WMOs as well as on understanding the factors that influence the performance of the WMOs. At the outset, it should be mentioned that in the three coastal programs, the WMOs supported over the years in earlier stages of SW and CDSP are still supported and monitored under the current program phases. Only in BG, the support to WMOs by the program came to an end with the closure of the program in December 2021.

To deconstruct sustainability, we look at three aspects of WMOs, that define their performance: legality, legitimacy, and functionality. Legality concerns the formal status of the WMOs, registration, and compliance with official procedures. Legitimacy describes WMOs are locally anchored and concerns their recognition by other organizations – BWDB, local government and Department of Agricultural Extension, and other parties. Functionality concerns the delivery of key tasks – operation and maintenance, water management, and other social and economic tasks.

It is useful to see the WMOs not in a narrow sense of organizations that are active or not but more as institutions by which an internal platform between otherwise unconnected individuals is created, and by which linkages with others are organized and by which ultimately prime functions are undertaken (Figure 5). The investment in a WMO is hence not merely the investment in a new organization, but also in new collective networks and linkages and functions that are otherwise not addressed. The prime functions of a WMO are the operation and maintenance of local infrastructure, in particular polder sluice gates, on demand of the water users; the timely maintenance of such vital infrastructure – keeping sluice gates in service and removing sediments and obstructions from the canals and drains. The WMOs are also in charge of local water resource management – such as the balancing of competing demands between different land and water users within the service area. The classical compromise in coastal polders is between agriculture and fishery – each having different requirements for water levels and water quality, in particular salinity. The balancing of these competing demands can go further by initiating better in-polder water management (the management of water levels between different areas, the management of the sedimentation process, the reuse of silt, for instance) and synchronized planting of crops to optimize water use or to undertake pest control by either collectively inundating or draining land.

WATER MANAGEMENT ORGANIZATIONS

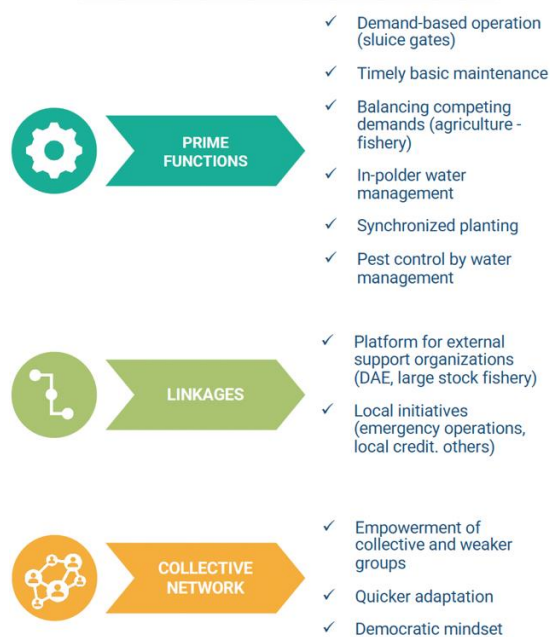


Figure 5 Prime functions, linkage functions and collective network functions of WMOs

The WMO provides for in such function both the collective network of otherwise dispersed water users and the interface with other organizations. The interface is with service providers (such as DAE, Department of Livestock, Department of Fishery, and NGOs) with the WMO connecting with the different individual water users within the area, thus, in principle, increasing outreach and reducing transaction costs. The WMO may also have other functions, as also described in chapter 2, being a conduit for agricultural extension or organizing local activities, such as micro-credit. The latter was stimulated in several coastal programs, in particular SW and BG.

The WMOs also function as collective networks, making it possible to work on the different prime functions as described above, but also, in a situation of high stress, they are a bulwark to safeguard the common interest – as in the history of CDSP – where the WMOs were the alternative to the exploitation and powerplays of

influential local land grabbers. The WMOs thus empower water users and may also serve as a vehicle to uplift deprived groups within the community, such as women, and imbue values of fairness and create a democratic mindset.

It is also good to compare WMOs with the counterfactual. This was done in the field survey. In areas where there are no WMOs, there are *beej* committees. These manage the drainage and the water management around it. Those committees depend on individuals and their ability to organize and connect. These informal organizations, however, serve only a narrowly usually problem-defined water management function; outside parties do not recognize them, and for the internal organization depend on the ability and availability of individual leaders. Not to say that WMOs across the board perform well in the legality/internal organization, legitimacy/interface, and functionality, but their scope and potential go quite far beyond the counterfactual informal organizations.

This chapter discusses the legality, legitimacy, and functionality of WMOs based on evidence from the three main programs. The long-term performance is concluded upon by the last section of this chapter, which addresses sustainability in a broader sense (section 3.4).

3.1 Legality

Legality is related to the official formal status of the WMOs. This is based on the requirements of the Participatory Water Management Ordinance of 2014. It requires the registration of the WMO to be renewed, an annual general meeting to be held, the re-election of the committee to be organized, and an audit to take place. It entitles the WMOs to be the interface with the government, undertake delegated work and subcontract to Labour Contracting Societies as well as operate revenue-generating assets such as borrow pits, given in usufruct. Find more about other local water management groups and acts/rules in Annex 3.

Prior to the Participatory Water Management Ordinance of 2014, water management groups were registered as Cooperative Societies under the Cooperative Society Act. This practice is still followed in the Local Government Engineering Department programs. The drawback of that arrangement was that Cooperative Societies are member organizations, whereas water management is a public function that, in principle, concerns all who are in the same hydrological unit. On the other hand, the legal position of a Cooperative Society is, in practice, stronger than that of a Water Management Organization, which is only recognized by the Bangladesh Water Development Board. All in all, approximately 2500-3000 WMOs are registered in Bangladesh, including the 1093 WMOs under CDSP, SW and BG.

In this section, we take stock of the performance of the WMOs in maintaining their formal legal status. We also analyse the underlying factors connected to the legal status based on an analysis of the WMO monitoring records as kept by different projects. Annex 5 provides more in-depth information and data on memberships of the WMOs.

An overview of the WMOs established in the three coastal zone projects is given in Table 5. More elaborate information is provided in the annexes. In the three projects combined, 927 WMGs and 165 WMAs were established and 1 Water Management Federation. The WMAs organize water management at a higher level, i.e., in a polder or section thereof. Water Management Groups are organized based on smaller administrative or hydrological units. A number of WMGs combine to form the membership of a WMA. The proportion of WMAs to WMGs differs between the three programs from 1:7 and 1:2.5 respectively in SW Phase 1 and 2; to 1:14 and 1:18 in Blue Gold and CDSP. Clearly, given this wide range, there is no uniform model for WMAs and WMGs yet. In BG, for instance, WMGs were initially formed based on administrative boundaries, whereas in SW, they were based on hydrological units.

The membership of WMGs in BG and SW is of the same order of magnitude – 232 to 348 members per WMG, covering 230 to 374 ha of land. The WMGs under CDSP are, however, different. Their average membership is much bigger (1169 households), but the CDSP WMGs have an internal structure of sub-units and area representatives. As discussed earlier, the gestation of the CDSP WMGs was also different – they were the pioneer organizations that had to form a front against local powerbrokers that tried to capture all newly emerging land. The WMGs in CDSP also played a prominent role in planning the entire development of the new lands – the road infrastructure, the ponds, and the embankments. Unlike in BG and SW, WMGs in CDSP had a wide range of functions beyond water management.

Table 5 Overview the WMOs under the three coastal programs, filled out as far as possible

	Blue Gold	Southwest Phase1	Southwest AF	CDSP
	At end project unless stated different	November 2022 unless stated different	November 2022 unless stated different	Amount of WMOs is amount active during bridging phase
# of WMFs	-	-	-	1
# of WMAs	36	14	102	3
# of WMGs	511	102	267	57
% of households that is WMG member	54			NA ¹
# of members per WMG (average)	268 (June 2019)	232	348	36 representatives for 1169 farmer households ¹ (CDSP-IV, 2018)
% of female WMG membership	43	40	50	39
% of female WMG leadership	34	Strive for > 30	Strive for > 30	
Average area per WMG (ha)	230 (Blue Gold Program, 2019)	374 (Data source 7 Annex 1)	294 (Data source 6 – Annex 1)	2100 (CDSP-IV, 2018)
Total cumulative fund per WMG (Tk)	152,084 (June 2019)		208,905 (Data source 6 – Annex 1)	
Total savings (current balance on bank + cash)	53,228 Tk (Blue Gold Program, 2019)	-	169,645 Tk (Southwest-AF, 2022)	82,074 Tk (CDSP-IV, 2018)
Total costs per WMG	147.337 Euro ² 12.17 Million taka (Blue Gold Program, 2021e)	425.490 \$ ³	23.596 Euro ⁴	3.316.666 \$ ⁵

In all WMGs, all categories of land users are represented – i.e., landowners and tenants. In BG, for instance, WMG membership includes 19% landless households. On the other hand, not all landowners and water users are members of the WMG. Just over half (54%) of sample households in the BG area are WMG members. For the other projects, the exact coverage is not known but seems comparable.

The membership of WMAs is gender-balanced: female membership is 39% to 50% across the WMGs in all three programs – according to project documentation. In several elements of the projects, specific attention was paid to the participation of women. In the field survey in March 2023, it was found that the percentage of female membership, as reported by the WMGs, was 40% for Blue Gold, 41% for Southwest, and 41% for CDSP. Annex 7 provides more information, data and examples on women participation in the three coastal programs. All in all, 293,461 households are members of the organizations. In general, membership in WMGs has increased over the years after their initial establishment, indicating the organizations are not static. In some polders, some people have withdrawn their membership, however. The different reasons to discontinue membership include (a)

¹ CDSP forms WMG with relatively few members that are representative of a much larger number of farm households. This is referred to as a representative type of WMG.

² Based on total project costs (75.3 Million euros) divided by 511 WMGs

³ Based on total project costs of 43.4 Million \$ (Southwest-Phase1, 2014) divided by 102 WMGs

⁴ Based on 6.3 Million Euros divided by 267 WMGs (IOB Evaluation, 2017)

⁵ Based on 79.6 Million \$ - the total costs of phase IV - divided over 24 WMGs (CDSP-IV, 2018)

conflict within the WMG executive committee or among general members – especially on financial issues; (b) not getting a micro-credit loan from WMG; and (c) not getting cooperation/support from BWDB to solve water management problems and infrastructure not being rehabilitated (Blue Gold Program, 2019).

The important question is, given the beginnings made under the three coastal development programs, how the WMOs fare in terms of legal requirements when they are no longer under intensive surveillance from the development program: do the WMO keep observing the legal requirements as defined under the 2014 Ordinance?

In the survey executed for this study, mixed answers were found to this question (Table 6). A quick look at this overview table shows that the legality parameters of Blue Gold (no support) did not keep up with the results for Southwest (still support) and CDSP (still support). For the WMGs from Blue Gold, there were no AGMs in the past three years – which, by its name, are scheduled annually. Elections for only two of the eight surveyed WMGs took place in time, following the 3-year election cycle.

Table 6 Answers to field survey in 2023 related to most recent AGM, most recent elections, and financial administration from surveyed WMGs and WMAs under Blue Gold, Southwest and CDSP. Unclear means that there was no survey AGM / election in 2022, but that it was not specified when the most recent one took place.

		Most recent AGM							Most recent elections							Financial administration			
		Un-clear	2018	2019	2020	2021	2022	2023	2016	2017	2018	2019	2020	2021	2022	2023	Books are not always updated	Financial statement can be prepared when asked for	Ready for review anytime
Blue Gold	WMA			1	3												2	2	
	WMG		1	1	6					1	5			2			3	4	1
Southwest	WMA	2					2							7	1			1	3
	WMG		1				7							8			1	2	5
CDSP	WMA			2			1		1					1					3
	WMG	1	1	1			5	1				1	1	5	1		1		7

A number of analyses shed some more insight as to why some WMO perform better in legality than others. When comparing the scores from the WMG self-monitoring⁶ (Q3 2020) with the number of members per WMG (June 2019), it is observed that there is a positive correlation between number of members and the overall status a – as categorized in the WMO-self monitoring questionnaire - but negative with overall legitimacy and overall functionality (Figure 6). In other words, the larger the member base of the WMO, the more likely it is that all formal requirements are met. On the other larger WMOs perform poorer in their connections to other organizations and in delivering on their functions. This brings up the question on the optimum size of a WMG.

⁶ Scores from the WMO self-monitoring are “low”, “medium” or “good” and are respectively rescored to “1”, “2” and “3” to allow for analysis.

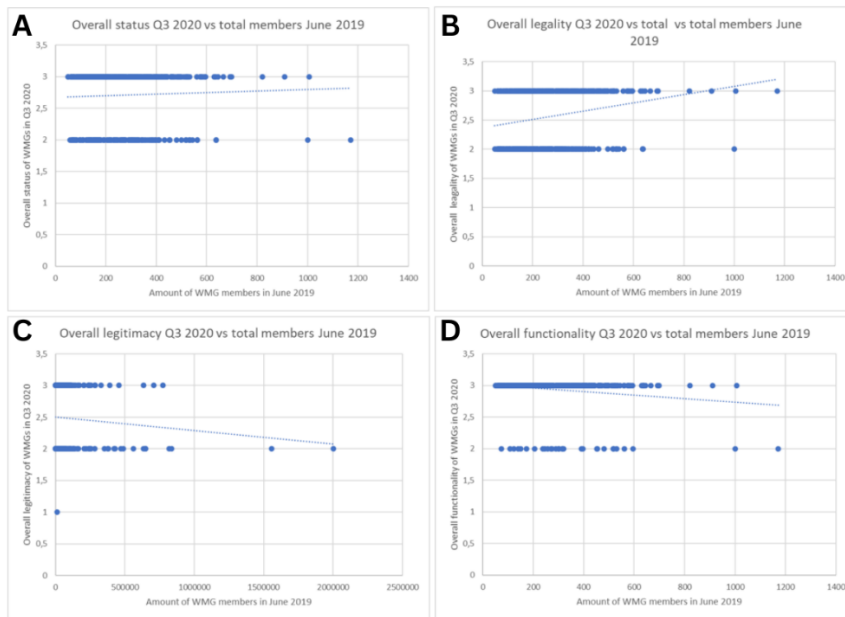


Figure 6 Amount of WMG members in June 2019 vs. scores of the self-monitoring of Q3 2020 for BG WMGs; A: Overall status, B: Overall legality, C: Overall legitimacy, D: Overall functionality

For the SW WMGs, it is observed that WMGs perform better, the lesser members and the smaller the area they have (Figure 7). For Phase 1, the overall PPATS (Participatory Performance Assessment & Target Setting) score (Q2 2022) was negatively correlated to the amount of members as well as the size of the command area. The same was found for Phase 2, using the PPATS data from Q4 2022. The results should be seen while having in mind that n=21 for Phase 1 (sample of WMGs), and n=267 for Phase 2 (all WMGs).

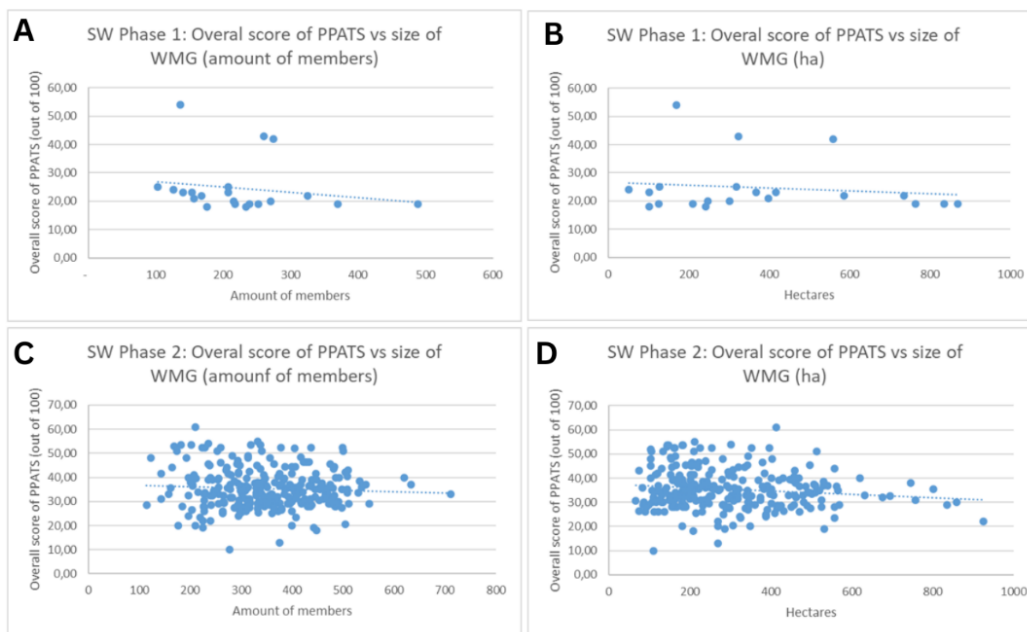


Figure 7 Overall scores of PPATS vs. size of WMG in terms of amount of members (A & C – Phase 1) and ha (B & D Phase 2)

For the CDSP WMGs, based on the monitoring round of 2018 in which all 24 WMGs of CDSP-IV participated and a sample of other WMGs from the earlier phases, positive correlations are found between how the WMGs score for the main legality, legitimacy, and the main functionality parameters (Figure 8). Data reveal that legality goes hand in hand with legitimacy and functionality: position, interaction, and action reinforce one another.

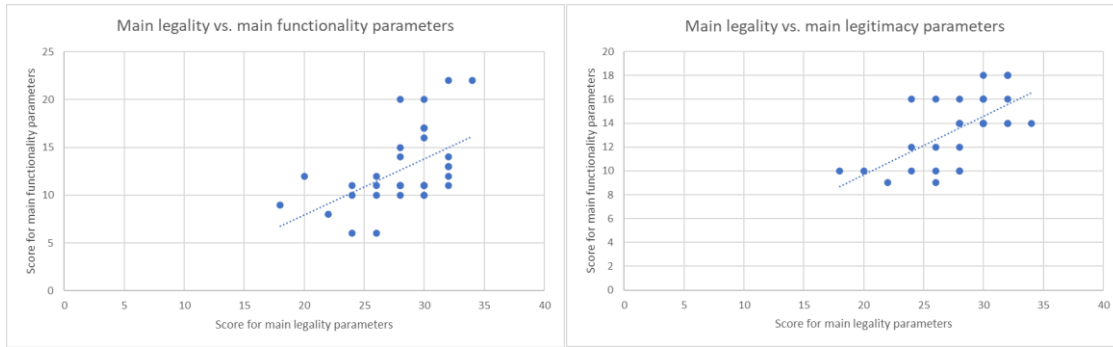


Figure 8 Scores for the main legality parameters vs. the main functionality parameters (left) and main legitimacy parameters (right) for the CDSP WMGs (2018, n=24)

In CDSP, WMOs size does not seem to influence performance. This may be related to the delegated nature of the WMGs in CDSP. Though the WMGs are much larger than they are in SW or BG, the WMGs consist of sub-units headed by a local representative farmer. This makes it easier to perform the key functions and connect to the most important local stakeholders. Such representative-type WMGs may not be appropriate for the management of irrigation systems, but drainage and flood control need much less active management, and water distribution between farmers is not an issue. The CDSP WMGs do not seem to have any problem in co-opting assistance from other farmers (CDSP-IV, 2018b).

Being a legal entity, the WMGs are able to collect and retain funds. These amounts gradually increased over time. In Blue Gold, for instance, the average fund position per WMG has tripled from around Tk 48,000 in 2014 to over Tk 152,084 (USD 1382) in 2019, with a total WMG Funds of Tk 77,714,698. In SW Phase 2, the average funds per WMG are slightly higher at Tk 208,905 (USD 1901). In comparison, in CDSP, the saving per WMG is more modest, with Tk 82.074 (USD 747) per WMG.

Whereas there was a notion that these savings would create the financial buffer to undertake repairs to the water system, in practice, the WMGs use the collective funds predominantly to fund income-generating activities (IGAs) in agriculture, poultry, fish culture, small business, and as the capital for local micro-credit (Blue Gold Program, 2019). The investment for IGA accounts for 41% to 44% of the total savings. The total amount invested in IGAs up to June 2019, in BG, has been Tk. 34,227,827 with more and more members taking part in collective activities for economic development. About 60% WMGs use their fund for micro-credit among members. All in all, however, it is also not a major activity financially, though the local impact may be positive (Blue Gold Program, 2019).

The savings then are largely disconnected from the funding of O&M. Interviews with WMGs suggest that WMGs prefer to hold a general collection for specific O&M activities among members and non-members as and when the need for O&M investment arises. In fact, the provision of a regular O&M fund in the set-up of the WMGs may not be appropriate, as not all water users are members of the WMGs. In fact, the total funds collected for O&M by WMGs in BG project area are extremely modest at Tk 6961 (USD 63) on average compared to the collective savings per WMG (at Tk 152,084). Funds for the collective savings come mainly from fees, savings, margins on LCS works, and profit from credit activities (Figure 9) (Blue Gold Program, 2019). This underlines the hybrid nature of the WMGs – as a local development organization and as a functional water management organisation, with the second role probably being less prominent.

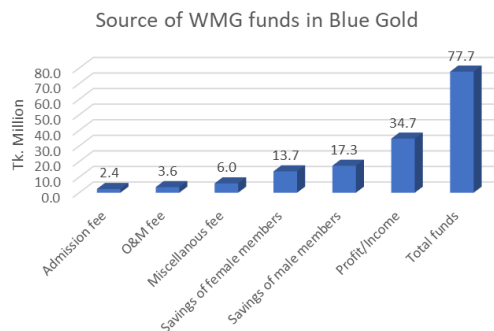


Figure 9 The sources of WMG funds in Blue Gold

When comparing the overall status of the WMOs (self-monitoring Q3 2020) with results from the WMG tracker (till June 2019) in Blue Gold, it was found that the collection of funds is overall positively correlated to overall status, legality, and overall legitimacy (external recognition). It is less related to the functionality of the WMG (Figure 10). This emphasizes the ‘development’ nature rather than the water management nature of the WMGs. A similar pattern emerges from the WMG data from SW and CDSP: collective savings served more to bolster joint income generating activities than to fund operation and maintenance.

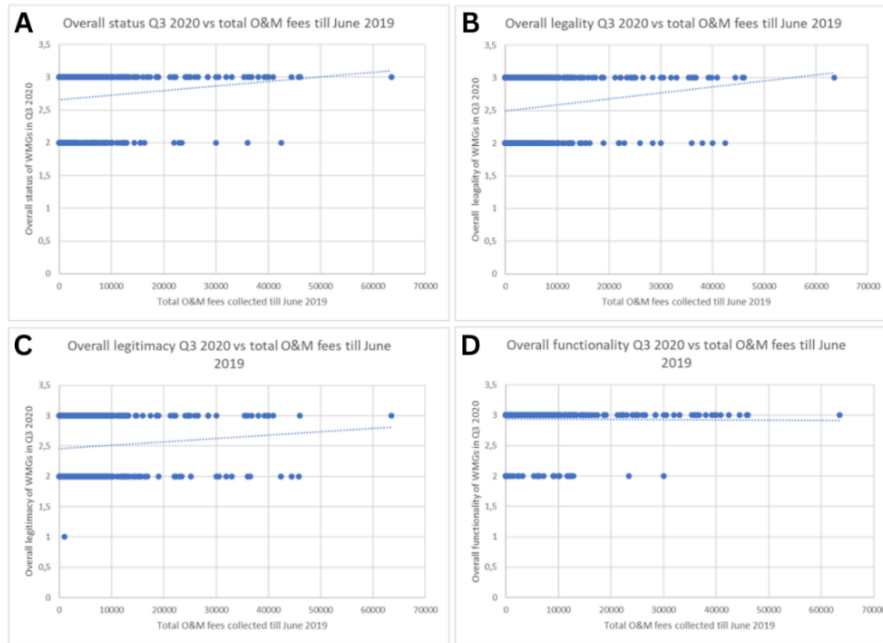


Figure 10 Total O&M fees collected till June 2019 vs. scores of the self-monitoring of Q3 2020; A: Overall status, B: Overall legality, C: Overall legitimacy, D: Overall functionality

In the final report of SW Phase-1, it is mentioned that O&M facilities have been handed over to WMAs. For this, separate O&M funds have been established with the WMOs. A token price of O&M cost of Tk 130 (USD 1.2) per hectare per year to involve the WMG member as a partner of the project has proven acceptable, with nearly all WMG members participating in this (Southwest-Phase1, 2014). This is an extremely low amount – in water management systems elsewhere in the world the O&M contribution or water tax is always upwards of USD 5 per ha, reaching in several cases more than USD 100 per ha per year (van Steenberg, Cornish, & Perry, 2006).

For SW Phase 1, with results from June 2022 (n=109), a positive but relatively weak correlation between member enrolment and total O&M fee collected was observed (Figure 11): irrespective of the size more or less a similar low amount was collected per WMG. This was different in SW Phase 2, based on results from December 2022 (n=267) (Figure 11), when the amount collected increased more or less proportionally (not entirely) with the number of members. One may postulate that this reflects the efforts in social mobilization rather than the strength of the WMG as such.

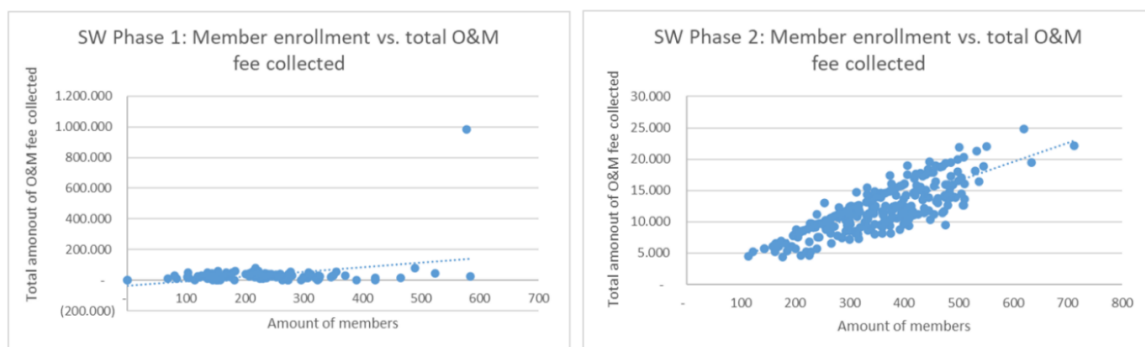


Figure 11 Member enrolment vs. total O&M fee collected. Left: SW Phase 1 (June 2022, n=109), Right: SW Phase 2 (December 2022, n=267)

On the expenditure by WMGs, the patterns appear to be haphazard. The amounts spent, in general are very low and do not relate to the size of the membership base of the WMGs (Figure 12).

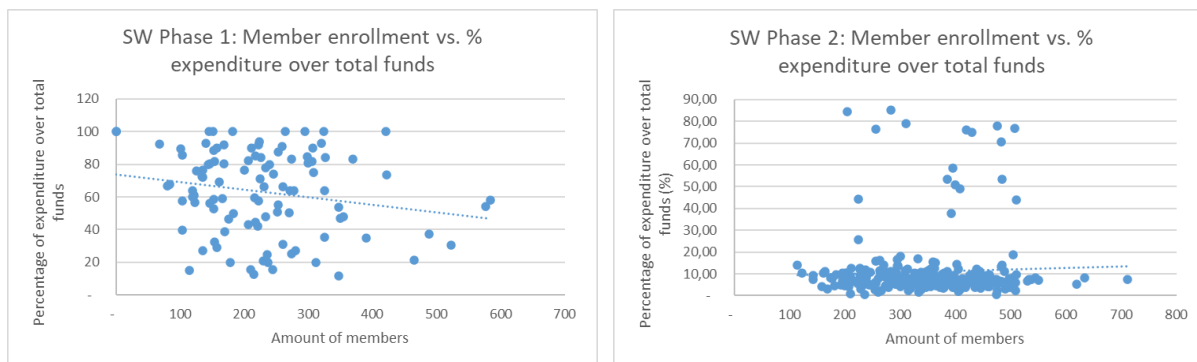


Figure 12 Member enrolment vs. % expenditure over total funds. Left: SW Phase 1 (June 2022, n=109), Right: SW Phase 2 (December 2022, n=267)

Similarly, in the CDSP-IV WMGs, WMG members generate group savings that are primarily used by WMGs to operate small microfinance loans to group members to do income-generating activities. Most of the CDSP-IV WMGs are maintaining records and savings books properly (CDSP-IV, 2018) WMG group members have generated Tk. 6,034,983 as group savings and all WMGs combined have an operational micro-finance outstanding Tk. 10,676,468 (USD 97200) till October 2022 (CDSP-IV, 2018). Based on the monitoring round of 2018 in which all 24 WMGs of CDSP-IV participated and a sample of other WMGs from the earlier phases, it appears that the smaller the WMG is, the more active it is in such activities (Figure 13).

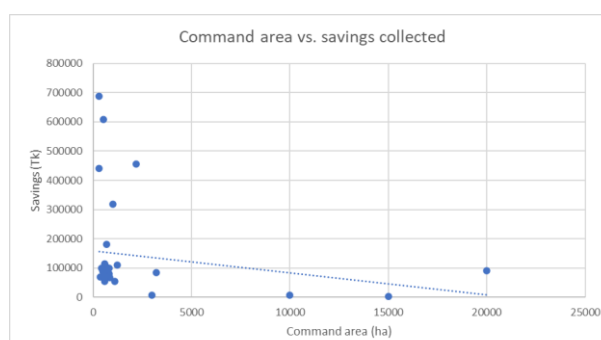


Figure 13 Command area vs. savings collected (n=24, 2018), for CDSP WMGs

In SW and CDSP, all WMOs are up to date with the legal requirements defined under the Participatory Water Management Ordinance: audit, reregistration, and committee renewal. This is not the case for BG, where WMOs are still regularly meeting and performing main duties, but registration and audit requirements are no longer maintained. This seems to have two reasons. First, unlike the other two programs, there is no regular hand-holding support anymore. Second, the role of the local Water Management Overseer of the BWDB was less present in BG, as much of the WMO strengthening was undertaken by dedicated teams of community facilitators.

3.2 Legitimacy

Legitimacy is related to the WMOs' interaction with other institutions and the recognition of WMOs by these other organisations. This may be the local political bodies – the Upazilla Parishads and the Union Parishad – or government bodies – such as the Local Government Institutions (LGIs), the Bangladesh Water Development Board (BWDB), and the Department of Agricultural Extension (DAE), which are essential. The overview of the relationships between the WMGs and other parties (UP, LGIs, BWDB O&M Division, and other parties), as found in the field survey in 2023, shows that relations with UP are in general good, and much better than those with BWDB (Table 7).

Table 7 Frequency of scores for WMGs in field survey 2023 for relations to other parties

		Good	Reasonable	Poor
Blue Gold (n=8)	Relation to UP	5	2	1
	Relation to LGIs	3	3	2
	Relation to BWDB O&M Division	2	3	3
	Relation to other organisations	2	6	0
Southwest (n=8)	Relation to UP	5	3	0
	Relation to LGIs	4	3	1
	Relation to BWDB O&M Division	3	4	1
	Relation to other organisations	3	5	0
CDSP (n=9)	Relation to UP	7	1	1
	Relation to LGIs	0	8	1
	Relation to BWDB O&M Division	4	5	0
	Relation to other organisations	2	7	0

Overall, it was found that there are strong connections between the WMOs and the local elected bodies, particularly the Union Parishads (UP). There is less connection with the higher-level Upazilla Parishads. The WMGs serve as stepping stones for local politics, with WMG and WMA committee members finding their way into the elected local representations. The WMGs also sometimes serve as a vote bank. The recent switch to electronic voting has somehow reduced the latter effect, as people can vote anonymously and are free to opt for the candidate of their choice. In some areas – as told during the field surveys - this has broken the grip of traditional power brokers with a shift to more local social activists getting elected.

From the UPs, there is occasional budget support for the WMGs. Also, UPs are sometimes involved in resolving conflicts when the WMGs cannot reach a settlement. The UPs also address larger water management issues – such as embankment resectioning, i.e., the siting of new embankments after river erosions. These topics are ‘too large’ for the WMGs to handle, whereas it appears that the WMAs are not well-entrenched enough to handle such contentious issues. The image that emerges is of WMGs having a niche next to the UPs, concentrating local water issues and related development activities. The connection between the WMGs and the UPs varies with the project history. In CDSP, the WMGs were the original pioneer organizations, and they still wield much influence in local affairs. In contrast, in SW and BG, the WMGs are more recent arrivals, complementing local governance but with a more internal coordination role.

BWDB staff at the zonal level appreciate and recognize the WMOs. The BWDB teams in the zonal offices generally have a positive participatory attitude, even though this does not translate into systematic interaction between the WMOs and BWDB. The latter is also related to the understaffing and vacancies in BWDB local offices and the lack of a clear O&M or water management strategy. The BWDB O&M division is chronically underfunded. This leads to a situation where budget requests are inflated, and budget awards are arbitrary. This makes it impossible to come to clear arrangements on who does what and when.

Manual-based maintenance against the BWDB budget is supposed to be done by Labour Contracting Societies (LCS) contracted by WMGs, who are allowed to keep an administrative margin. This system, however, only takes place in CDSP and with interruptions. In general, there are no regular meetings or monitoring with BWDB staff, unlike in the LGED-supported water management groups. BWDB is furthermore hindered by staff rotation, which puts continuity at risk. In a nutshell: though there is goodwill on both sides, there is no effective cooperation between WMOs and BWDB, either maintenance or water management. The exception is the operation of the polder sluice gates, which are entrusted to WMGs or groups of WMGs.

WMOs are found to serve as a platform for other organisations based on newly formed relationships with, amongst others DAE, DoF, and DoL. Those connections and relations are, however, not systematic. The presence of subcommittees⁷ within the WMOs offers opportunities to further build and strengthen those relations. It needs to be said that DAE, DoF, and DoL have a pragmatic approach to working together with WMGs: it is not

⁷ The WMGs under Southwest each have six subcommittees, focusing on respectively agriculture, fisheries, the environment, gender and livelihood, O&M of facilities, and internal audit (Asian Development Bank, 2016)

part of their standard operations, but they make use of WMGs where convenient and otherwise may create parallel local organizations, such as farmer clubs.

The Bangladesh Water Rules issued in 2018 describe the formation and composition of integrated water resources management committees at the decentral level, i.e., District, Upazila, and Union. These committees are composed of representatives of the civil administration and the line departments, are to be supported by a technical committee at each of these three levels and include a representative member of WARPO as member-secretary.

It is important to note that the Upazila and Union Committees include a representative of Water Management Co-operative Association (registered under the Cooperative Act) but makes no references to the Water Management Organisations registered under the BWDB, as per Participatory Water Management Rules 2014. This was somehow corrected in the Detailed Guidelines for these committees, published by the Government under separate cover for Districts, Upazilas and Unions, respectively, in 2019. In these guidelines, WMOs registered under the BWDB are included as members of these Committees. In reality, however, there is no WMO presence in District Water Committees, and neither are LGED WMCSs present there. Reportedly, there is an influence there via other members of the district.

The database of BG makes it possible to dive deeper into the factors that drive a WMG legitimacy, in particular, the relation between two legitimacy parameters in Blue Gold: 1) the links between WMOs and LGIs and 2) the links between WMOs and BWDB - as recorded in the self-monitoring has been further analysed and correlation coefficients⁸ have been calculated (Table 8).

Results show, amongst others, that the functioning of WMGs is highly positively correlated to the functioning of its WMA. It also shows a highly positive correlation between maintaining a financial administration and links to LGIs. Also, it is observed that WMAs' relation to BWDB is positively correlated with its relation to LGIs. (Table 8). The picture that emerges is of formally operating WMOs doing well in recognition by LGIs and BWDB. On the other hand, there is no clear relation between the recognition by BWDB and LGIs, as a reflection of the dimension of legitimacy, and active engagement in water management including the preparation of polder water management plans. This appears to be more of an internal activity.

Table 8 Correlation coefficients between 1) BG WMAs link to LGIs and 2) BG WMAs link to BWDB and a number of other indicators from the self-monitoring rounds of Q3 2020, Q4 2020, Q1 2021 and their average. The colour codes serve as a guide for the reader: red indicates a negative correlation, while green indicates a positive correlation. The darker the color, the stronger the correlation.

Relations between link to LGIs (from legitimacy) and ..				
	Q3 2020	Q4 2020	Q1 2021	Average
Catchment plans up-to-date	-0.116	Not possible	-0.053	-0.084
Relation of WMA to BWDB O&M Division	0.071	0.185	0.364	0.207
Maintaining of financial administration	0.253	0.470	0.959	0.561
WMA management committee status	-0.167	Not possible	-0.053	-0.110
Water management actions taken	0.098	0.470	Not possible	0.284

Relations between link to BWDB (from legitimacy) and ...				
	Q3 2020	Q4 2020	Q1 2021	Average
Catchment plans up-to-date	-0.093	Not possible	-0.042	-0.068
Relation of WMA to LGIs	0.071	0.185	0.364	0.207
Maintaining of financial administration	-0.093	0.185	0.181	0.091
WMA management committee status	0.159	Not possible	-0.042	0.058
Water management actions taken	0.159	0.185	Not possible	0.172

⁸ -1 = perfectly negative correlation, 0 = no correlation, 1 = perfectly positive correlation. Not possible means that no correlation coefficient could be calculated as all WMOs score the same for that indicator for one of the two parameters assessed.

3.3 Functionality

Functionality is about the action by WMOs in O&M, in in-polder local water management as well as in performing other responsibilities. Functionality is about whether the WMOs are doing what they were set up for in the long run: long-term delivery of services that contribute to food security.

The WMOs were set up as community partner organizations during the implementation of the project but the question is what happens when the project implementation is over. Do the WMOs transition and become part of local governance? Do WMOs change from a party in participatory development to a player in long-term water system management?

The creation of the WMOs made a difference in the systematic construction of relations between otherwise loosely connected water users, allowing them to take up joint activities. Section 3.1 explained that not all water users were included, but a substantial quorum was created. As discussed in section 3.2, the WMOs also got anchored locally: they developed relations with local politics, BWDB, and other organizations, such as DAE, DoF or DoL. There is, however, no clear institutional framework that describes the exact mutual responsibilities of all organizations including the WMOs. For BWDB, it is difficult to commit to such a framework as budget allocations for maintenance and repair are unpredictable and generally insufficient. Organizations such as DAE, DoF, and DoL work with various farmer groups, including but not exclusively or primarily with WMOs. In this context WMOs must find their way – they are important assets in a partly unclear institutional setting.

In this chapter, we review how the WMOs have performed on the three core functions: O&M, water management and other functions. More elaborate information, data, and example are provided in Annex 8.

Operation and Maintenance

This study zoomed in on three projects, all with WMOs under the 2014 act/rules, which defines participation as a responsibility of the local people, and it transferred the ownership of water management projects to water user groups. Ownership includes the responsibility of everyday operation, regular maintenance, periodic maintenance, and emergency maintenance of medium- and small-scale projects without any financial arrangements (Sadik, et al., 2022).

It would be useful to compare similarities and differences between this 2014 act and others and to find out how the WMOs under the different acts function, what strengths, weaknesses, and lessons to be learnt are. Based on experiences from this study, it seems that, besides the form of registration, the interface with the concerned department (LGED or BWDB) makes the most difference.

The basic tasks that WMOs are supposed to execute - sluice operation, cleaning of *khals*, and embankment maintenance - are found to be well taken care of in all three program areas. In SW, this has been supported systematically with training in O&M planning and fee collection.

A WMG survey of BG found that all sluices were operated by WMGs. In sluices serving larger areas, this was sometimes done by a group of WMGs, or it was entrusted to one particular WMG (Figure 14). This ended the earlier practice whereby sluices were controlled by private people or government staff, with no accountability to the larger community of water users. This could, for instance, lead to operation for fishing or *gher* operation – including letting saline water that would affect the rice yields (Blue Gold Program, 2019). The field survey in March 2023 showed that WMGs were still controlling their respective sluices, even after the BG program was ended. Similarly, all WMGs are involved in controlling obstructions in the *khals* and plugging holes in the embankments.

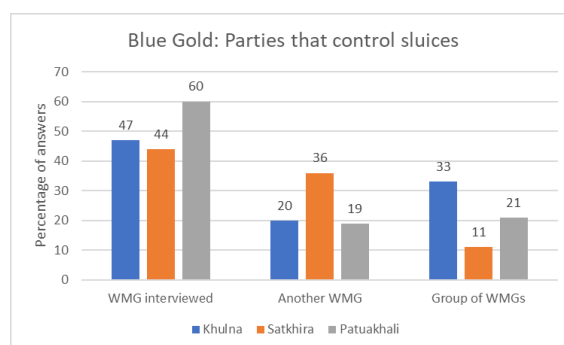


Figure 14 Control of sluices, as based on interviews with WMGs (Blue Gold Program, 2019)

The Blue Gold Program has witnessed a consistent increase in community participation in O&M activities from 2014 to 2019. This rise is indicative of the community's growing recognition of the benefits associated with O&M. Additionally, the involvement of Water Management Group (WVG) members in collective economic actions has notably expanded, suggesting a clear understanding of the advantages derived from collaborative efforts (Blue Gold Program, 2019).

These are the relatively lighter duties, requiring primarily labor. There are, however, some grey areas in local O&M. One concerns the desilting of the drainage canals (*khals*). Whereas WVGs oversee the removal of obstructions, the cleaning of the *khals* is often done by LCS on the budget of the BWDB and possibly contracted through the WVGs. There is no cost contribution of the WVGs here. The funding for desilting by BWDB (or sometimes from local government contributions) creates a grey area. A second area of confusion is the replacement of the sluice gates. The WVGs take care of greasing the hoisting equipment and painting the gates. However, when gates are corroded, a recurrent problem in areas with saline water, replacement is not by the WVGs, but in almost all cases by the BWDB. The steel gates are the weak spot in the polder water management system, as replacement often takes several years, affecting farming performance and creating regular setbacks in food security. The pernicious problem could be overcome with composite gates, but despite many discussions, these have not been introduced in the coastal polders of Bangladesh. In summary, the WVGs appear to continue their role in O&M, also when programs end or are phased out, but their overall remit is limited, as is also clear from the small amounts collected for O&M.

Similarly, in CDSP CDSP-IV, 8 of the 24 WVGs are responsible for managing sluice gates and all have some length of drainage canal to look after – on average of 12.8 km. WVGs regularly operate their designated water bodies like drainage canals, culverts, and infrastructures like sluices, closers, and embankments as their primary jobs. Again, the task of the WVG is in basic labour-based services. The WVG also performed contractual assignments of construction works offered by BWDB, LGED, and the Department of Public Health Engineering (DPHE) (CDSP-IV, 2018).

Often, the tasks for the WVG are not entirely clear. On a scale of not at all clear, a bit clear, almost clear, clear, and very clear, the WVGs reported as visualised in Table 9. Here, on average, a higher level of clarity is found for Blue Gold, and a lowest level of clarity for Southwest.

Table 9 Frequency of reporting on the clarity of the task for WVG, as in field survey of 2023

	Not at all clear	A bit clear	Almost clear	Clear	Very clear
Blue Gold		6			6
Southwest		11			1
CDSP		7	1		4

Water management

In all programs, the engagement of WVGs has resulted that the operation of the sluice at the intake and outlets of the polders is under control of WVGs (see also above). Beyond this, there has been little attention for water management in the three programs except for BG. In BG, at the lowest level community, water management was initiated and rolled out, with farmers compartmentalizing their fields and managing water levels supporting the new BR rice varieties. In addition, sub-polder water management plans by clusters of WVGs were made that covered a range of water management measures: managing water levels in rice fields, combining fish farming and rice cultivation, creating storage, reusing sediment, and pest control with water management. These measures contributed to higher productivity. This package of measures has not travelled beyond the BG program to other programs.

The contributions of WVGs go far beyond the operation and maintenance of water management infrastructure. WVGs have helped select locations for water management infrastructure and dug small drains to channel water into *khals*. Much of the work of WVG has involved working with their communities – solving conflicts over waterlogging and issues that arise during project implementation (CDSP-IV, 2018). The project also reported that WVGs contributed to the resolution of other social conflicts and discouraged child marriage. WVGs also make

an important contribution to disaster preparedness and warning of cyclones. Furthermore, several WMGs work alongside school management committees to maintain these shelters (CDSP-IV, 2018).

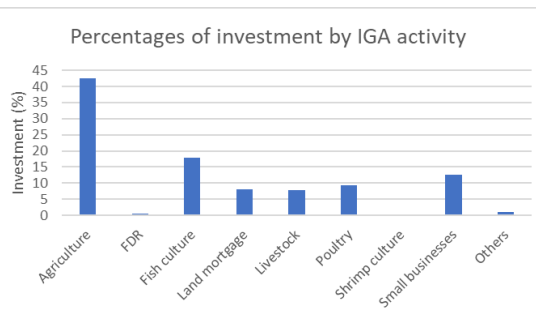
Other activities

With the WMOs being a conduit for agricultural extension and organising local activities, It is furthermore observed that IGA and micro credit are important drivers for the functionality of WMOs. Both these factors were stimulated in the coastal programs.

In BG, the WMGs used collective funds to fund income-generating activities (IGAs) in agriculture, poultry, fish culture, small business, and as the capital for local micro-credit (Blue Gold Program, 2019). The investments for IGA accounted for 41% to 44% of the total savings. About 60% WMGs use their fund for micro-credit among members. Out of the total 511 WMGs, 309 WMGs of 17 polders are involved in IGAs; the others are not interested in credit functions for investing in IGAs as they find it difficult to maintain account books and other related documents, and they think that loan recovery is a difficult task. This also reflects that BG stopped supporting WMGs in running of internal credit facility, as this is not a core task for the TA polder teams but rather something that WMGs can do on their own using the well-established S&C approach. Table 10 shows the percentages of investments by IGA activity (Blue Gold Program, 2019).

Table 10 Investments by type of business investments, total progress (Blue Gold Program, 2019)

Type of business investment	No. of persons involed	Amount of investment (Tk.)	% of investment
Agriculture	3585	14,499,373	42.4
FDR	50	200000.000	0.6
Fish culture	1709	6,099,734	17.8
Land mortgage	5928	2,797,550	8.2
Livestock	616	2,669,565	7.8
Poultry	449	3,222,666	9.4
Shrimp culture	2	11,000	0.03
Small businesses	1549	4,327,339	12.6
Others	367	400,600	1.17
Total	14255	34,227,827	100



In CDSP, with training on several IGAs, it was found, in 2018, that the participation of WMGs in IGAs was yet to spread – but that it significantly improved the livelihoods for women, with 62% reporting that they had a direct IGA (CDSP-IV, 2018b).

Drivers of functionality

We also tried to understand what drives the functionality of WMA and WMGs. Several factors have been found to be positively correlated to functionality, including the attendance of Farmer Field Schools (FFS) (Figure 15), the renewal of catchment plans (Table 11), and the organisation of AGMs (Table 11). Also, a positive correlation between the functionality of WMGs and their overarching WMA is observed, highlighting the interconnectivity between scales (Table 11). Furthermore, WMGs functionality positively correlates to its relations with UP, its financial administration, and its AGMs (Table 13).

Table 11 Correlation coefficients between overall functionality WMA in BG and several other indicators from self-monitoring

Relations between overall functionality WMA and				
	Q3 2020	Q4 2020	Q1 2021	Average
Catchment plans up-to-date	0.560	Not possible	0.697	0.628
Relation of WMA to LGI's	0.013	0.251	-0.075	0.063
Relation of WMA to BWDB O&M Division	0.076	0.000	-0.061	0.005
Relation to other agencies	0.424	-0.240	-0.061	0.041
Maintaining of financial administration	-0.053	0.251	-0.072	0.042
WMA management committee status	-0.075	Not possible	-0.042	-0.059
Organisation of WMG AGM	0.092	0.396	0.093	0.193
Functioning of WMGs	-0.094	0.750	0.697	0.451

In BG, it was found that FFS attendance is positively correlated to the WMO self-assessment scores (Figure 15). This is not necessarily causal, but it does likely show that education and capacity building drive the performance of WMGs, though the correlation to functionality is weak (Figure 15 D).

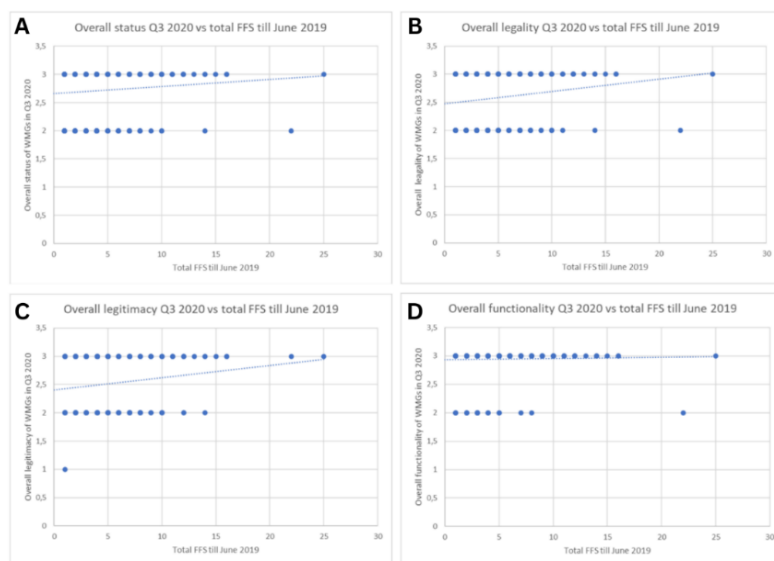


Figure 15 Total FFS attendance till June 2019 per WMG in BG vs A: Overall status, B: Overall legality, C: Overall legitimacy and D: Overall functionality as from the self-monitoring in Q3 2020, with 1 = poor, 2 = medium, 3 = good

Also, it is analysed how the functioning of WMGs (per WMA) is linked to the WMA legality parameters as listed in Table 12. Interestingly, no strong correlations are found here, only a weak correlation with the organization of annual general meetings. Hence, fulfilling the legal requirements of a WMGs does not predict better service delivery performance.

Table 12 Correlation coefficients between the functioning of WMGs and several other legality indicators from self-monitoring

How is the functioning of WMGs linked to the following WMA legality parameters?				
	Q3 2020	Q4 2020	Q1 2021	Average
Maintaining of financial administration	-0.053	-0.075	-0.050	-0.059
WMA management committee status	-0.075	Not possible	-0.029	-0.052
Organisation of WMG AGM	0.092	0.297	-0.054	0.111

Also, the relation between the overall functionality of WMGs in Blue Gold, as assessed in the self-monitoring, and several other indicators have been evaluated via a data analysis (Table 13). This shows, amongst others, that the overall functionality of WMGs is more positively correlated to the relations of WMGs to UP and its maintenance of a financial administration than to the WMG management committee status. This shows a glimpse of the broad diversity of how functionality is influenced by other indicators.

Table 13 Correlation coefficients between overall functionality WMGs and several other indicators from the self-monitoring

Relations between overall functionality WMGs and				
	Q3 2020	Q4 2020	Q1 2021	Average
Relations of WMG to UP	0.168	0.214	0.317	0.233
Maintaining of financial administration	0.356	0.141	0.378	0.292
WMG management committee status	0.026	-0.129	0.122	0.006
Organization of WMG AGM	0.107	0.111	0.125	0.114

The relations between the overall functionality of WMGs in Blue Gold, as assessed in the self-monitoring, and a number of other indicators have been assessed via a data analysis (Table 14). This shows, amongst others, that the positive correlation between the overall functionality of WMGs is more correlated to the relations of WMGs to UP and its maintenance of a financial administration than to the WMG management committee status. The analysis shows a glimpse of the broad diversity of how functionality is, possibly, influenced by other indicators.

Table 14 Correlation coefficients between overall functionality of BG WMGs and several other indicators from the self-monitoring of Q3 2020, Q4 2020, Q1 2021 and their average

Relations between overall functionality WMGs and				
	Q3 2020	Q4 2020	Q1 2021	Average
Relations of WMG to UP	0.168	0.214	0.317	0.233
Maintaining of financial administration	0.356	0.141	0.378	0.292
WMG management committee status	0.026	-0.129	0.122	0.006
Organization of WMG AGM	0.107	0.111	0.125	0.114

Conclusion

Even as good practices are in place, not all opportunities are used by all, and there is significant room for further uptake and sharing of those practices. Such a practice is, in general, water-related disease control. Other good practices that were found to be working but not as widely spread as possible are for Southwest/Narail, the O&M planning and fee collection; for Blue Gold, the in-polder water management, the polder water management planning, and the synchronised planning, and; for CDSP the emergency preparedness and the linkages to larger issues.

The making of catchments (O&M) plans is closely related to functionality (Table 12). To assess functionality in the survey in 2023, we therefore, added a question on when the most recent catchment plans have been made (Table 15). It shows that Blue Gold WMOs, where support has stopped, are lacking behind in updating catchment plans. It should be noted that not explicitly making plans does not mean that bottlenecks in the water systems are not addressed.

Table 15 Answers in the field survey to: “When was the catchment O&M plan made? How long ago?” (left) and “Are the planned actions for the catchment implemented?” (right)

		Most recent catchment plan						Level of implementation			
		No plan	2018	2019	2020	2021	2022	2023	Hardly	Partly	Largely
Blue Gold	WMA		1		3					3	1
	WMG	1			5	2			2	4	1
Southwest	WMA	1					3		1		2
	WMG		1				6	1	1	5	2
CDSP	WMA	1					2			3	
	WMG	3		2			4		2	5	

3.4 Sustainability

Sustainability is related to the performance of the WMOs after project completion, but also about the development of the performance of a WMO in the timespan of the project. The legality, legitimacy, and functionality of WMOs are seen as explanatory factors for the sustainability of the WMOs. It concerns whether WMOs continue functioning and positively contributing to water management and livelihoods. It has been found that WMO strength is by far not the only or main factor in the sustainability of an area/farming system, as many important factors are beyond WMO control. Those other factors include river erosion, maintenance at higher scales by BWDB, emergency funds procedures and funds availability by BWDB, the low maintenance of infrastructures (composite gates), recognition of WMGs by other institutes, and their willingness to interact.

As mentioned earlier, the factors of legality, legitimacy, and functionality reinforce one another. Sustainability is found ‘inside the wheel’ of those (Figure 16). One of the critical findings for sustainability is that one should not pay too much to token,



Figure 16 Overview between WMOs and larger system, and the linkages between them

static performance such as funds collected. Evaluating sustainability needs a more robust approach to assessing the actual developments in the polders.

For long-term sustainability, in literature from all projects, it is found that some sort of follow-up support would be helpful to keep up the level of performance of the WMGs. This is also frequently mentioned by participants from the field survey. However, as seen in the field, also with the currently present support, WMOs do keep functioning to some extent after project completion. It should be noted that one cannot solely focus on the WMOs themselves when assessing their sustainability: they are part of the (institutional) ecosystem, and the performance of and interaction with all those actors influences the performance and sustainability of the WMOs.

In this chapter, we dive deeper into the performance and sustainability of the WMOs as established under the three coastal programs, one by one. Whenever feasible, performance has been compared both during and after the program. In cases where direct comparisons are not possible, analyses rely on assessing performance development throughout the program.

Blue Gold

For Blue Gold (Table 16), based on self-monitoring, most of the WMOs scored good, especially in Q4 2020 and Q1 2021. This shows that, generally, they perform increasingly better during the project's time span. Also, WMGs score relatively better than WMAs in self-monitoring. As the zonal/polder teams observed, some WMOs seem to have been more critical in Q1 2021 than before about rating their performances, strengthening the point of improved performance over time (Blue Gold Program, 2021a).

Table 16 Overall results of self-monitoring Blue Gold for WMAs and WMGs. The table shows the frequency of the different scores (Blue Gold Program, 2021a)

WMAs	Q3 2020				Q4 2020				Q1 2021			
	Overall	Legality	Legitimacy	Functionality	Overall	Legality	Legitimacy	Functionality	Overall	Legality	Legitimacy	Functionality
Poor	5	3	0	3	0	11	0	0	1	12	1	0
Medium	30	32	16	32	19	18	9	5	12	19	1	2
Good	0	0	19	0	16	6	26	30	22	4	33	33
WMGs	Q3 2020				Q4 2020				Q1 2021			
	Overall	Legality	Legitimacy	Functionality	Overall	Legality	Legitimacy	Functionality	Overall	Legality	Legitimacy	Functionality
Poor	0	0	1	0	1	1	0	1	1	1	0	1
Medium	147	221	253	31	54	209	79	106	42	241	54	24
Good	355	281	248	471	448	293	424	899	460	261	449	478

Southwest

For Southwest, using the data from PPATS Q2 2022 (Phase 1 WMGs) and PPATS Q4 2022 (Phase 2 WMGs), a quite different image of WMG performance is found, with Phase 2 WMGs scoring higher than Phase 1. The scores are relatively low, but can not be compared with other projects one on one, given the different monitoring frameworks (Table 17).

For Phase 1, the overall PPATS score (Q2 2022) was negatively correlated to both the amount of members as well as the size of the command area. The same was found for Phase 2, using the PPATS data from Q4 2022. The results should be seen while keeping in mind that n=21 for Phase 1 (sample of WMGs), and n=267 for Phase 2 (all WMGs).

Table 17 Overall results of Southwest following the PPATS surveys, Q2 2022 for Phase 1 and Q4 2022 for Phase 4

	Frequency of scores	
	Phase 1 (n=21)	Phase 2 (n=267)
A = 80% or higher	0.00%	0.00%
B = 60% to 80%	0.00%	0.37%
C = 50% to 60%	4.76%	6.74%
D = 40% to 50%	9.52%	16.10%
E = 30% to 40%	0.00%	48.31%
F = Below 30%	85.71%	24.34%
Average score	24.67%	35.43%

CDSP

For CDSP, the overall rating of WMGs shows that CDSP III performs best, followed by CDSP I and II (Table 18) – based on the CDSP report from 2018. The relatively poor ratings for CDSP IV WMG may be at least partly due to the fact that CDSP IV has provided less support to its WMG compared with CDSP III. The amount of training that CDSP IV provided to each WMG was less than half that of CDSP III (CDSP-IV, 2018). BWDB could not provide the number of extension staff required for the work in CDSP IV. When adding the results from the field survey of 2023 as done for this IOB study to this comparison, it is shown that the performance has kept up quite good and seems to have even improved. However, it should be noted that the 2023 survey is based on answers provided in interviews and that answers could not be verified. It should also be noted that two categories are left out of the 2023 survey; skills and efficiency & accountability and transparency. Together, they determine 12% of the score, but this has been corrected for, in calculating the 2023 scores.

Table 18 Distribution of WMG performance over categories A (highest scoring) to E (lowest scoring) and average scores (CDSP-IV, 2018)

Rating score	% of WMGs scoring per category			
	CDSP I & II (CDSP, 2018)	CDSP III (CDSP, 2018)	CDSP IV (CDSP, 2018)	2023 field survey
A - 80% or higher	0%	75%	4%	56%
B - 70% to 79%	67%	25%	46%	22%
C - 60 to 69%	33%	0%	21%	11%
D - 50% to 59 %	0%	0%	17%	11%
E - 49% or lower	0%	0%	13%	0%
<i>Average score</i>	72.8%	82.0%	66.1%	75.4%

Costs and benefits

The three coastal development programs have different approaches in setting up WMOs. These are elaborated in Annex 4. Those projects and approaches all come with their costs and benefits, which can be observed from project to field scale. A short overview on this, including several parameters, is provided in Table 19. It should be noted that several functions and outcomes can not be monetarised, such as the achievement of democracy, more gender equality, and the establishment of people's rights. However, it is important to think of the costs and benefits of WMO development to make the point that WMOs are assets that need to be nurtured and developed. Overall, it is found that WMOs are important assets and important for social infrastructure in the project areas, but that durability and active engagement are required to ensure sustainable contributions. It should also be noted that the overview provided in table 19 does by far not cover all costs and benefits to their full extent. It rather gives some indications and pointers on the directions and elements of the costs and benefits, mainly based on reports from the programs.

Table 19 Key findings on the costs and benefits of WMO development for the three projects

Program	Key findings on costs and benefits																																																																				
Blue Gold	<ul style="list-style-type: none"> - Payback period of 0.79 years for whole project expenditure based on increased annual farmer income (Blue Gold Program, 2021e). - Considerable variation between the polders. - Improvements in water management infrastructure have removed bottlenecks in an existing system. Therefore, the rapid return and increases in food security are not surprising. - Blue Gold has achieved its expected outputs in terms of improved water management leading to better conditions for crop production and farmers gaining knowledge and skill through training and extension activities. - Participation in water management and O&M work has increased. - WMGs with lower water management problem scores have a higher cropping intensity. - Cropping intensity would not have increased to the same extent without improved water management. - Big reduction in water-related constraints to crop production - 69% of WMGs indicated the situation as good or very good at end of project, compared with only 13% in the pre-project situation. 																																																																				
Southwest	<ul style="list-style-type: none"> - Between 2009 and 2013, the monthly average income increased from Tk. 3107 to Tk. 4070.00. - For Phase 1, the total costs estimates are presented in the table below. The numbers are presented in \$ Million, with a) 10% base cost for civil works, land acquisition, and resettlement, and 5% for consultancy, and b) 0% for foreign exchange, and c) includes taxes and duties for 3\$ Million (Southwest-Phase1, 2014). <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Project Components</th> <th>Foreign Exchange</th> <th>Local Currency</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>A. Base Cost</td> <td></td> <td></td> <td></td> </tr> <tr> <td>1. Integrated Water Management Plan Preparation</td> <td>0.5</td> <td>0.3</td> <td>0.8</td> </tr> <tr> <td>2. Productive Water Management</td> <td></td> <td></td> <td></td> </tr> <tr> <td> a. SIP Preparation and beneficiary Mobilization</td> <td>0.1</td> <td>1.1</td> <td>1.2</td> </tr> <tr> <td> b. Water Management Infrastructure</td> <td>5.2</td> <td>16.7</td> <td>21.9</td> </tr> <tr> <td> c. Support Services for Agriculture and Others</td> <td>0.0</td> <td>2.8</td> <td>2.8</td> </tr> <tr> <td> d. Support for Sustainable O&M</td> <td>0.6</td> <td>2.3</td> <td>2.9</td> </tr> <tr> <td>3. Institutional Strengthening and Project Management</td> <td>2.1</td> <td>4.8</td> <td>6.9</td> </tr> <tr> <td> Subtotal (A)</td> <td>8.5</td> <td>28.0</td> <td>36.5</td> </tr> <tr> <td>B. Contingencies</td> <td></td> <td></td> <td></td> </tr> <tr> <td>1. Physical ^a</td> <td>0.4</td> <td>1.4</td> <td>1.8</td> </tr> <tr> <td>2. Price ^b</td> <td>0.0</td> <td>4.3</td> <td>4.3</td> </tr> <tr> <td> Subtotal (B)</td> <td>0.4</td> <td>5.7</td> <td>6.1</td> </tr> <tr> <td>C. Interest Charge</td> <td>0.8</td> <td>0.0</td> <td>0.8</td> </tr> <tr> <td> Total ^c</td> <td>9.7</td> <td>33.7</td> <td>43.4</td> </tr> <tr> <td> Percent</td> <td>22</td> <td>78</td> <td>100</td> </tr> </tbody> </table>	Project Components	Foreign Exchange	Local Currency	Total	A. Base Cost				1. Integrated Water Management Plan Preparation	0.5	0.3	0.8	2. Productive Water Management				a. SIP Preparation and beneficiary Mobilization	0.1	1.1	1.2	b. Water Management Infrastructure	5.2	16.7	21.9	c. Support Services for Agriculture and Others	0.0	2.8	2.8	d. Support for Sustainable O&M	0.6	2.3	2.9	3. Institutional Strengthening and Project Management	2.1	4.8	6.9	Subtotal (A)	8.5	28.0	36.5	B. Contingencies				1. Physical ^a	0.4	1.4	1.8	2. Price ^b	0.0	4.3	4.3	Subtotal (B)	0.4	5.7	6.1	C. Interest Charge	0.8	0.0	0.8	Total ^c	9.7	33.7	43.4	Percent	22	78	100
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CDSP	<ul style="list-style-type: none"> - The economic internal rate of return of CDSP-IV is estimated to be 38.9%. - This is higher than the 17.2% estimated at design. Compared with design projections, there has been a greater adoption of HYVs, a higher increase in cropping intensity, and larger increases than projected in homestead production of vegetables along with livestock, poultry, fish and, non-farm enterprises. - In 2018, for CDSP-IV, over 90% of farmers within polders reported reduced crop damage from salinity, flooding, and waterlogging. 																																																																				

Overall, it has been found that there are multi-faceted impacts of the projects in terms of food security in its full entirety: quantity, quality & diversity, access, and safety. The WMOs are an intricate part of this – together with infrastructure and capacity building. It is hard – if not impossible - to divide the benefits of the projects over the different components, given their interlinkages. Investing in water infrastructure only works out when O&M is in place as well, and vice versa. We argue that investing in water management organisations is an integral part of the success of the projects. Success is, amongst others, measured by economic analyses, which show that investment in agriculture water management and extension generates very rapid returns, and are thus a very good use of funds from the government and donors.

4. Learning and conclusions

4.1 Learnings

The central question in this study was to what extent WMOs set up in the three coastal water management programs contribute to the sustainable improvement of food security in the coastal area. Chapter 2 described the vital contribution of the WMOs to the spectacular increases in food security that were achieved in all three programs, complementing the rehabilitation of the polder infrastructure and the agricultural support programs. The WMOs were and are pivotal as a conduit for agricultural extension to a large group of farmers, as the mechanism to facilitate settlement of new land (especially in CDSP), organize improved local water management (only undertaken in BG), settling conflicts between competing uses and users, facilitate nutrition awareness (especially in CDSP), recognize the role of women and bolster access of women to food, ensure the access of landless people to increases in food security, facilitate the labour contracting societies, providing employment to those BPL (primarily in CDSP), and promote safe practice in agriculture (especially in SW).

The question is how the WMOs transition from organizations that support program implementation to organizations that are part of local governance and keep delivering services in food security, in particular in the upkeep of the polder system. Concerning the sustainability question, there are two dimensions – the sustainability of the WMOs themselves and the contribution of the WMOs to the sustainability of the improved systems.

Below (Table 20), the questions on the continued performance of the WMOs in terms of legality, legitimacy, and functionality, as well as overall sustainability, as described in the ToR, are answered. The following section tries to answer the sustainability questions from both dimensions. The last section gives a number of learnings and conclusions.

Table 20 Question from ToR, references to the (main) section in which it is discussed, and a summary and/or details of the answer

1. General	Section	Summary / Details
What is type of water and land management (incl. collective farming) for each of three projects?	1.1	<p>Water management concerns regulating in and outflow into the polders' area for irrigation and drainage. In some areas (BG and CDSP), salinity management is involved. There, the surrounding rivers are saline for at least part of the time. In CDSP, water management includes the additional task of managing land settlement after land accreditation.</p> <p>A second layer of water management is within the polders – this concerns, in the first instance, the dovetailing of divergent interests (water levels, salinity), which drives the operation of the sluice gates. This is done by the sluice operators that almost everywhere work under the supervision of the WMG. Beyond this, there are opportunities in in-polder water management, such as controlling water levels between fields, creating storage, synchronized planting, reusing sediment, creating higher grounds in flood-prone areas, and pest control with water management. These practices are only practiced sporadically despite the potential.</p>
What is the state of infrastructure to keep polders safe and to provide adequate water and drainage services?	1.1	<p>The polder system is relatively uniform, although polders differ in size: an embankment with several inlets operated with sluice and inside the polder a network of (drainage) canals (often following the creeks that existed before the polder developments) and sometimes storage reservoirs. The drainage (and irrigation) are large operated by tidal effects. The main damage is the erosion of embankments – triggered by changes in the tidal rivers; the siltation of the rivers as a</p>

		result of changes in the river hydrology (upstream development); corrosion and aging damage to the sluice gates and siltation of the <i>khals</i> . The first two categories of damage are beyond the capacity of the WMOs, whereas replacement and <i>khal</i> siltation is also done by BWDB. If one takes SW and BG as an indicators, the cost of rehabilitation (embankment improvement, sluice replacement, and desilting) is USD 50M/100000ha every 10 years – or USD 50/ha. Whereas this is a modest amount, the bulkiness of the repair and the absence of a water tax system has caused all such big maintenance to be undertaken by BWDB, sometimes with international support. This modest amount also goes to explain the large value for money.
2. WMG approach / legality		
What is type and averaged cost for O&M per unit/ha for each of three projects?		Episodical maintenance (see above): USD 50/ha/year Regular maintenance: USD 30/ha/year
What has been the level of effort and approach in supporting the development of the water management organisations?	1.1 3 Annex 4	WMG and WMAs are formed by the process of social mobilization – starting with introduction meetings, joint sessions, and joint planning; forming of special groups; promoting IGAs and micro-credit; supporting in formal registration; training and joint planning). As a ballpark figure, the cost per WMO for all activities is USD 8000-12000 as BG calculated the return period on all investments, including WMG support, to be 0.79 years.
How many % of water users/ in a defined area are members of a WMG?	3.1 Annex 5	54% (BG)
How many members are non-landowners? What is the payment collection system?	3.1 Annex 5 Annex 6	19% (BG)
How high is the cash budget of WMGs and for what purposes is it spent?	3.1 Annex 3	WMGs have an average collective saving of USD 747 (CDSP), USD 1382 (BG), and USD 1901 (SW). This is largely used for income-generating activities and as capital for micro-credit. For O&M, labour, modest financial contributions (USD 37/ha) are collected annually.
3. Legitimacy		
To what extent does the introduction of IWM committees help to build a bridge between the local and regional government structure, including District Water Management Groups and that of the BWDB?	3.2	The committees of the WMGs and WMAs have created platforms of local farmers that are otherwise unconnected or only partly organized in informal <i>beel</i> committees. This has a created stronger interface with UPs, LGIs and to a lesser extent BWDB and DAE – the latter due to the under-capacity in BWDB as well. Nor WMGs nor WMCS are represented in DWMGs, but they exert their influence through different members.
How do politics (alignment of WMOs with local and national politics) play a role?	3.2	The WMOs serve as steppingstones and vote banks for local elected bodies. WMGs indicate that relations with local elected bodies are closer than with LGI and BWDB/DAE.
Are there any differences with areas <1000 ha for which LGED is responsible?	3.2 Annex 3	In the LGED schemes, a different formal structure is chosen – i.e., registration as Cooperative Societies. There is regular interaction with these groups and the district engineer of the LGED, unlike in the WMGs

To what extent is the maintenance carried out done by landless people / local labour?	2.3 3.1	Part of the maintenance, in particular larger earthworks, is done through LCS (Labour Contracting Societies). It is mainly landless people and marginal farmers that work in these LCSs.
What is the relation of WMGs to other groups?	3.2	There are several local groups, many relatively ad hoc. It was found that where there are WMGs, they attract the largest local membership (>50%) of families, whereas Farmer Clubs – the next most present group – typically have a membership of <20% of community members.
4. Functionality		
To what extent do the WMGs function to fulfil their mandate in O&M, water management and other services?	3.3	The WMGs fulfil a role in basic low-cost maintenance, the operating of the sluice gates, the greasing of hoisting gear and painting of the gates, the inspection and plugging of rat holes in the embankments, and the removal of obstructions in the drainage canals. All this involves little monetary expense. The cleaning of the drainage canals and storage ponds is often done by LCS, with the budget provided by BWDB.
Are their unintended or unexpected benefits and costs?	3.3 Annex 3	There are many intangible and unintended benefits of the WMGs – the following were listed from the field survey, beyond the obvious benefits of better water management and increased food security: <ul style="list-style-type: none"> - WMGs could spend some funds on healthcare during the COVID-19 period (mentioned a few times) - WMGs contribute to religious work as a sign of cooperation (mentioned once) - WMG gives financial help in weddings of low-income families (mentioned once) - WMG used funds to repair a bridge (mentioned once).
To what extent are WMGs able to take on independent water management and maintenance after intervention? What is the evidence – of activities done and not done?	3.3 Annex 8	The WMG may be able to do more. Their tasks are at present limited, while there is scope for: <ul style="list-style-type: none"> - Systematic engagement in in-polder water management - Larger role in <i>khal</i> desilting - Stronger role in emergency planning - Consideration of water service collection <p>At the same time, the overall arrangement for O&M by BWDB would need to be improved.</p>
Do the WMGs have clear responsibilities, and do they meet the needs of water users (agricultural production, but also drinking water, flood protection, other function)?	3 Annex 3	There is a certain degree of unclarity on the role of WMGs in water management, in particular in their contribution to: <ul style="list-style-type: none"> - In-polder water management - Flood preparedness.
According to the water users, is sufficient and timely maintenance carried out on the infrastructure for which BWDB is responsible?	3.1 3.2 3.3 3.4	Not at all.
Do they take responsibility for infrastructure maintenance and send WMGs to use land and water in a sustainable way?	3.1 3.2 3.3 3.4	Infrastructure maintenance suffers from the lack of a clear framework in which responsibilities of BWDB and WMGs are clearly spelled out, and mutual accountability is possible. There is not much attention to sustainable and efficient water

		and land use beyond farmers' ingenuity. DAE is venturing into this field.
5. Overall sustainability		
How does the production per unit area change over the lifetime of support to the WMGs and after the closure of support? What is the contribution of the infrastructural rehabilitation?	2	<p>The best indication is the spectacular increase in production per unit achieved during the integrated programs' implementation. This was also partly caused by the introduction of new BR rice varieties:</p> <ul style="list-style-type: none"> - Yields per ha of main paddy crop increased by 75% (SW) - Cultivation of high-value crops increased by 16-25% (BG) - Egg production increased by 3.5 times, milk production by 2.7 times (CDSP-IV) - Net incomes increased by 31% (CDSP); net farm income increased by 131% (SW) <p>One may assume an erosion of infrastructure and institutional capacity over time (say 8-15 years) that may undo part of the achievements unless structural changes in the O&M system and governance arrangements are made.</p>
What are the factors that ensure that a WMG continues to function successfully?	3.3 3.4 4.2	<p>Constant support and being part of a larger governance arrangement are pivotal for WMG functionality. At the individual WMG level, factors of positive influence include:</p> <ul style="list-style-type: none"> - Size - Leadership - Training and attending FFS - Regularly updating plans - A well-functioning overarching WMA - Good relations with UP - Well-maintained financial administration - Organising AGMs
What is the effect of the performance of the institutional superstructure (role of BWDB, DAE, Local Government) contributing to the performance of these agendas?	3.2 3.3 3.4 4.2	The contributions are not structured enough. They are well-coming but hampered by constraints within the government organizations.
How is the expected long-term sustainability/impact of the institutional investments?	3.4 4.2	<p>At informal and formal levels, it is reasonable to expect that the WMOs keep delivering the current services, which, however, have a modest remit.</p> <p>The field survey (n=36) indicates that many WMGs are not confident of their institutional sustainability: less than 50% of WMOs expect to survive long beyond the duration of the programs.</p>

4.2 Conclusions: sustainability of the system

With respect to the sustainability of the system there are two main dimensions. First, there is the sustainability of the WMOs themselves. Then, there is the sustainability of the polder water management system. This section discusses these two dimensions separately.

4.2.1 Sustainability of the WMOs

Chapter 3 and chapter 4.1 discuss the continued performance of the WMOs in terms of legality, legitimacy, and functionality is given. In summary:

- After the closure of the program, the legal requirements for WMOs are eroding, unless there is a handholding operation. WMOs are not optimistic about their continued survival.
- In spite of this, many new linkages and contacts have been created.
- The WMGs have been anchored in the local setting – more with elected bodies than with government organizations. Especially the connection with BWDB is not assessed as strong. Over time, there is a risk that the connection with the BWDB further fades away, as there are staff rotations and no systematic platform for interaction. In this respect, the context differs from LGED, which uses a regular monitoring system, awarding best performing WMCS, and where there are regular meetings.
- Regarding functionality, the WMGs - irrespective of their legality - perform the different functions. In general, functionality does not depend on legality.
- There is much uncharted territory in local water management and other functions that the WMOs could take up.

In general, a process of institutional erosion seems inevitable, though informally, the new relations and linkages will continue, and the limited scope of functions undertaken - nowadays - by the WMO may still be performed.

The WMOs – randomly selected, when asked in the field survey (n=36), are also soberingly pessimistic about their chances of survival: far less than 50% expected to do so, the scores being lower for WMGs than for WMAs (Table 21).

Table 21 Percentage of WMOs that mention to continue functioning without further support, as reported in the field survey in March 2023 (n=36)

% of WMOs that would continue functioning without further support			
	Blue Gold	Southwest	CDSP
WMA	50%	25%	67%
WMG	25%	38%	44%

4.2.2 Sustainability of the polder water management system.

The institutional sustainability of the WMOs is discussed above. The continued performance of the water management system depends not only on the continued performance but also, and possibly to a major degree, on how the BWDB is organized at the zonal level.

In section 3.2, the local anchorage of WMOs was discussed. The connection of WMOs with the BWDB is still weak compared to the engagement with the elected bodies or the local government institutions.

There are several features that explain this relative disconnect. Some concern the way the BWDB is organized, with limited outreach at the district level, general understaffing in the zonal divisions, and frequent reposting. This affects the cooperation between BWDB and WMOs.

There are other limitations in the operation and organization of the BWDB that have a large bearing on the sustainability of the polder water management system.

- Unpredictable and insufficient budgets for O&M in the zonal offices of BWDB.
- Cumbersome system of emergency repairs to tackle embankment erosion at an early stage.
- Lack of a life cycle approach, one manifestation being the use of vulnerable steel gates and non-availability of composite gates.
- Lack of integration of private dredging in river management planning.

At the same time, the overall arrangement for O&M would need to be improved. All these elements can be repaired and could help break the “Build, Neglect and Rebuild” cycle that characterizes the management of the coastal polders. It is also important to emphasize that the sustainability of the polder water system only to a certain (limited) degree depends on the sustainability of the WMOs. Rather the WMOs, as they are now, also contain an unfulfilled potential of a larger contribution to water management within the polders that would add to their functionality and hence continued performance.

4.3 Recommendations

While some recommendations have been made throughout the text in the annexes, this section elaborates on some of the main recommendations made in this report. It does not pretend to be a complete overview of the recommendations on all ground this report covers but does provide direction to the way forward.

This study has been executed against the backdrop of the National Water Policy and the Bangladesh Delta Plan 2100. In total, approximately 3500 WMOs have been established under ten different programs. Despite this large number, there are ample areas without local WMOs. In the control area of the survey from this study, a large interest in setting up WMOs was found.

We recommend - based on reports, experts and WMO representatives - developing and rolling out a similar support program for all those 35000 WMOs. This can be a light package, but its overall coverage will still make it worthwhile. It will also pinpoint what the different WMOs can learn from one another – and will allow water management professionals to learn how to better support local water management in the future. Here is room for improvement with a larger presence of extension overseers and more systematic connections to BWDB and others, including DAE. Rolling out a capacity-building program for WMOs, as also done in the separate programs, would make sense in this regard.

Regarding monitoring, it is important to keep this simple yet effective. We observed that all three projects used different but comparable systems, all with different intervals and frequencies. The WMO self-monitoring, as under Blue Gold, was simple; however, it still stopped after the project duration. There is a need for some level of continued support – possibly in the shape of a capacity-building facility - to ensure continued high-level performance of WMOs.

Some governance questions that arose from the Blue Gold experience are about the availability of institutional capacity to initiate and support PWM at a nationwide scale, about the extension of partnerships between WMOs and LGIS & line agencies, about how to optimise the planning of small- and large-scale infrastructure to complement each other and about how new local and regional water resources committees enhance the synergy between national, regional and local interest (Blue Gold Program, 2021). Those questions are linked to challenges of spatial scale and capacity, which deserve attention when thinking about mainstreaming PWM in Bangladesh.

Based on experience, involving water users in the creation and execution of plans to enhance local economic development leads to increased motivation to maintain, operate, and construct small-scale water infrastructure for economic gain. However, effective water management for local economic development necessitates stronger links between agricultural commercialization and water management, systematic and significant engagement of local government institutions with specialized departments, and incorporation of practical experience in aligning commercial production with water management into agricultural extension while considering the economic potential of crops and fisheries as well as trade-offs between them.

While this report looked mostly into institutional sustainability, environmental sustainability deserves attention too. In a CDSP-IV report, it was concluded the sustainability of production systems, community institutions, and benefits is good, but that that is much more doubtful for environmental sustainability – both of the groundwater aquifers in the face of increasing irrigation abstraction and, more important, the continuing riverbank erosion resulting in loss of land and requiring more water management infrastructure to be replaced (CDSP-IV, 2018).

Enabling environment and sustainability

It is pivotal to include the government organizations and their capabilities to support the WMOs, but also their financial capability to do their part of the operation and maintenance. Without this, any new project might be in vain. In other words, one cannot solely assess the sustainability of WMOs – as asked by IOB - without including their enabling environment. A recent CEGIS report also recommends strengthening the water management wing of BWDB with more administrative power, financial capability, workforce, and expansion to field offices (CEGIS, 2022). It, in line with this study, also recognizes the importance of training WMOs – by BWDB – and the important role that BWDB can have in building networks and relations between WMOs to ensure technology and experience transfer between them (CEGIS, 2022). The importance and potential of horizontal learning as an effective capacity development method are also stressed in an evaluation study of WMCAAs (JICA & LGED, 2014). Regarding capacity building within BWDB, it, amongst others, addresses the importance of training BWDB field staff on the PWMR 2014 and the PWM guidelines (CEGIS, 2022).

In this regard, also the recognition (legitimacy) of WMOs by other stakeholders, including governments and BWDB, is very important. Too often, BWDB plans and executes a project without involving the WMOs. It has also been observed that other government departments, e.g., DAE, BADC, and MoDMR, have their own farmers group/users groups.

The importance of not just focusing on WMOs to ensure PWM, is also addressed in an SIBP report (2021) on PWM challenges. There it is stressed that WMOs, BWDB, and LGIs all three need to play a crucial role but that they cannot efficiently function without coordinating their work with other government agencies and stakeholders. Therefore, GoB also needs to focus on the possible coordination mechanism in the water sector (SIBDP, 2021).

The above, on the enabling environment and sustainability, also strongly links to the earlier cited “Build, Neglect, and Rebuild” cycle that characterizes the management of the coastal polders. To break this cycle, one needs to address the root causes of this cycle – in line with the statement that the sustainability of the polder water system only to a certain (limited) degree depends on the sustainability of the WMOs. Rather the WMOs, as they are now, also contain an unfulfilled potential of a larger contribution to water management within the polders that would add to their functionality and hence continued performance.

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Annex 1: Methodology

To answer the main research questions, the sustainable functioning of WMOs has been studied. Sustainable functioning has to do with the continuity of the WMOs after the project period, but also with the different factors of functioning. We see legality, legitimacy, and functionality as the three core categories among which WMOs can be assessed and have formed the sub research questions around those themes (Table 22), grouped in five categories: 1) general information about the projects, 2) the approach that has been used to set up WMOs and legality, 3) legitimacy, 4) functionality and 5) sustainability.

Four different methods have been used to answer those sub research questions, as mentioned before, being project literature and data analysis, interviews with project staff, interviews with key stakeholders and fact finding in the post project period, including a WMO field survey (n=45, incl. 20% control group) and focus group discussions in March 2023. Where possible and relevant, triangulation has taken place (Table 22). The contributions of the WMOs to food security is assessed in a separate chapter in this report and is largely based on reports, supplemented with findings in the field.

Table 22 Methodologies to answer questions. 0 means that the method was used.

Methodologies to answer questions, with 0 = methodology being employed				
# of methodology	(1)	(2)	(3)	(4)
Methodology	Interviews key stakeholders	Interviews project staff	Field survey	Literature and data analysis
1. General				
What is type of water and land management (incl. collective farming) for each of three projects?		0		0
What is the state of infrastructure to keep polders safe and to provide adequate water and drainage services?	0			
2. WMG approach / legality				
What is type and averaged cost for O&M per unit/ha for each of three projects? (Might need to be derived from other information)		0		
What has been the level of effort and approach in supporting the development of the water management organisations?		0		
How many % of water users/ in a defined area are members of a WMG?			0	0
How many members are non-land owners? What is the payment collection system?		0	0	0
How high is the cash budget of WMGs and for what purposes is it spent?			0	0
To what extent does the introduction of IWM committees help to build a bridge between the local and regional government structure, including District Water Management Groups and that of the BWDB?	0	0		
How do politics (alignment of WMOs with local and national politics) play a role	0	0	0	
Are there any differences with areas <1000 ha for which LGED is responsible?	0	0		
3. Legitimacy				
To what extent is the maintenance carried out done by landless people / local labor?			0	0
What is the relation of WMGs to other groups?	0	0	0	0
4. Functionality				

To what extent do the WMGs function to fulfil their mandate in O&M, water management and other services?	0		0	0
Are their unintended or unexpected benefits and costs?	0	0	0	
To what extent are WMGs able to take on independent water management and maintenance after intervention? What is the evidence – of activities done and not done?	0		0	0
Do the WMGs have clear responsibilities and do they meet the needs of water users (agricultural production, but also drinking water, flood protection, other function)?			0	0
According to the water users, is sufficient and timely maintenance carried out on the infrastructure for which BWDB is responsible?			0	
Do they take responsibility for infrastructure maintenance and send WMGs to use land and water in a sustainable way			0	
5. Sustainability				
How does the production per unit area change over the lifetime of support to the WMGs and after the closure of support? Was is the contribution of the infrastructural rehabilitation?		0	0	0
What are the factors that ensure that a WMG continues to function successfully?		0		0
What is the effect of the performance of the institutional superstructure (role of BWDB, DAE, Local Government) contributing to the performance of these agendas?	0	0	0	
How is the expected long term sustainability/impact of the institutional investments?	0	0	0	

Next to those questions, that were formulated before starting the study, additional questions and analyses have been done based on what data and information was available and on the initial findings.

The four different methods that have been used are:

Method 1: Interviews with key stakeholders

Several interviews took place with key persons from BWDB, LGI, DAE and others – including the Upazila and district level government representatives. Those interviews provided insights in all the themes. The interviews were guided by the questions as in Table 22, but the interviewers differed from this depending on the role of the interviewee. Also, interviews took place with others, such as representatives from Solidaridad and LGED.

Method 2: Interviews with project staff

Several interviews took place with project staff involved in local institutional development in the three programs, to amongst others understand the approach taken towards the strengthening of WMOs and possible adjustments over time, the connection between WMOs and other organizations (local government, BWDB, DAE etc), the main functions of the WMOs at different levels, the internal networking and learning and the costs involved. The interviews were guided by the questions as in Table 22, but the interviewers differed from this depending on the role of the interviewee.

Method 3: WMO field survey

As a part of this study, a survey took (n=45) took place, equally over the three programs. The survey for the WMOs was based on the questions as in Table 22, but was furthermore build on the questions as posed in the

WMO self-monitoring survey of Blue Gold – as used in Q3 2020, Q4 2020 and Q1 2021 and the questions that were used in the WMG survey of CDSP in 2018.

The selection of WMOs for the field survey was at random at much as possible, however, practicalities needed to be considered. For Blue Gold and Southwest, 4 WMAs and for each of them 2 WMGs have been selected. This also allows for seeing the links between WMGs and WMAs. The polders / sub projects have been selected based on practicalities and based on conflict avoidance. For Southwest, the equal division between Phase 1 and AF was made on purpose. For CDSP, 9 WMGs have been selected at random, and the 3 WMAs – there were only three – have all been selected. The control groups for each of the projects (n=3, per project) have been selected by the enumerators.

Method 4: Literature and data analysis

Project documentation available for the three programs including WMO tracking data sets have been analysed, guided by the question as in Table 22. Next to those questions, depending on what the data allowed for, interesting analyses have been made. For Blue Gold, amongst other data from the self-monitoring and WMG tracker, as well as reports, proved to be useful. For CDSP, besides reports, the data from the survey from 2018 was highly relevant. For Southwest, data from the Participatory Performance Assessment & Target Setting (PPATS) was useful. The limited data and project documentation availability, and at times the way the data were structured, made it by time challenging to process and analyse data. Often, data had to be transformed to allow for analysis. For example, the WMO self-monitoring from Blue Gold worked with the categories poor, medium and good. This was turned in to respectively 1, 2, 3 to allow for numerical analysis. An overview of the used datasets is provided before the annexes section of this report.

Table 23 gives an overview of the datasets that have been use for the data analyses as shown in this report – next to the data from reports to which is referred when and where relevant.

Table 23 Overview of employed datasets

#	Project	Dataset	Explanation
1	Blue Gold	WMO Self-Monitoring Q3 2020, Q4 2020 and Q1 2021	Contains information on how WMAs and WMGs score on a number of indicators in the categories legality, legitimacy, and functionality, a score for each of those categories, as well as an overall score. Scores are “low”, “medium”, or “good” and are respectively rescored to “1”, “2” and “3” to allow for analysis. In this report, mainly the scores from Q3 2020 are used, as those are most closely (in time) to the most recently available data from the WMG tracker.
2	Blue Gold	WMG Tracker Data up to June 2019	The WMG tracker is an output monitoring instrument for finding an objectively clear picture of the achievements of each WMG. The most recently available data is the cumulative data till June 2019 and has been used for this report.
3	CDSP	WMG evaluation survey 2018	Contains data on all CDSP IV WMGs and a selection of WMGs from earlier phases. Some of the questions/categories have been grouped together to form the categories of legality, legitimacy, and functionality for the purpose of this study.
4	Southwest	PPATS Q4 2022 for Phase 2	Data from the Participatory Performance Assessment and Target Setting (PPATS) of Q4 2022 on the WMGs established under Phase 2. PPATS results are used for assessing and computing performance-based ranking of WMOs.
5	Southwest	PPATS Q2 2022 for Phase 1	Data from the Participatory Performance Assessment and Target Setting (PPATS) of Q2 2022 on the WMGs established under Phase 1. PPATS results are used for assessing and

			computing performance-based ranking of WMOs. In this survey, only 21 WMGs participated.
6	Southwest	Phase 2 Member Enrollment and Financial Status up to December 2022	Data on member enrolment and financial status of the WMGs established under Phase 2 up to December 2022.
7	Southwest	Phase 1 Member Enrollment and Financial Status up to June 2022	Data on member enrolment and financial status of the WMGs established under Phase 1 up to June 2022.
8	WMCAs LGED	Grading of WMCAs under LGED	Data on WMCAs established under LGED in Khulna.

Selection of WMOs for field survey

Blue Gold – In total 4 WMAs and 2 WMGs per selected WMA, and three control groups

	Area	Polder	WMO	Name
1	Sathkira	2 & 2 Extension	WMA	Moheswarkati Sluice WMA
2	Sathkira	2 & 2 Extension	WMG	Jori Beeler Khal
3	Sathkira	2 & 2 Extension	WMG	Naikati Bottala Khal
4	Khulna	34/2 Part	WMA	Polder 34/2Part WMA
5	Khulna	34/2 Part	WMG	BKS
6	Khulna	34/2 Part	WMG	Nangladesh Khal
7	Khulna	27/1 & 27/2	WMA	Bhadra-Shalta WMA
8	Khulna	27/1 & 27/2	WMG	Machhaghona
9	Khulna	27/1 & 27/2	WMG	Sajiara
10	Khulna	25	WMA	Beel Dakatia WMA
11	Khulna	25	WMG	Andulia
12	Khulna	25	WMG	Daokona
13 (control)				Shovnaly
14 (control)				Narayan Khali
15 (control)				Shivnagar

CDSP - 9 WMGs from different phases, 3 WMAs (there are only 3), and three control groups

	CDSP phase	Name of char	WMO	WMG
1	CDSP-I	Char Bhatir Tek	WMG	Nabagram
2	CDSP-I	Char Mojid	WMG	Char Mojid
3	CDSP-II	59/3B-Alauddin	WMG	Karim Khal
4	CDSP-II	Chae Elahi	WMG	Char Elahi
5	CDSP-III	Boyer Char	WMG	Tankir Khal-2
6	CDSP-III	Boyer Char	WMG	Gabtole Khal-1
7	CDSP-IV	Char Nangulia	WMG	South-KK-1
8	CDSP-IV	Char Nangulia	WMG	North-KK-1
9	CDSP-IV	Char Ziauddin	WMG	Char Bagga
10	CDSP-IV	?	WMA	WMA Char Nangulia
11	CDSP-III	?	WMA	WMA Boyer Char
12	CDSP-IV	?	WMA	WMA Noler Char

13 (control)			Jorilia
14 (control)			Kalpora
15 (control)			Dukadi

Southwest - 2 WMAs from Phase 1, 2 WMAs from AF and for all two underlying WMGs. 3 control groups, 1 in Phase 1 area, 2 in Phase 2 area, with c = control

	Phase 1 or Phase 2 (AF)	Name of Sub-Project	WMO	Name of WMO	If WMG, then under WMA:
1	1	Narail Sub-Project	WMA	WMA SIP # 08	
2	1	Narail Sub-Project	WMG	Sharaboni WMG # SWN -8/3	WMA SIP # 08
3	1	Narail Sub-Project	WMG	Falguni WMG # SWN-8/9	WMA SIP # 08
4	1	Chenchuri beel Sub-Project	WMA	WMA SIP # 15 (SWC)	
5	1	Chenchuri beel Sub-Project	WMG	Babra WMG # SWC - 15/2	WMA SIP # 15 (SWC)
6	1	Chenchuri beel Sub-Project	WMG	Hasla WMG # SWC - 15/6	WMA SIP # 15 (SWC)
7	AF	BSSP	WMA	WMA-2	
8	AF	BSSP	WMG	Solakundu-Rosiknagor WMG # 02	WMA-2
9	AF	BSSP	WMG	Rajbari Khal WMG # 12	WMA-2
10	AF	KASP	WMA	WMA-3	
11	AF	KASP	WMG	Singra Tilkhori WMG # 01	WMA-3
12	AF	KASP	WMG	Katakhal WMG # 04	WMA-3
13 c	1			Noba Gram	
14 c	AF			Chiriga (Nazrul Mistri Kheya)	
15 c	AF			Char Kolmi	

Annex 2: Blogs

This annex is a collection of blogs, published in collaboration with people involved in this report, on themes related to this study.

Land entitlement

This blog is on the process of giving land titles in the name of the wife (first) and husband (second) - and the societal change this created in the CDSP project area.

<https://thewaterchannel.tv/thewaterblog/land-entitlement/>

Roadside social forestry

This blog is on managing roadside commons as is done in the CDSP project area.

<https://thewaterchannel.tv/thewaterblog/roadside-social-forestry-managing-road-side-commons/>

Land erosion

This blog zooms in on those the victims of land erosion in the CDSP project area. Many people had to move multiple times as their land was taken by moving rivers. There is a lot of hardship, but also a remarkable resilience in their stories.

<https://thewaterchannel.tv/thewaterblog/loose-and-gain-coastal-erosion-in-bangladesh/>

Local water management

This blog is on the untapped potential of local water management in Bangladesh.

<https://thewaterchannel.tv/thewaterblog/the-untapped-potential-local-water-management-in-bangladesh/>

Annex 3: Costs and benefits

In the updated version of the report (November 2023), much of the below has become part of the core text.

The projects have different approaches in setting up WMOs. These are elaborated in Annex 4. Those projects and approaches all come with their costs and benefits, which can be observed from project to field scale. A short overview on this, including several parameters, is provided in Table 24. It should be noted that several functions and outcomes can – and should - not be monetarised, such as the achievement of democracy, more gender equality, and the establishment of people’s rights. However, it is important to think of the costs and benefits of WMO development to make the point that WMOs are assets that need to be nurtured and developed. Overall, it is found that WMOs are important assets and important for social infrastructure in the project areas, but that durability and active engagement are required to ensure sustainable contributions.

Table 24 Key findings on the costs and benefits of WMO development for the three projects

Program	Key findings on costs and benefits																																																																				
Blue Gold	<ul style="list-style-type: none"> - Payback period of 0.79 years for whole project expenditure based on increased annual farmer income (Blue Gold Program, 2021e). - Considerable variation between the polders. - Improvements in water management infrastructure have removed bottlenecks in an existing system. Therefore, the rapid return and increases in food security are not surprising. - Blue Gold has achieved its expected outputs in terms of improved water management leading to better conditions for crop production and farmers gaining knowledge and skill through training and extension activities. - Participation in water management and O&M work has increased. - WMGs with lower water management problem scores have a higher cropping intensity. - Cropping intensity would not have increased to the same extent without improved water management. - Big reduction in water-related constraints to crop production - 69% of WMGs indicated the situation as good or very good at end of project, compared with 13% in pre-project situation. 																																																																				
Southwest	<ul style="list-style-type: none"> - Between 2009 and 2013, the monthly average income increased from Tk. 3107 to Tk. 4070.00. - For Phase 1, the total costs estimates are presented in the table below. The numbers are presented in \$ Million, with a) 10% base cost for civil works, land acquisition, and resettlement, and 5% for consultancy, and b) 0% for foreign exchange, and c) includes taxes and duties for 3\$ Million (Southwest-Phase1, 2014). <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Project Components</th> <th>Foreign Exchange</th> <th>Local Currency</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>A. Base Cost</td> <td></td> <td></td> <td></td> </tr> <tr> <td>1. Integrated Water Management Plan Preparation</td> <td>0.5</td> <td>0.3</td> <td>0.8</td> </tr> <tr> <td>2. Productive Water Management</td> <td></td> <td></td> <td></td> </tr> <tr> <td> a. SIP Preparation and beneficiary Mobilization</td> <td>0.1</td> <td>1.1</td> <td>1.2</td> </tr> <tr> <td> b. Water Management Infrastructure</td> <td>5.2</td> <td>16.7</td> <td>21.9</td> </tr> <tr> <td> c. Support Services for Agriculture and Others</td> <td>0.0</td> <td>2.8</td> <td>2.8</td> </tr> <tr> <td> d. Support for Sustainable O&M</td> <td>0.6</td> <td>2.3</td> <td>2.9</td> </tr> <tr> <td>3. Institutional Strengthening and Project Management</td> <td>2.1</td> <td>4.8</td> <td>6.9</td> </tr> <tr> <td> Subtotal (A)</td> <td>8.5</td> <td>28.0</td> <td>36.5</td> </tr> <tr> <td>B. Contingencies</td> <td></td> <td></td> <td></td> </tr> <tr> <td>1. Physical ^a</td> <td>0.4</td> <td>1.4</td> <td>1.8</td> </tr> <tr> <td>2. Price ^b</td> <td>0.0</td> <td>4.3</td> <td>4.3</td> </tr> <tr> <td> Subtotal (B)</td> <td>0.4</td> <td>5.7</td> <td>6.1</td> </tr> <tr> <td>C. Interest Charge</td> <td>0.8</td> <td>0.0</td> <td>0.8</td> </tr> <tr> <td> Total ^c</td> <td>9.7</td> <td>33.7</td> <td>43.4</td> </tr> <tr> <td> Percent</td> <td>22</td> <td>78</td> <td>100</td> </tr> </tbody> </table>	Project Components	Foreign Exchange	Local Currency	Total	A. Base Cost				1. Integrated Water Management Plan Preparation	0.5	0.3	0.8	2. Productive Water Management				a. SIP Preparation and beneficiary Mobilization	0.1	1.1	1.2	b. Water Management Infrastructure	5.2	16.7	21.9	c. Support Services for Agriculture and Others	0.0	2.8	2.8	d. Support for Sustainable O&M	0.6	2.3	2.9	3. Institutional Strengthening and Project Management	2.1	4.8	6.9	Subtotal (A)	8.5	28.0	36.5	B. Contingencies				1. Physical ^a	0.4	1.4	1.8	2. Price ^b	0.0	4.3	4.3	Subtotal (B)	0.4	5.7	6.1	C. Interest Charge	0.8	0.0	0.8	Total ^c	9.7	33.7	43.4	Percent	22	78	100
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CDSP	<ul style="list-style-type: none"> - The economic internal rate of return of CDSP-IV is estimated to be 38.9%. - This is higher than the 17.2% estimated at design. Compared with design projections, there has been a greater adoption of HYVs, a higher increase in cropping intensity, and larger increases than projected in homestead production of vegetables along with livestock, poultry, fish and, non-farm enterprises. - In 2018, for CDSP-IV, over 90% of farmers within polders reported reduced crop damage from salinity, flooding, and waterlogging. 																																																																				

Overall, it has been found that there are multi-faceted impacts of the projects in terms of food security in its full entirety: quantity, quality & diversity, access, and safety. The WMOs are an intricate part of this – together with infrastructure and capacity building. It is hard – if not impossible - to divide the benefits of the projects over the different components, given their interlinkages. Investing in water infrastructure only works out when O&M is in place as well, and vice versa. We argue that investing in water management organisations is an integral part of the success of the projects. Success is, amongst others, measured by economic analyses, which show that investment in agriculture water management and extension generates very rapid returns, and are thus a very good use of funds from the government and donors.

Sustainability of WMOs

To further strengthen the sustainability of WMOs, it is pivotal to also focus on legitimacy and functionality, and not solely or mainly on legality. The latter is attractive for administration purposes, as it allows for quick analyses and keeping an overview, but does not show what is actually happening. Creating a broad governance spectrum that goes from registration to actual accountability is of relevance in that regard (Figure 17).



Figure 17 The broader governance spectrum

Support and nurturing are required to keep the performance of WMOs up. Here is room for improvement with a larger presence of extension overseers and more systematic connections to BWDB and others, including DAE. Rolling out a capacity-building program for WMOs, as also done in the separate programs, would make sense in this regard.

There is room to learn from one another, between WMOs and between project staff, to consolidate successful models, and to learn from good practices. The two-tier structure of WMGs and WMAs is successful, and a common element found in the programs, which could be at the base of such a learning exercise. One example that proved to work but is not omnipresent is having an office for WMOs.

Outreach of WMOs

This study has been executed against the backdrop of the National Water Policy and the Bangladesh Delta Plan 2100. In total, approximately 3500 WMOs have been established under ten different programs. Despite this large number, there are ample areas without local WMOs. In the control area of the survey from this study, a large interest in setting up WMOs was found.

We recommend developing and rolling out a similar support program for all those WMOs. This can be a light package, but its overall coverage will still make it worthwhile. It will also pinpoint what the different WMOs can learn from one another – and will allow water management professionals to learn how to better support local water management in the future. Such a broad system would also allow to work on system constraints.

Regarding monitoring, it is important to keep this simple yet effective. We observed that all three projects used different but comparable systems, all with different intervals and frequencies. The WMO self-monitoring, as under Blue Gold, was simple; however, it still stopped after the project duration. There is a need for some level of continued support – possibly in the shape of a capacity-building facility - to ensure continued high-level performance of WMOs.

Some governance questions that arose from the Blue Gold experience are about the availability of institutional capacity to initiate and support PWM at a nationwide scale, about the extension of partnerships between WMOs and LGIS & line agencies, about how to optimise the planning of small- and large-scale infrastructure to

complement each other and about how new local and regional water resources committees enhance the synergy between national, regional and local interest (Blue Gold Program, 2021). Those questions are linked to challenges of spatial scale and capacity, which deserve attention when thinking about mainstreaming PWM in Bangladesh.

Based on experience, involving water users in the creation and execution of plans to enhance local economic development leads to increased motivation to maintain, operate, and construct small-scale water infrastructure for economic gain. However, effective water management for local economic development necessitates stronger links between agricultural commercialization and water management, systematic and significant engagement of local government institutions with specialized departments, and incorporation of practical experience in aligning commercial production with water management into agricultural extension while considering the economic potential of crops and fisheries as well as trade-offs between them.

Overall, as also concluded in a Blue Gold report, the benefits of improved water management created by BWDB, together with the organisational strength of WMOs, play an important role in increasing agricultural production and profitability.

While this report looked mostly into institutional sustainability, environmental sustainability deserves attention too. In a CDSP-IV report, it was concluded the sustainability of production systems, community institutions, and benefits is good, but that that is much more doubtful for environmental sustainability – both of the groundwater aquifers in the face of increasing irrigation abstraction and, more important, the continuing riverbank erosion resulting in loss of land and requiring more water management infrastructure to be replaced (CDSP-IV, 2018).

Other local water management groups

SaFaL for IWRM

Under the SaFaL for IWRM project (2022-2026), Solidaridad and its partners aim to improve agricultural productivity and income for 90,000 smallholder farmers in Southwest Bangladesh, by amongst other rejuvenating 80 micro-watersheds and setting up local water management committees – responsible for maintenance of the *khals* - in each of them (Solidaridad, 2022). In the six pilot areas, where this has already been done, it has been shown that improving water management at the micro-watershed level can increase livelihood opportunities for farmers in the area if it is done in combination with larger-scale water management and taking future developments into account (Mornout, 2022). In SaFaL, more attention is paid to legitimacy and functionality – not to legality. The committees – informal groups - are initially not officially registered. The project decided to dedicate its resource to the actual mobilisation of farmers and the performance of the groups – not their legality.

LGED WMCAs

When analysing the WMCAs as established in Khulna under LGED, a positive correlation between their score for O&M grading (including funds for O&M, maintenance works, and bookkeeping of O&M) and their organisational grading (including the number of (female) members, meetings and funds) (Figure 18). This could mean that better-organised organisations are better capable of doing their O&M activities and that investing in local water management makes sense.

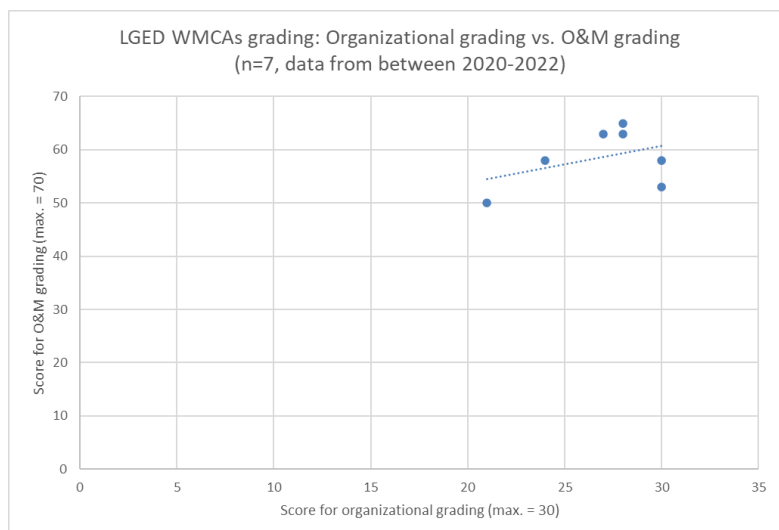


Figure 18 Organisational grading vs. O&M grading for 8 WMCAs in Khulna

Different acts/rules

This study zoomed in on three projects, all with WMOs under the 2014 act/rules, which defines participation as a responsibility of the local people, and it transferred the ownership of water management projects to water user groups. Ownership includes the responsibility of everyday operation, regular maintenance, periodic maintenance, and emergency maintenance of medium- and small-scale projects without any financial arrangements (Sadik, et al., 2022).

It would be useful to compare similarities and differences between this 2014 act and others and to find out how the WMOs under the different acts function, what strengths, weaknesses, and lessons to be learnt are. Based on experiences from this study, it seems that, besides the form of registration, the interface with the concerned department (LGED or BWDB) makes the most difference.

Other notes and findings from the field survey (March 2023)

The cash budgets for the WMGs and WMAs, as found in the field survey in March 2023, vary. They seem to be higher in the still ongoing Southwest and CDSP than in Blue Gold (Table 25).

Table 25 Average cash budget (Tk). The ones that did not have a budget or did not provide a number are not considered in the calculation of the averages.

Average cash budgets in BDT			
	Blue Gold	Southwest	CDSP
WMA	137340.25	213675.00	125523.33
WMG	58163.38	137805.00	230698.13

Regarding unintended benefits/costs, only benefits were mentioned; WMGs could spend some funds on healthcare during the COVID-19 period (mentioned a few times), WMGs contribute to religious work as a sign of cooperation (mentioned once), WMG gives financial help in weddings of low-income families (mentioned once), WMG used funds to repair a bridge (mentioned once).

Regarding the more open questions on what is needed to keep WMOs functioning and on how the future of the WMOs is seen, the input from the WMOs is largely in line with findings from the literature, interviews, and data analyses. Under the umbrellas of legality, legitimacy, functionality, and sustainability, different elements are made explicit in the field survey and elaborated upon below.

Answers to the question of what would be needed to keep WMO functioning include effective leadership, formulation, and implementation of realistic plans, financial transparency, and accountability, good relations with BDWB, good linkages with government and non-government organisations, due consideration of general members on any local problems, the execution of specific measures (e.g., the re-excavation of a *khal*, constructions of culverts, sluices, and embankments), project support (as in Blue Gold, CDSP, and Southwest), training, regular meetings, and more resources, in terms of time, labour and money.

Answers to the question of how the future of the WMOs is seen include a role in poverty reduction, them being effective and sustainable, them contributing to increased agricultural production by improved water management, have it seen as an “acceptable WMG” / “strong organisation” to everyone in the area, them contributing to less fallow land and afforestation (mentioned frequently in the SW area), them facilitating the joint purchase and sale of vegetables, and them initiating IGAs and bringing socio-economic development.

Some other relevant notes from the survey include the high demand for follow-up support. Some WMGs also mention needing help from BWDB and UP to recover BWDB-acquired land from illegal occupation. In the BG area, it is frequently mentioned that WMGs would like to lease land of BWDB. The scope for horizontal learning is also demonstrated by the fact that WMOs often mention the wish to be a model for others. Lastly, it is frequently mentioned that WMGs would be more dynamic if there were more coordination meetings between WMOs and UP / BWDB.

Annex 4: Approach of setting up WMOs

The different projects each employed their own strategies in setting up WMOs, even though they all follow the principles of participatory water management (PWM). In this annex, which does not aim to be an overarching overview, we provide insights into the approaches used to set up WMOs under the three coastal programs.

Blue Gold

Blue Gold organised communities in WMOs to become the driving force for the natural resources-based development (agriculture, fisheries, livestock), whereby environment, gender, and good governance issues are effectively addressed. It followed the guidelines for participatory water management on the levels of WMOs. In polders where there were already WMGs present, from IPSWAM, Blue Gold worked with them as they are – based on social and hydrological units. For new polders, Blue Gold formed the WMGs based on catchment areas (Blue Gold Program, 2021b). Blue Gold has developed an approach for PWM (Figure 19), and included that in its field manual for PWM, published in 2017 (Blue Gold Program, 2017). It was made before Blue Gold went to new polders and would be updated based on experiences there.

Collective Actions	Water management	Organisation
Preparations stage		
Meet partner agency field staff; set-up polder team; conduct orientation workshop and deployment of polder team (including collection of basic data)		
Activation at entry stage		
Identify existing collective actions (CAs) and liaise with their leadership	Conduct walkthrough and mapping with CA leadership and key informants	Form core group and organise horizontal learning
Planning for action stage		
Facilitate and expand existing CAs	Water and Land Use Analyses Workshop, catchment-level planning and preparation of first Polder Development Plan	Involve core group and key informants
WMG activation stage		
Promote and implement new CAs (<i>inter alia</i> community agricultural water management) and LCSs	Support WMG action planning	WMG formation from core group and strengthening; exchange visits; selected foundation courses for WMGs
Learning and Networking stage		
Exchange visits between CAs (horizontal learning)	Review and update of catchment-level water management and O&M plans	Facilitate networking and partnerships
WMG consolidation stage		
Support mature CA and market linkages	Support evaluation and reflection on action plan implementation and collective actions	Coach and review foundation skills
WMA activation stage		
Support mature CA functions and market linkages	Support implementation of catchment-level water management and O&M plans; support construction monitoring; prepare O&M agreements	WMA formation and registration; WMA exchange visits; assist WMAs to improve WMA performance

Figure 19 Flowchart of Blue Gold PWM approach (Blue Gold Program, 2017)

All WMGs (511) and WMAs (36) that have been established are registered with BWDB. WMGs formed at a later stage in BG generally covered a larger area than WMGs formed at an early stage (Blue Gold Program, 2019). Blue Gold built the capacity of WMG members – and others in the community – through various training sessions: organisational management, account keeping, modern agricultural technology, Farmer Field Schools, and horizontal learning process (Table 26) (Blue Gold Program, 2019).

Table 26 Capacity building under the Blue Gold Program up to June 2019 (Blue Gold Program, 2019)

Capacity building category	Outreach
Horizontal learning (including farmer's field days, exchange visits etc.)	243,900 persons, 57% female (potentially with double counts when attending multiple HL events)
Management trainings / workshop / orientation	28,798 WMG members (= 21% of total WMG members), 36% female
Modules on agricultural skills training including a) homestead production FFS including fisheries and livestock, b) crop production, and c) market-oriented farmer field schools (MFS)	70,485 persons
Agricultural demos/trials plots on different crops	5,731 plot owners with a demo/trial
Agricultural technologies adopted by WMG members and other community people	358,547 WMG members and others that have adopted agricultural technologies

The demos/trials, mentioned in Table 26, work in such a way that one FFS farmer demonstrates a learning issue (like vegetable, sesame, mung bean, dragon fruit, etc.) in a trial plot on their own land or homestead area and then shows other WMG farmers and community people for practical learning.

Next to the WMOs, 505 LCS (Labour Contracting Societies) have been formed, with 31,437 members, of whom 34% are female. LCS groups were involved in earthwork – construction/repair of embankments and re-excavating *khals* (Blue Gold Program, 2019).

Southwest

In Southwest, WMOs (WMGs and WMAs) have been formed both under Phase 1 and under the AF (additional financing) phase (Southwest-AF, 2022). In the current AF phase, there is also support for the Phase 1-WMOs. Phase 1 is also referred to as NSP (Nasrail Sub Project) and JSP (Jashore Sub Project) (Southwest-AF, 2022).

WMO formation is based on hydrological boundaries with, as a guide, some 400-500 beneficiaries per WMG (Southwest-Phase1, 2014). This number varies based on the extent of the geographic area that an individual WMG serves. The boundaries delineating the WMOs are based on hydrological rather than political or administrative boundaries (Asian Development Bank, 2016). Each WMG is governed by a 12-member executive committee and a general committee. At least 30% of the members of these committees are women (Asian Development Bank, 2016).

The WMGs each have six subcommittees, with each focusing on agriculture, fisheries, the environment, gender and livelihood, O&M of facilities, and internal audit. At least 30% of the members of these subcommittees should be women. All subcommittees meet at least monthly for the purpose of preparing proposals that address specific problems. These proposals are then submitted to the executive committee—which also includes representatives of these subcommittees—for disposition at its monthly meetings (Asian Development Bank, 2016). The executive committee concerned decides on problems that relate to the command area of the WMG in question, while the WMA to which this WMG belongs addresses issues that are either unable to be resolved by this group, or issues that transcend the command area of this particular group (Asian Development Bank, 2016).

The project's strategy (Phase 1) was to make investments in rehabilitating existing infrastructure and restore the under-performing schemes to full operational and productive levels. Along with rehabilitation, modifications were envisaged to address other water-using needs and to involve the local people fully in the implementation and O&M, without which no FCD/I project can succeed and sustain (Southwest-Phase1, 2014). In Phase 1, there were preparation studies and feasibility studies for new sub-project areas executed (Southwest-Phase1, 2014) (BWDB, 2023).

In Southwest, a participatory approach to developing WMOs was used. Through this methodology, it was aimed to develop beneficiary groups into vibrant, aware, positively critical, and self-reliant WMOs. The key concept in the approach was the active, intensive, and disciplined involvement of as many beneficiaries – and not just the wealthy and educated – as possible in all aspects of project development (Southwest-Phase1, 2014). The synchronized participatory process is visualized in Figure 20.

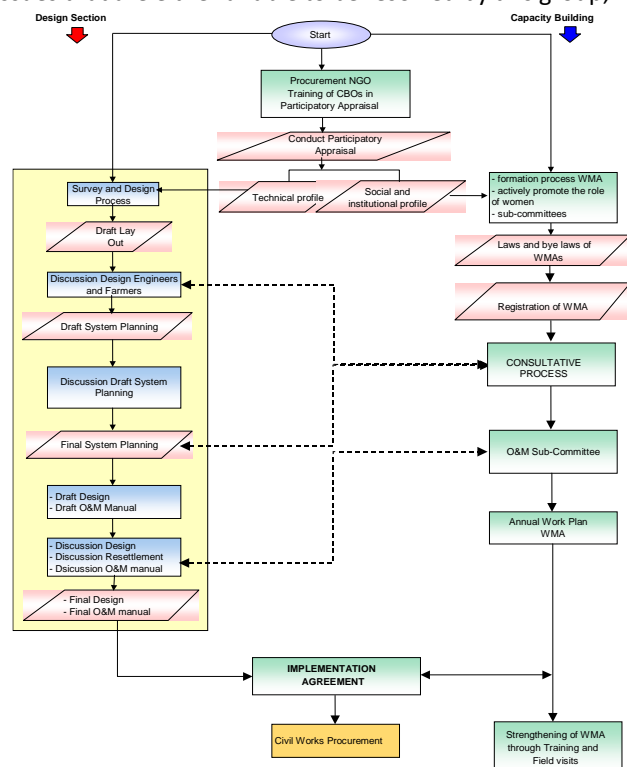


Figure 20 Synchronised participatory process as under Phase 1 of Southwest (Southwest-Phase1, 2014)

Special features of this approach include (Southwest-Phase1, 2014):

- It operationalized the key principles of the NWP (National Water Policy), particularly participatory and integrated planning, development, and management of water to address diverse stakeholder interests, environmental concerns, and other local constraints on agriculture, fishery, and livelihood in the FCD/I areas. Pro-poor focus will be pursued with the representation of the vulnerable poor in WMOs and targeted delivery of support. In addition, women were a specific target group in developing the WMOs.
- It institutionalized sustainable O&M for medium-sized and large FCD/I schemes, with joint management with and management transfer to WMOs, another key NWP principle. This followed the good practices and lessons proven effective in small FCD/I schemes assisted by ADB to support WMO-managed O&M. A range of agreed actions was also pursued to improve funding of jointly managed facilities.
- It operated stringent quality control systems by clearly stipulating process and impact targets in SIPs. It progressively implemented subproject works by confirming the achievement of the predefined targets at each step, with improved monitoring and control systems. It also supported broad institutional actions to enhance sector governance in coordination with other externally assisted programs.
- It strengthened WMOs as responsible agents to provide self-help efforts for facility O&M, and then empowered them to take lead roles in subproject decision-making and monitor the program delivery, thereby transforming the agency role from implementer to service provider. Progressive WMOs were also trained as local enterprises with collective bargaining power, facilitating farmer communication with service providers.

The project (Phase 1) provided several trainings to strengthen project institutions, including operating staff and trainers, to create a pool of professional staff that institutionalizes the participatory and integrated business processes embodied in the NWP. Project training has enhanced skills for participatory IWMP preparation; socially inclusive WMO development and management; management of diverse stakeholder interests; resettlement; design and construction management; environmental management; agriculture, fishery, and livelihood enhancement; sustainable O&M; and quality control (Table 27).

Table 27 Overview of training programs in Phase 1

Category of Training	Events No.	Participants No.	Men No.	Women No.
WMO Training				
O&M	46	1332	985	347
Agriculture	91	2952	2035	917
Fisheries	163	5259	3278	1981
Income Generating Activities	229	7188	3773	3415
Environment	79	2550	1652	898
Miscellaneous WMO	201	6507	3706	2801
Total WMA/WMG	809	25788	15429	10359
Staff Training				
BWDB/LGIs	115	3372	2833	539

The project (Phase 1) established WMAs to manage pre-, construction, and post-construction activities. The goal is to have WMAs play effective organizational, operational, resource mobilization, and networking functions for productive water management with sustainable O&M. After the SIP was finalized, the project supported the WMA to implement the institutional development plan specified in the SIP, including:

- Enrolling members and mobilizing functional subgroups.
- Registering, with the formation of executive committees and operational rules.
- Collecting cash contribution equivalent to annual O&M requirement for the concerned facilities transferred to WMAs, and establishing that contribution as an O&M reserve fund.

The project will facilitate the process by recruiting and fielding community-based organizers (CBOs) locally that will be trained by private providers, including nongovernment organizations (NGOs), with the support of the ISPMS consultants. The WMO formation process over time is shown in Figure 21 and can be divided into four phases, with some overlap being 3.5 to 4 years:

- (i) WMO formation and participatory planning (6 months)
- (ii) Participatory Infrastructure development (12-24 months)
- (iii) Intensive Interventions (24 months)
- (iv) Consolidation and planned withdrawal of project assistance (6 months).

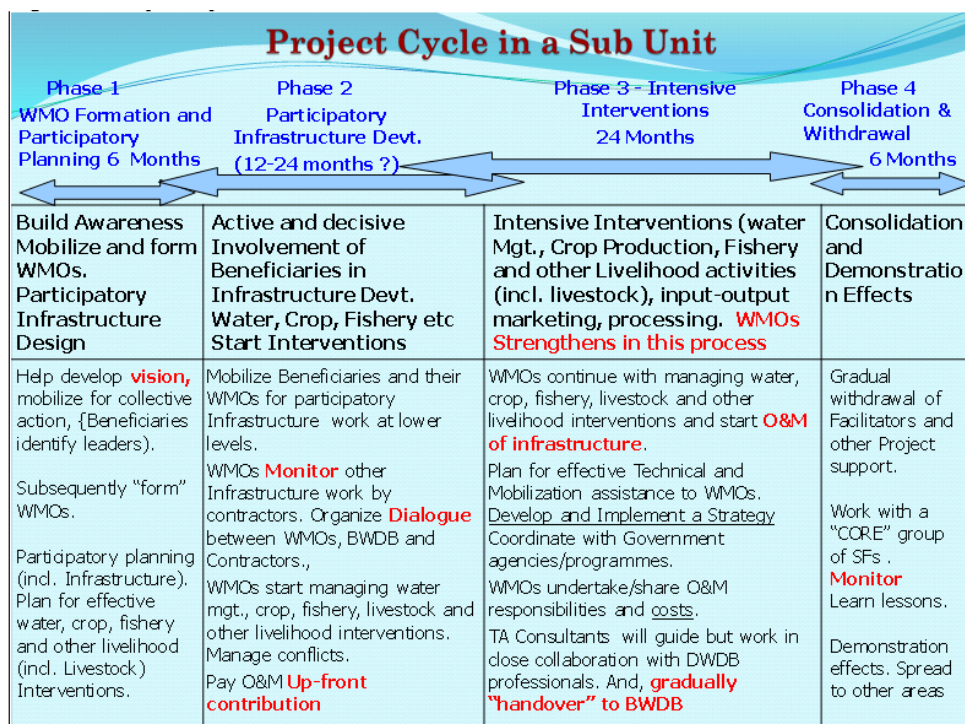


Figure 21 Project cycle of the WMO formation process over time (Southwest-Phase1, 2014)

It all starts with the entry of the facilitator. She/he will enter the community with some understanding of the basic hydrological characteristics of the area and with a map indicating hydrological units. The basic unit would be the "future WMG area". She/he will create awareness and motivate, organise, and facilitate collective action before the formation of WMOs. This will provide a good opportunity for the beneficiaries to "get united", identify effective leaders and generate additional income / enhance profits. Such initial collective action undertaken by informal groups would, therefore, be an incentive to expand more group action gradually. At the same time, the facilitator would have continued to explain them on project benefits and especially how they could improve profits if they manage water and take responsibility for O&M. With this motivation, and because they have experienced profits from collective action, they would contribute membership fee and O&M contribution; form WMO through the formal registration process with cooperatives. Even before the formation of WMO, Facilitators within a "future WMA area" will help beneficiaries identify and select representatives from each of the "future WMG areas" to become members of the "Planning Committee" (PC). This is an "ad-hoc" committee formed at the WMA level (Southwest-Phase1, 2014)

During this implementation process, a participatory detailed design of water management structures will be undertaken, along with the refinement and implementation of the resettlement plans (RPs) included in the SIP. After the WMA achieves its institutional development targets and endorses the detailed design with RP implementation, an implementation agreement will be signed by representatives of the Government, WMA, and local government institutions (LGIs), as a benchmark to start civil works procurement (Southwest-Phase1, 2014).

An interesting observation about WMO formation under Phase 1 is that WMO formation was initially delayed as not all stakeholders were keen to participate or familiar with the concept. Then, in January 2008, a District Level Consultation Workshop was held at Narail with ADB, EKN, the local Deputy Commissioner and related Union Council Chairmen, local NGOs, line agencies & stakeholders where a decision was taken to hold Union Level Consultation Workshop at all 18 Unions of the project area to make the people motivated. Accordingly, workshops were organized and people started to understand to form WMOs following Guidelines for People's

Participation (GPWM). These workshops proved to be a crucial event in the project. Subsequent to these meetings Community Facilitators were mobilized (Southwest-Phase1, 2014).

Also, from Phase 1, it was learnt that the role of community mobilizers is crucial; more than 60 field staff were recruited by the project & mobilized. To outsource community mobilization to NGOs proved to be less effective. Instead, mobilizers with higher experience and academic qualifications were recruited by PMO directly on an individual basis and with a higher salary structure. Woman facilitators are very effective in the formation process, and so it is recommended that at least 50% of the facilitators should be women (Southwest-Phase1, 2014).

For the WMA- managed facilities, after construction, the Project will provide on-the-job training for a full year in undertaking (i) annual inspection through a joint walk-through with BWDB, (ii) preparation of the annual O&M plan, and (iii) implementation of the plan. During implementation, WMAs also increased the reserve fund established during its formation stage through further beneficiary contributions and fees collected from leaseholders of embankment lands and water bodies. After WMA capacities had been confirmed, the WMA entered into a formal O&M agreement with BWDB, based on which O&M responsibilities were transferred. Annual monitoring of the management and performance of the concerned WMAs is supported by technical, social, and financial audits (Southwest-Phase1, 2014).

Regarding the main facilities (defined as flood embankments, and major regulators and canals for a command area of over 2,500 ha), the Project established a joint management system (2 JMCs were established) between BWDB, LGIs, and WMAs, following the National Water Policy (NWP). Specifically, it institutionalized (i) preparation of annual O&M plans following a standardized guideline through joint inspections with WMAs; and (ii) plan implementation by WMAs for facility operation and routine preventive maintenance and by BWDB for periodic maintenance. During its implementation period, the Project has also supported O&M, with a declining Asian Development Bank (ADB) funding share (Southwest-Phase1, 2014).

The status of the WMOs as of 30 November 2022 is the following (see Table 28, 29, 30, and 31). (Southwest-AF, 2022).

Table 28 Overview of WMOs as of 30 November 2022 (Southwest-AF, 2022)

Sl.#	Name of District	Name of Upazila	Name of Sub Project	# of WMA		# of WMG		Remarks
				Target	Achievement	Target	Achievement	
Phase-1								
1	Narail	Sadar, Lohagora & Kalia	NSP & CSP	12	12	91	91	
2	Jashore	Avoyanagar	NSP	2	2	11	11	
ST	2	4	2	14	14	102	102	
Additional Financing								
3	Faridpur	Sadar, Saltha, Nagarkanda, Boalmari, Alfadanga, Sadarpur, Bhanga & Madhukhali	BS-SP, CF-SP, AB-SP, DK-SP, HR-SP	11	11	120	120	
4	Rajbari	Sadar, Baliakandi & Kalukhali	HR-SP	4	4	51	51	
5	Magura	Sadar & Shalikhha		6	6	75	75	
6	Narail	Sadar	BB-SP	1	1	09	09	Counted in Phase -1
7	Gopalganj	Kashiani	PC-SP	1	1	12	12	
ST	4	15	9	23	23	267	267	
Total	6	19	11	37	37	369	369	

*Counted as single district

Table 29 The status of WMGs up to 30 November 2022 (Southwest-AF, 2022)

Sl. No.	Area	Name of Subproject	Target for Ad-hoc committee formation	Ad-hoc formed	Target for EC formation	EC formed	Target for registration/re-registration	WMGs registered
1	Phase-1	NSP				43	43	41
		CSP				59	59	49
ST						102	102	90
2	AF Batch-1	CF-SP	37	37	37	37	37	37
		BS-SP-1	24	24	24	24	24	24
		AB-SP-2,3	26	26	26	26	26	26
		DK-SP-3	5	5	5	5	5	5
		KA-SP-1,2	19	19	19	19	19	19
ST			111	111	111	111	111	111
3	AF Batch-2	BS-SP-2	13	13	13	13	13	13
		KA-SP-3,4	18	18	18	18	18	18
		AB-SP-1	6	6	6	6	6	6
		HR-SP1,2,3,4	52	52	52	52	52	52
ST			89	89	89	89	89	89
4	AF Batch-3	DK-SP-1,2	8	8	8	8	8	8
		PC-SP-1	12	12	12	12	12	12
		BB-SP-1,2,3	47	47	47	47	47	47
ST			67	67	67	67	67	67
Total			267	267	267	369	369	357

Table 30 The status of WMAs up to 30 November 2022 (Southwest-AF, 2022)

Sl.#	Area	WMA target	Ad-hoc formed	EC Formed	(Re-) registered under PWMR-2014	Remarks
1	Phase-1	14	10	10	9	
ST		14	10	10	9	
2	AF Batch-1	9	9	9	9	
3	AF Batch-2	8	8	8	8	
4	AF Batch-3	6	6	6	6	
ST		23	23	23	23	
Total		37	33	33	32	

Table 31 The status of WMGs audit up to 30 November 2022 for the fiscal year – 2021-2022 (Southwest-AF, 2022)

Sl.#	Name of Subproject	WMG Target	Audit Completed	Remarks	
A.	Phase-1	102	87		
	ST	102	87		
B.	Phase-2				
	1	Chatlar Fakurhat	37	36	
	2	Beel Sukunia	37	36	
	3	Kalidaskhali-Arpara	37	37	
	4	Alfadanga-Boalmari	32	32	
	5 & 6	Daduria-Kandor Beel	13	13	
	7	Horai River	52	49	
	8	Bamonkhali- Barnali	47	-	
	9	Purulia Charbhatpara	12	-	
	ST		267	203	
Total		369	290		

CDSP

In CDSP documentation, reference is made to the Guidelines for Participatory Water Management (GPWM), which BWDB has made in accordance with the Participatory Water Management Rules of 2014. These include this eight-step process for WMG formation: (i) information campaign, (ii) workshops with key persons for demarcation of the operational area, (iii) plan for WMG, (iv) mass meetings (men and women separately), (v) orientation on roles and responsibilities of WMG, (vi) formation of a 12-member management committee and the organisation of regular meetings, (vii) preparation of bylaws, and (viii) training and registration. As the process is participatory, so the whole process depends on the community and their situation rather than following a top-down blueprint (CDSP-IV, 2018).

This approach, with the participation of people at the grass-roots level, is one of the cornerstones of the CDSP approach. It has put considerable emphasis on developing various types of field level institutions (FLI), of which one of the most important are WMGs. The specific objectives of WMGs are (CDSP-IV, 2018):

- To encourage and enable community participation in the areas of water management (i.e., reducing loss of water, optimum utilization of water for productive purposes, conservation water, infiltration of saline water, and drainage of excess water).
- To maintain & smooth operation of water control infrastructure built by the different phases of CDSP by BWDB and other agencies.
- To assist all the partner agencies of CDSP and other bodies in providing services to the community in an effective manner and to resolve any crisis constraining the development process.
- Develop partnerships with other agencies, including respective Local Government Institutions, in order to provide services on a sustainable basis after CDSP interventions are completed.

At the start of the project, mass meetings were held in each settlement (samaj) to explain the objectives and approach of the project. The modalities of CDSP were not difficult to put across to char households as they had usually heard of CDSP activities in earlier phases and were looking forward to CDSP arriving on their char. A series of mass meetings were held to select members of a number of different Field Level Institutions – Water Management Groups, Farmers Forums, and Social Forestry Groups – these being the key points of entry for BWDB, DAE and FD. WMG had an important role in identifying local needs and siting items of infrastructure. LGED and DPHE also worked closely with WMG (CDSP-IV, 2018).

The WMGs are based on catchments, varying roughly from 700 to 1500 ha, as mentioned by project staff. For the CDSP-IV WMGS, apart from Urir char, the command area per WMG varies from 375 to 1091 ha, with an average of 629 ha. WMGs on Urir char have much larger command areas – an average of 4,100 ha (CDSP-IV, 2018).

Training is important for WMGs under CDSP, but the amount of training delivered to the 24 WMGs formed under CDSP-IV is much lower than in CDSP-III. This is because the BWDB was unable to provide its own extension staff for this work, which then became the responsibility of the TA team (CDSP-IV, 2018). Training is on themes including agriculture, fish, gender, and nutrition. In the monthly meetings with the WMGs, there is also training on institutionalisation of the groups. Also, other kinds of groups in the project get training on a variety of topics. There is no facilitated exchange between WMGs. But, in interviews, it was learnt that different groups are invited to training.

The WMGs under CDSP-IV were provided with tin-shed-type centres for meetings. There were significant delays in the construction of some of these buildings – WMG were meant to build them themselves, but some were not able to do this within the allowed budget, and others had problems in finding a site (CDSP-IV, 2018).

In 2018, a stocktaking was carried out of all WMGs formed by CDSP I to III phases. Out of 53 WMGs, 27 were found to be active, 20 could not be traced, and 6 were untraceable but not active as shown in table below (see Table 32). There are a range of explanations for WMG becoming inactive – and eventually no longer traceable. Significant parts of the CDSP II area have been lost to erosion, with some WMG areas disappearing altogether and others losing protective embankments along with the sluice gates they used to operate (CDSP-IV, 2018).

Table 32 Status of WMG from CDSP I to III Phases (CDSP-IV, 2018)

Status	CDSP I	CDSP II	CDSP III	Total
Traceable and active	3	15	9	27
Traceable but not active	0	5	1	6
Not traceable	0	20	0	20
Total	3	40	10	53

In 2019, CDSP took special measures to strengthen and revitalize water management organisations. As a result, there were then 57 active WMGs, 3 WMAs, and 1 WMF in CDSP.

Following the nine months gap between CDSP-IV and AF, there was a need to revitalise WMOs, as there was no support for them between those phases. Of the current 57 WMOs, 4 or 5 are not fully active, and the program is trying to revitalise them. In interviews, it was learnt that the WMOs are managed by four program coordinators who have monthly meetings with them, and that two field level staff are working with the WMOs.

Regarding the effort and approach to set up WMOs, it is mentioned in interviews that project staff first gets to know the community when there is a project, ask them for the support needed, and then let them know what support the project can offer. This can be very different for the coastal areas that CDSP is operating in than for other areas; needs are different on the new chars with limited facilities. Then, at some point, there is an agreement, and the project activities can start.

In interviews with project staff, it was learnt that it takes 1 to 2 months to organise setting up a WMG at the field level. When it is agreed to form a WMG, a general meeting is called – there is then also the election of committee members in the presence of the election committee. From then on, there is a monthly meeting in the office of the WMG with project staff + BWDB people (if they have time) for monitoring, discussing, and

solving problems. Also, financial aspects (savings and capital raising, and micro-finance) are discussed in that meeting. In the project completion report of Phase 1, it is noted that WMOs have complained about some features of the present design of the offices and that it is recommended to use IPSWAM/LGED type design (Southwest-Phase1, 2014)

In a comparative analysis of how WMOs are developed in Bangladesh, the following figure (Figure 22) was used to describe the process of formation of WMOs in CDSP (Blue Gold, 2014).

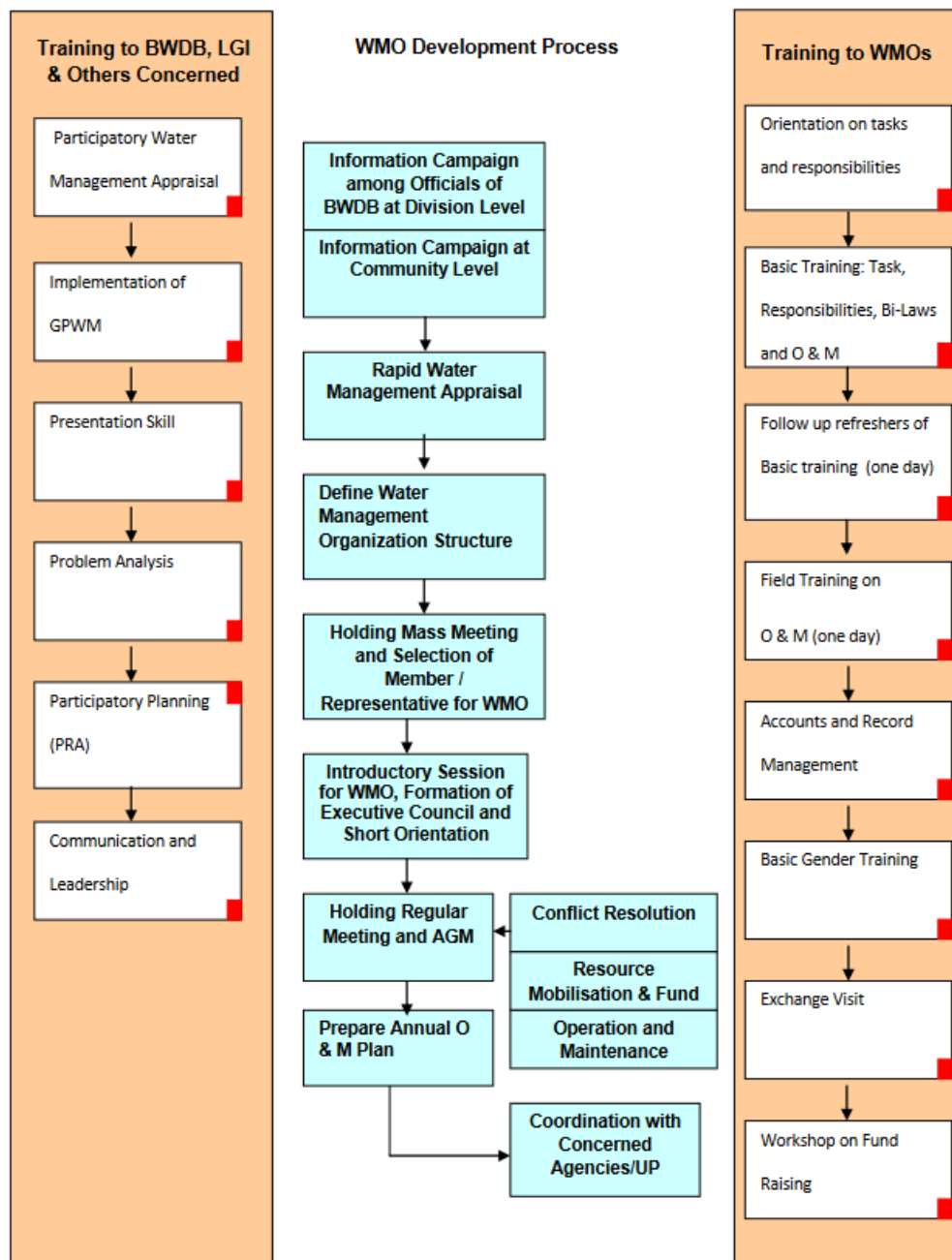


Figure 22 The formation of WMOs in CDSP (Blue Gold, 2014)

Annex 5: Membership

This annex provides more information and background on the content presented in the chapter on legality of this report.

Blue Gold

Just over half (54%) – compared to 21% in 2017 – of sample households were WMG members; a WMG has, on average, 389 members. Female membership accounts for 43% of the total members. WMG membership is very broadly representative of a cross-section of agricultural households, including landless household, with 19% of the WMG members being landless and 19.7% of the households in the endline survey (Blue Gold Program, 2021b).

According to the WMG tracker, with data up to June 2019, the 511 established WMGs have a total of 136,919 members – which means 268 members per WMG on average. While in general, membership in WMGs has increased over the years, in some polders, some people withdrew their membership for different reasons. Reasons to discontinue a membership include (a) conflict within the WMG executive committee and/or among general members – particularly on financial issues; (b) not getting a loan from WMG as per their requirement; and (c) not getting cooperation/support from BWDB to solve water management problems – infrastructures not being rehabilitated (Blue Gold Program, 2019).

Compared with non-members, WMG members are more involved in agriculture and more likely to join other community institutions and attend training – even non-BG training. Active engagement in water management during the last year is reported by only 6% of households – but this is considerably more than in 2017, when only 1.4% reported participation (Blue Gold Program, 2021b).

Southwest

For Phase 1, up to August 2022, there are 23,629 WMG members, of which 9,493 are female. (Southwest-AF, 2022). The first is equal to 232 members per WMG on average, based on 102 WMGs. For Phase 2, up to November 2022, the enrolment of WMG members is 93,119 in November 2022. This is equal to 348 members per WMG on average, based on 267 WMGs. Female enrolment was 46,668 (50.06%) in November 2022. These are all registered under BWDB. (Southwest-AF, 2022).

CDSP

In the currently active 57 WMGs, there are 808 (39%) female members and 1264 (61%) male members. Each WMG under CDSP IV represents around 1,000 farmers (ranging from 600 to 1,400) and was formed at a mass meeting of these farmers, and has between 20 and 56 members, with women making up between 16% and 56%. WMGs are managed by a committee of 12 members, of whom one-third are usually women (CDSP-IV, 2018).

Annex 6: WMG payments and budget

This annex provides more information and background on the content presented in the chapter on legality of this report. The information provided differs per program based on the available documentation.

Southwest

In the final reporting from Phase 1, it is recommended that in the future, more work should be given to the LCS to encourage investment in the water management system of the respective WMGs. However, this is an ad hoc arrangement for O&M fund collection. The main option is the collection of fee-based on land holdings of the beneficiaries at a rate per unit area, say, decimal, according to his benefitted land, which is the proper institutional arrangement to achieve towards the goal of sustainable operation and maintenance of the project (Southwest-Phase1, 2014).

In Phase-1, CAP activities were also meant to provide the WMA/WMGs with funds for O&M costs. CAPs were introduced to all registered WMGs, and value chain activities have been initiated in the more developed WMGs. Input wise (Agriculture, Fishery, Gender & Livelihood, WMOs, and environment), sub-committees are formed in all WMGs to vitalize the WMGs for sustainability. It should be noted that this component was only gradually developing and that project management offices are building up experience with the support of the SAFAL project on value chains from Solidaridad (Southwest-Phase1, 2014). A first lesson is that WMG members showed a keen interest, however, the initial results of the obtained profit margin showed only a small profit (Average Tk 57/per head). Activities such as HYV seed multiplication, urea briquette production and marketing, and fish culture so far seemed the most successful. Another important lesson learnt from the CAP activities is that this activity requires close guidance and monitoring from the WMO monitors & evaluators.

Key financial figures from Phase 1 WMGs till August 2022 are presented in Table 33 (Southwest-AF, 2022).

Table 33 Key financial figures from Phase 1 WMOs till August 2022 (Southwest-AF, 2022)

#	Indicator	Total for 102 WMGs	Per WMG on average
1	Total capital (Share + Savings + Others)	63166872	619283
2	Total Saving collection from WMG Members	27960684	274124
3	Total Capital Less Profit distribution, Share & Savings return	47614296	466807
4	Money in Bank + investment+cash in hand (General Bank + O&M Bank + Fixed Deposits, FD in Bank + Cash in hand + Invested money)	36336045	356236
5	Total Bank Balance in General Account	18290482	179318
6	Fixed Deposits (investment) in Bank	5862437	57475
7	Total O&M Fund (O&M Bank + O&M expenditure)	5403881	52979
8	Total O&M Fund in Bank	3419949	33529
9	Total O&M expenditure	1983932	19450
10	Total capital invested by WMG in WMG-managed Collective Action, CA {This doesn't include WMG-supported individual activities, WMG-managed FAO machinery	7812205	76590
11	Total no. of Collective Activities, CAs	81	NA
12	Per head investment in CAs	331	NA
13	Total WMG benefited from FAO machinery & equipment	57	NA
14	Total income from FAO machinery (WMOs provided services (hiring) or leased	6823692	66899
15	Total profits from WMG-managed Demonstrations	1520778	14910

16	WMG Total Income from WMG-managed Labor Contracting Societies' work (LCS)	5017964	49196
17	WMG Total Income from Bank Interest	5007876	49097
18	Total Profit from WMO-managed/supported CA: {a) WMO-owned CA + b) WMO-supported individual activities + c) WMO-managed FAO machinery (incl. leasing/hiring) + d) WMG-managed Demonstrations + e) LCS + f) Bank interest}	24903813	244155
19	Profit per head from WMO-managed/supported CA	1054	NA
20	Total Profit distributed	6173872	60528
21	Savings Money Returned	9054732	88772

Key financial figures from Phase 1 WMGs till June 2014 are presented in Table 34 (Southwest-Phase1, 2014)

Table 34 Key financial figures from Phase 1 WMOs till June 2014 (Southwest-Phase1, 2014)

#	Activities	Achievement (Tk when money)	Per WMG
1	Registered WMGs	102	NA
2	WMAs formed	14	NA
3	JMC formed	2	NA
4	Total capital (share + savings+ others excluding O&M fund)	26485497	259662
5	Total O&M Fund in Bank	193799,60	1900
6	Total capital invested on CAPs	6528960	64009
7	Total # of CAP activities	404	3,96
8	Total WMG members involved in CAPs	23,921 (79.15%)	NA
9	Total female members involved	9755 (40.78%)	NA
10	Per head investment in CAPs	272.94	NA
11	Total profit	1463471	14347,75
12	Per head profit from CAPs	Tk. 61.18	NA

Key financial figures from Phase 2 WMGs till November 2022 are presented in the Table 35 (Southwest-AF, 2022).

Table 35 Key financial figures from Phase 2 WMOs till 30 November 2022 (Southwest-AF, 2022)

Category	Amount total (267 WMGs) (Tk)	Per WMG on average (Tk)
Total savings collected	35253211	132034
Total deposited at bank	44999457	168537
Total O&M fees collected	3146830	11786
Total CAP share money collected	385620	1444
Total admission fee and others collected	15540780	58205
Total expenditure	9031245	33825
Total cash in hand	295739	1108
Total deposited at bank + total cash in hand	45295196	169645

Annex 7: Participation of women

In several elements of the projects, specific attention was paid to the participation of women. This topic has been mentioned and elaborated upon multiple times in the core of the report and is elaborated upon per project below. In the field survey in March 2023, it was found that the percentage of female membership, as reported by the WMGs, was 40% for Blue Gold, 41% for Southwest, and 41% for CDSP.

Blue Gold

Participation of women is reflected in membership in WMOs, and in outreach via horizontal learning. However, the increase from 46% (pre-project) to 57% of hired labour, means that also more women are being hired for agricultural labour – especially with much male labour being absorbed in the non-farming sector. Women are now hired for almost all farm operations in Khulna and Satkhira and are still mostly hired for non-rice crops in Patuakhali (Blue Gold Program, 2021).

Women are almost always paid less than men (in many cases, only 50% to 65% of the men's wages), but in some locations, the differential has narrowed and has risen from around 60% to 80% of men's wages. Increased participation in the workforce has also increased the overall workload of women, but overall, women consider themselves better off – with additional own income, leading to a greater say in household decision-making (Blue Gold Program, 2021).

Despite an increasing number of women with leadership capacities and water management knowledge, women still face specific constraints to becoming WMA leaders. These include: social and religious barriers, including the pressure of domestic responsibilities, issues relating to travelling, and an absence of security, as WMA meetings and activities often take place outside of their villages, inspections at night of illegal operations of sluice gates or illegal fishing are more problematic for women, and limited acceptance of women as leaders and decision-makers, and in liaising with government officials. (Blue Gold Program, 2021c)

By the end of Blue Gold, about two-thirds of all women WMA EC members are recognised as active leaders. Women are still underrepresented in most key positions as WMA President (0 out of 35), General Secretary (1), Treasurer (3), and Vice-President (7), but well represented as Joint Secretaries (19 out of 35). (Blue Gold Program, 2021c)

Blue Gold organized gender awareness trainings, encouraged the participation of women in all activities, and integrated gender topics in WMA capacity-building workshops. Blue Gold advocated for women's WMA leadership to better represent the interest of all polder dwellers, be more attentive to social aspects, address the growing number of capable and motivated women who want to contribute to the development of their communities and polders and follow the government mandates that women must fill at least 33% of all WMA leadership positions (Blue Gold Program, 2021c).

Observed changes during Blue Gold are that Women's involvement in WMAs has shifted from passive membership to active membership and that women influence WMA decision-making and take their own initiatives. It has been observed that women leaders ensure more attention to the socio-economic development of both men and women and that the acceptance and recognition of women's leadership have increased. Women WMA leaders also successfully stood for Union Parishad elections (Blue Gold Program, 2021c).

Women form 34% of the executive committee members, the latter against a quota of 30%. Women's participation in key roles (president, secretary, treasurer) has gone up from 5 to 9%. Of the 93 WMO executive committee members who won a seat in the 2016 Union Parishad elections, 25 were female. (Blue Gold Program, 2021). Each WMG nominates four representatives as WMA members, of which at least one must be a woman. At least four seats for every 12-member WMA Executive Committee are reserved for women (Blue Gold Program, 2021c).

Southwest

The participatory approach was embedded in the social development and WMO formation and development process of the project, particularly ensuring 30% involvement of women in all affairs, WMG subcommittees, Executive committees, LCS, etc. (Southwest-Phase1, 2014)

The project prepared a specific Gender Action Plan (GAP) during the first year. This Gender Action Plan was further adjusted during its implementation (a revised plan was approved in June 2012) and included:

1. Employment of female staff at all levels and training for field staff in gender-sensitive and participatory planning and project implementation.
2. Employment opportunities for women generated by the project and O&M works, and training for all aspects of O&M.
3. Training for women's work in farm and homestead production.
4. Strengthening the extension system to become gender equitable.
5. Response to women's agricultural and household needs for technology in close collaboration with implementing agencies and NGOs.
6. Support for women in their home-based postharvest production, processing, and marketing activities by providing local market information and linkages.
7. Training for women in crop and horticulture production, postharvest operations, poultry and small livestock rearing, social forestry, fisheries production and processing, credit, seed production, and nutrition education.

Gender-specific monitoring indicators have been established to support the plan. In line with the project criteria, implementation of the gender action plan achieved at least an average of 33% representation by women in WMMGs/WMAs and due representation of diverse stakeholders in WMGs/WMAs following the household distribution in the subproject areas (Southwest-Phase1, 2014).

The gender action plan, when again updated on 30 June 2014, also included, amongst others, a target for the recruitment of female staff in the project team (target 50% - result 20%), training on gender for the rapid rural appraisal teams, separate meetings with women in WMGs to discuss specific programs for women, the aim for at least 30% female membership and leadership in WMG subcommittees, and 35% women involvement in IGAs and 30% in civil works, and a women group per WMG (Southwest-Phase1, 2014)

Of the WMO training, about 40% of the participants were women, while about 15% of women participated in the staff training. This percentage of training for women in WMOs is in line with the enrolment of women in WMOs; this also stands at 40%. (This is higher than the target of 30% women participation as planned in the project). In the AF phase, 52,266 people have received training until the end of November 2022, of which 20,716 are female (Southwest-AF, 2022).

CDSP

Although it is mandatory for all WMGs to include women, and all do (with one exception), the picture regarding their active participation is mixed, as reported in 2018. In only 21% of the WMGs, women are very active and participate fully. They are reasonably active in 42% of the WMGs and have very limited participation in the remaining WMGs (37%). Participation of women is particularly limited in the recently formed WMG on Urir char (CDSP-IV, 2018).

Annex 8: Functionality

This annex provides more information and background on the content presented in the chapter on functionality. The information provided differs per program based on the available documentation.

Blue Gold

Participation in O&M

Participation of community people and WMG members in O&M activities (Table 36) has increased every year (from 2014 to 2019). Increased participation of community people in O&M of infrastructure seems to indicate that they are getting or recognizing the benefits of O&M. The involvement of WMG members in collective actions in economic activities has substantially increased over the duration of Blue Gold; it seems to indicate that people easily recognize benefits of collective actions (Blue Gold Program, 2019).

Table 36 Number of WMG members and community people involved in collective actions for O&M of infrastructure up to June 2019 (Blue Gold Program, 2019)

Type of Activities	Total participants	% of female	Estimated Value (Tk.) for works
1 Cleaning of khals	12,022	20	2,923,710
2 Excavation of field channel	3,942	18	1,502,968
3 Repair of embankment	5,100	17	1,306,620
4 Repair/maintenance of structures-Inlets	362	11	124,458
5 Repair/maintenance of structures-Outlet	749	5	227,250
6 Repair/maintenance of structures-Sluice	3,247	9	1,048,060
7 Others	98	2	50,580

IGA

Up to June 2019, WMGs used their savings predominantly to fund income-generating activities (IGAs) in agriculture, poultry, fish culture, small business, etc. The WMGs have been investing a sizeable amount in IGAs; it accounted for 44% of the total WMG fund in 2014, 44% in 2015, 43% in 2016, 41% in 2017, 40% in 2018, and 44% in 2019. The total amount invested in IGAs up to June 2019 has been Tk. 34,227,827 (Blue Gold Program, 2019).

Out of the total 511 WMGs, 309 WMGs of 17 polders are involved in IGAs; the others are not interested in credit functions for investing in IGAs as they find it difficult to maintain account books and other related documents, and they think that loan recovery is a difficult task. This also reflects that BGP stopped supporting WMGs in the running of an internal credit facility, as this is not a core task for the TA polder teams but rather something that WMGs can do on their own using the well-established S&C approach. Figure 23 shows the percentages of investments by IGA activity, and the number of persons involved (Blue Gold Program, 2019).

Type of business investment	No. of persons involed	Amount of investment (Tk.)	% of investment
Agriculture	3585	14,499,373	42.4
FDR	50	200000.000	0.6
Fish culture	1709	6,099,734	17.8
Land mortgage	5928	2,797,550	8.2
Livestock	616	2,669,565	7.8
Poultry	449	3,222,666	9.4
Shrimp culture	2	11,000	0.03
Small businesses	1549	4,327,339	12.6
Others	367	400,600	1.17
Total	14255	34,227,827	100

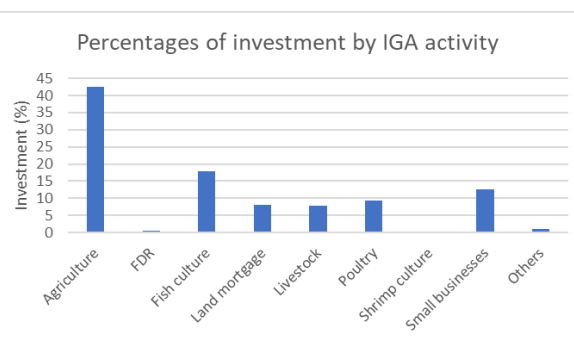


Figure 23 Investments by type of business investments, no. of persons involved, amount of investment, and % of investment. Left: presented in table form, Right: percentages of investment presented in a graph (Blue Gold Program, 2019)

Meet needs of water users

Farmers in the FGDs repeatedly said that improved water management had allowed them to crop more intensively, grow more valuable crops and get improved crop yields. There may be too much variation between

WMG within polders for this to show up when comparing the averages for different polders (Blue Gold Program, 2019).

WMG continued to report a reduction in water-related constraints to crop production, with 69% of the seasonal reports from WMGs saying the situation is now good or very good, compared with only 13% in the pre-project situation and 56% in the 2019 WMG survey. Overall, 79% of seasonal reports on water management conditions from WMGs say there has been an improvement, compared with 68% in 2019. However, still, some problems were identified, and flooding has become a major problem for 20% of WMGs in the kharif 2 season, especially in Patuakhali (Blue Gold Program, 2021a).

In the end line survey of Blue Gold, it was found that improved water management has reduced losses from poor drainage, salinity, and lack of irrigation. It was then reported that over half of the losses by value are caused by pests and diseases, and water and weather-related causes are much less reported than in 2017. Only a small amount of land is left uncultivated because of water-related problems. Improved water management has also reduced losses from gherms being flooded, and fish washed away (Blue Gold Program, 2021b).

In the executive summary of the Lessons Learnt Report of Blue Gold, the water management problems before Blue Gold and the improvements brought via PWM are visualized and summarized (Figure 24).









Water management problems before BGP	Improvements brought about by Participatory Water Management
 <p>Waterlogging during the aman season in Patuakhali and Satkhira</p>	 <p>Improved drainage system</p>
 <p>Scarcity of the water for irrigation in rabi season in Patuakhali, Khulna, Satkhira and Barguna</p>	 <p>Increased supply of water for irrigation</p>
 <p>Salinity problems in some areas of Khulna, Satkhira and Barguna</p>	 <p>Salinity no longer a significant problem</p>
 <p>Large-scale shrimp farming, resulting in obstructions to the drainage system in Satkhira</p>	 <p>While water management problems still exist, they are now less severe</p>

Figure 24 Summarising overview of the water management problems before Blue Gold and the improvements that PWM has brought (Blue Gold Program, 2021).

CDSP

IGA

Participation of WMGs in income-generating activities is yet to spread more, as reported in 2018, where the management committees should give more attention. The IGAs, however, significantly improved women's livelihoods, with 62% of women reporting that they had a direct IGA (CDSP-IV, 2018b).

Meet needs of water users

For CDSP IV, at the outcome level, for water management, over 90% of farmers within polders reported reduced crop damage from salinity, flooding, and waterlogging, although indicators for the effectiveness and sustainability of WMG are not as good as for the longer established WMG of CDSP III (CDSP-IV, 2018b).

For CDSP IV, monitoring by DAE on all five chars shows that in March (when salinity was at its highest), average soil salinity declined from as E_ce of 23.2 ds/m in 2012 (extremely saline) to 7.7 ds/m (moderately saline) in 2016. In the impact survey of 2018 (Table 37), many fewer farmers located inside a polder reported significant damage to homestead vegetables. The difference for Aman was smaller but still significant for flood damage (CDSP-IV, 2018b).

Table 37 Percentage of farmers reporting moderate or heavy crop damage after CDSP-IV (CDSP-IV, 2018b)

Source of damage	Crops	Inside polder	Outside polder
Salinity	Aman paddy	21%	22%
	Homestead vegetables	8%	25%
Flooding	Aman paddy	20%	27%
	Homestead vegetables	2%	23%
Waterlogging	Aman paddy	21%	22%
	Homestead vegetables	8%	25%

Source: impact survey 2018, more detailed data in Appendix

More farmers inside polders also report reductions in crop damage, especially from flooding, than those outside polders (Table 38). Improved drainage developed by CDSP IV may help account for the reported improvements to crops outside the polder (CDSP-IV, 2018b).

Table 38 Percentage of farmers reporting reduced crop damage after CDSP-IV (CDSP-IV, 2018b)

Source of damage	Crops	Inside polder	Outside polder
Salinity	Aman paddy	96%	78%
	Homestead vegetables	96%	78%
Flooding	Aman paddy	95%	64%
	Homestead vegetables	96%	65%
Waterlogging	Aman paddy	94%	82%
	Homestead vegetables	95%	77%

Other benefits/costs

The contributions of WMGs go far beyond the operation and maintenance of water management infrastructure. WMGs have helped select locations for water management infrastructure and dug small drains to channel water into *khals*. Much of the work of WMG has involved working with their communities – solving conflicts over waterlogging and issues that arise during project implementation (CDSP-IV, 2018). The project also reported that WMGs contributed to the resolution of other social conflicts and discouraged child marriage. WMGs also make an important contribution to disaster preparedness and warning of cyclones. Furthermore, several WMGs work alongside school management committees to maintain these shelters (CDSP-IV, 2018).

Annex 9: Terms of Reference

This annex provides the Terms of Reference for the assignment under which this report has been produced.

Terms of Reference duurzaamheid NL interventies polders Bangladesh

Verdiepende studie binnen de periodieke rapportage beleidscoherentie en effecten op BHOS artikel 2 duurzame ontwikkeling naar de duurzaamheid van WMGs binnen de programma's Blue Gold, SWAIWRPMP en CDSP.

21-11-2022

Aanleiding

IOB studie

IOB heeft in December 2021 Bangladesh bezocht in het kader van het onderzoek naar beleidscoherentie en de effecten op voedselzekerheid, water en klimaat. Naast het doel van de evaluatie om deze effecten te onderzoeken tracht IOB in deze studie helder te krijgen hoe coherent NL beleid en uitvoering waren en wat de processen waren die coherentie (positief of negatief) beïnvloed hebben. De geografische nadruk van het veldbezoek lag in het zuidwestelijke gedeelte van de delta waar polders worden ontwikkeld met de door Nederland gefinancierde programma's 'Southwest Area Integrated Water Resources Planning and Management Project (SWAIWRPMP, of kort Southwest, i.s.m. de Asian Development Bank) en Blue Gold (i.s.m. de Wereldbank).

IOB vond dat Southwest en Blue Gold als waterprogramma's op lokaal niveau coherent waren met voedselzekerheids- en klimaatadaptatiedoelstellingen. Landbouwproductie heeft een enorme boost gekregen, mede door deze programma's.

Strategie Nederland (polderontwikkeling door waterbeheergroepen) en hypothesen

De door Nederland gestimuleerde aanpak van participatief waterbeheer heeft geleid tot de ontwikkeling van water management associations (WMAs), onderverdeeld in verschillende waterbeheergroepen (WMGs). Deze groepen zijn in geval van ontwikkeling door de BWDB gaan vallen onder de jurisdictie van de Bangladesh Water Development Board (BWDB), waar ze voorheen onder de Local Government and Engineering Department (LGED) vielen. De BWDB maakt gebruik van hydrogeologische grenzen, terwijl bestuur in Bangladesh over het algemeen volgens de grenzen van Unions, Upazila's en districten gaat. In 2018 zijn Integrated Water Management Committees opgezet, bestaande uit leden van verschillende overheidsinstanties om het belang van waterbeheer beter aan te laten sluiten met de bestaande lokale overheidsstructuren.

Gebieden < 5000 ha moeten beheerd en onderhouden worden door lokale organisaties als het om klein onderhoud gaat. Gebieden <1000 ha vallen nog steeds onder de LGED.

Aanpak BG, SW en CDSP

De benadering van participatief waterbeheer is dwarsdoorsnijdend in de geselecteerde programma's. Toch verschilt de aanpak van de programma's. De ontwikkeling van chars in CDSP begon vanaf de basis met verstrekken van landrechten en constructie van infra. Blue Gold bouwde voort op de activiteiten van IPSWAM en richtte zich naast rehabilitatie van de infrastructuur op verhoging van landbouw- en visproductie en marktontwikkeling. Ondersteuning in de vorm van geld, machines en assistentie was intensief en projectgestuurd. SW gebruikte technische assistentie om vanuit de gemeenschappen projecten te ontwikkelen.

Onderhoud

Terwijl ondersteuning in SW en Blue Gold eind 2021 nog liep, werd in interviews met zowel watergebruikers als medewerkers van de departementen (BWDB, DAE en LGED) duidelijk dat de BWDB moeite had het eigenaarschap van het onderhouden van de infrastructuur en het beheer van de polders op zich te nemen. Dit vanwege lage mens- en financiële capaciteit en vanwege de sterke institutionele structuur die voor de andere departementen geldt, zoals bij LGED en de Directorate for Agricultural Extension (DAE). Bij het ontwikkelen van de WMGs is een (niet altijd heldere) onderverdeling gemaakt in verantwoordelijkheden van de WMGs en de BWDB. De Board dient de grotere infrastructuur te onderhouden zoals inlaatsluizen. De groepen dienen de waterverdeling te regelen en klein onderhoud toe te passen. Over de verantwoordelijkheden van het baggeren van de irrigatie/drainage-kanalen werd geen eenduidig antwoord gegeven.

- *Hypothese 1:* IOB ziet hierbij het risico van institutionele afbraak wanneer programmaondersteuning wordt afgeschaald.

WMGs zijn relatief nieuw en lijken nog niet goed te zijn verbonden aan bestaande overheidsstructuren. Dat maakt hun positie en bestaansrecht zwak.

- *Hypothese 3:* Door de zwakke positie van WMGs in overheidsstructuren dreigen deze hun rol niet te kunnen vervullen of zelfs geheel niet te functioneren. Hierdoor komt ook onderhoud in gevaar en dreigt de infrastructuur voor irrigatie en drainage op korte termijn niet meer bruikbaar (dichtslibben en stukgaan).

Onder interventie van de geselecteerde programma's is de productie van gewassen en vis toegenomen.

- *Hypothese 4:* Door het achteruitgaan van het functioneren van de WMGs wordt het water minder goed beheerd en gaat de productie achteruit.

Financiën

De bezoeken aan de WMGs maakten duidelijk dat de groepen meer geld spaarden dan dat er uitgegeven wordt. Er werden verschillende antwoorden gegeven op de vraag waarvoor de 'savings' voor gebruikt werden en/of mochten gebruikt worden. Vaak werd voor onderhoud naar de BWDB gewezen. Het gebruik van het kasgeld voor individuele leningen was ook niet altijd mogelijk (onder het department of cooperatives kon dit wel, maar onder de BWDB is dit juridisch ingewikkelder) of had men er geen goede ervaringen mee.

- *Hypothese 4:* In geval van een WMG met een functionerend betalingssysteem is er genoeg geld om onderhoud als baggeren van kanalen en rehabilitatie van infra te kunnen financieren.

Problemen met zoutwaterintrusie, sedimentatie en overstromingen zijn groot en drukken een stempel op het investeringsgedrag en, breder nog, het landgebruik in de polders. De algemene perceptie is dat de problemen worden veroorzaakt door klimaatverandering.

- *Hypothese 5:* Gebrek of verkeerd waterbeheer op grotere schaal dan op polderniveau draagt bij aan de negatieve gevolgen binnen de dijken. (Toelichting: Bestuurlijk lijkt hier een gat te zijn, de betrokken departementen die IOB heeft ondervraagd lijken zich meer te richten op symptoombestrijding in plaats van grondoorzaken aan te pakken.)

Belang ambassade

De ambassade heeft zicht op de mogelijke problemen en heeft duurzaamheid van WMGs opgenomen in de Meerjarig Landenstrategie (MLS) als onderdeel van een bredere MEL vraag binnen de benadering van participatief waterbeheer. Andere vragen die leven gaan over de duurzaamheid van WASH interventies en waterbeheer. Hiervoor wordt een MEL-programma ontwikkeld voor 4 jaar. Ook wil de ambassade kijken naar de governance-structuur op nationaal overheidsniveau vanuit de programma's CDSP, Blue Gold en SW.

Wat betreft Blue Gold is de toekomst onzeker. GoB (BWDB) wil opschalen naar de andere 117 polders, de ambassade wil eerst dat de huidige polders goed functioneren. Daarnaast is ADB uitgenodigd om te praten over een derde fase van SW.

De post start nu een nieuw polderontwikkelingsproject voor 6 jaar i.s.m. ADB en IFAD van 250 mln. euro, het Climate and Disaster Resilient Small-Scale Water Resources Management. LGED is de lokale uitvoerder. Men gaat dus gebruikmaken van een nieuwe institutionele benadering op kleiner governance niveau dan met de BWDB in Blue Gold en Southwest het geval was. Veel integrated water management committees (IWMC's) daar liggen met elkaar in de clinch, daarom wordt via LGED meer samenhang gezocht tussen centrale en decentrale overheid. Daarbij heeft LGED lokale financiële capaciteit.

Positionering t.o.v. update effectmetingen Blue Gold

Het Blue Gold Program is tijdens haar looptijd gemonitord op effecten op WMG en huishoudniveau. Er is hierbij o.a. gekeken naar de effecten van de interventies op de landbouwproductie en inkomen. Het laatste

meetmoment (op huishoudniveau) dateert van 2020. IOB wil nu op basis van de bestaande WMG- en huishoud surveys de analyse verbeteren door sterker de link te leggen naar het moment van ondersteuning door het project. Eventueel kan een volgend meetmoment toegevoegd worden als dat mogelijk en wenselijk is. Daarbij zouden Idealiter alle 511 BG WMGs meegenomen worden.

Door te vergelijken tussen polders die eerder of later ondersteund zijn, specifiek in de vorm van infrastructuur rehabilitatie, kunnen binnen de projectgebieden controlepolders gevonden worden waardoor de analyse sterker wordt dan alleen voor/na (zoals de huidige BG rapportages). Effecten kunnen dan vastgesteld worden op basis van de beschikbare BG-surveys door boeren binnen project en controlegebieden met elkaar te vergelijken ten aanzien van productie en inkomen, daarbij controlerend voor het functioneren van de WMG. Ook kan op deze manier het onderscheid tussen eerder en later ondersteunde polders vastgesteld worden.

Hierbij is het van belang dat het type en moment van werkzaamheden goed is gearchiveerd om na te gaan of het überhaupt mogelijk is controlegebieden te vinden a.d.h.v. het moment van ondersteuning. Dit is nog onzeker, waardoor een effectmeting mogelijk geen optie is. Deze gegevens (met name contracten met aannemers) zijn opgevraagd bij de BWDB en zijn deels opgenomen in een excel-bestand. Dit hebben we echter nog niet ontvangen en is sowieso niet compleet. Wellicht vergt dit nog extra inspanning om compleet te krijgen.

Twee doelen

Bovenstaande leidt tot de volgende vragen die enerzijds tot input moeten leiden voor de periodieke rapportage van IOB over beleidscoherentie en anderzijds om de vraagstelling helderder te krijgen voor het geplande MEL traject dat de ambassade voorziet. Daarnaast kunnen de bevindingen van deze (kwalitatieve) studie de surveys voor de update van de kwantitatieve effectmeting aanscherpen.

De algemene hoofdvraag is de volgende:

In hoeverre zijn de Nederlandse interventies gericht op waterbeheergroepen in de polders van de Bangladesh delta duurzaam en wat zijn de factoren om een WMG te laten functioneren.?

Deelvragen

- Hoe is de staat van infrastructuur om polders veilig te houden en op het juiste moment van water te voorzien?
- In hoeverre functioneren de WMGs dermate adequaat dat zij voldoen aan hun mandaat?
- Hoeveel % van de watergebruikers in een afgebakend gebied is lid van een WMG en betaalt het afgesproken bedrag?
- Hoe hoog is het budget van WMGs en voor welke doeleinden wordt dit besteed?
- In hoeverre zijn WMGs in staat om zelfstandig waterbeheer en onderhoud op zich te nemen na interventie?
- Wat zijn de factoren die ervoor zorgen dat een WMG succesvol blijft functioneren?
- Hebben de WMGs duidelijke verantwoordelijkheden en sluiten deze aan bij de behoeften van de watergebruikers (landbouwproductie, maar ook drinkwater, bescherming tegen overstroming, etc.)?
- In hoeverre wordt het gepleegde onderhoud gedaan door landlozen / lokale arbeid?
- In hoeverre helpt het introduceren van IWM committees om een brug te slaan tussen de lokale en regionale overheidsstructuur en die van de BWDB?
- Hoe verandert de productie per oppervlakte-eenheid na afsluiten van ondersteuning aan WMGs en na rehabilitatie?
- Wordt volgens de watergebruikers voldoende en op tijd onderhoud gepleegd aan de infrastructuur waarvoor BWDB verantwoordelijk is? Zijn er verschillen met gebieden <1000 ha waarvoor LGED verantwoordelijk is?
- Nemen zij verantwoordelijkheid voor onderhoud van infrastructuur en sturen zij WMGs aan land en water op een duurzame manier te gebruiken?

Afbakening en methodologie

Dit onderzoek neemt de Nederlandse benadering van participatief waterbeheer binnen drie programma's onder de loep. Bij deze benadering zijn waterbeheergroepen opgericht onder de assumptie dat waterbeheer op lokaal

niveau gezamenlijk door watergebruikers op de meest effectieve manier uitgevoerd kan worden. Hierbij is getracht het systeem van de Nederlandse waterschappen te volgen waarbij het waterschap (de BWDB) het zeggenschap heeft over het waterbeheer op stroomgebiedniveau (gesimplificeerd) en verantwoordelijkheid heeft de primaire waterinfrastructuur te onderhouden. Het onderzoek moet uitwijzen of zowel BWDB als de WMGs zich aan de gestelde afspraken houdt om waterbeheer optimaal te laten verlopen.

Voorgesteld wordt een veldbezoek van zo'n drie weken binnen de ontwikkelingsgebieden van Blue Gold Programme, South West, CDSP en controle polders. Per programma dient een selectie te worden gemaakt van WMGs binnen die gebieden, zo dat het (hydrogeologisch, geografisch en demografisch) representatief is voor de programma's. Hetzelfde geldt voor de controle polders, dat gebieden moeten zijn waar NL of een andere donor geen WMGs heeft helpen te ontwikkelen.

Per programma wordt het mogelijk geacht om 25 WMGs te selecteren met verschillende eigenschappen in een polder (laag/hog, recent-lang geleden onder interventie, etc.). Voorstel is om per programma zo'n 5 WMGs per polder te kiezen. Interviews kunnen gedaan worden in focus group discussions aan de hand van semi-structureerde interviews met stuurgroepleden (committee members) van de WMG, leden van de WMG en watergebruikers zonder lidmaatschap van een WMG (indien van toepassing). Bij ieder gesprek zal een lijst met mogelijke vragen gehanteerd worden, maar het staat de onderzoeker(s) vrij om andere vragen te stellen of door te vragen, zolang dit bijdraagt aan de gestelde doelen. Van ieder interview wordt een verslag gemaakt.

Daarnaast is een observatie van de infrastructuur nodig. Dit omvat een fysieke check op het functioneren van de infra (dijken, kanalen en inlaten), temporele oplossingen in het veld, sedimentatie, etc. Eventueel zouden additionele interviews gehouden kunnen worden met een random selectie of op basis van locatie in polder met watergebruikers (ook niet-leden van een committee). Wat betreft Blue Gold zou dit onderzoek een kwalitatieve aanvulling zijn op de geplande impact-update.

De vergelijking tussen de programma's moet inzichten bieden in welke interventies het beste zorgen voor bestendigheid van het waterbeheer. De vergelijking met controlegebieden moet inzicht gaan bieden in de additionaliteit van de Nederlandse interventies. Het lijkt op voorhand mogelijk om conclusies te kunnen trekken op gebied en contributie.

Selectie van bronnen

Voor de selectie van WMGs is de volgende data nodig van deze groepen: locatie, hydrogeologische gegevens (indien beschikbaar), aantallen leden. De programma's zijn in meer of mindere mate gemonitord; aangenomen wordt dat deze gegevens opvraagbaar zijn via de BWDB en of indirect.

Voor de selectie van non-interventie polders zou de BWDB de juiste ingang moeten zijn.

Ethische overwegingen

De ethische risico's van dit onderzoek zijn beperkt. Het belangrijkste risico heeft betrekking op de verwerking van persoonsgegevens in het kader van privacywetgeving. Hieronder leggen we uit hoe dit risico gemitigeerd wordt.

Vertrouwelijkheid van interviews

Gesprekspartners ontvangen voorafgaand aan het interview informatie over hoe we met hun gegevens omgaan. De interviews zijn vertrouwelijk en bevindingen op basis van de interviews zullen in het evaluatierapport niet herleidbaar zijn tot individuele respondenten. Er kunnen anonieme citaten uit interviews in het rapport worden opgenomen, maar de betreffende respondenten zullen eerst om toestemming worden gevraagd. Het rapport zal geen lijst met gesprekspartners bevatten.

Archivering van aantekeningen interviews

De interviewaantekeningen worden tijdens het onderzoek opgeslagen op een afgeschermd digitale ruimte, alleen toegankelijk voor de bij de evaluatie betrokken onderzoekers. Na publicatie van het rapport worden geanonimiseerde aantekeningen van de interviews gearchiveerd: eerst tien jaar in het BZ archief, en vervolgens in het nationaal archief. In beide gevallen worden ze zo gearchiveerd dat ze alleen toegankelijk zijn voor onderzoekers die bij de evaluatie betrokken zijn.

Planning

IOB zou graag een dergelijke studie nog in 2022 opzetten. Een snelle inschatting is dat zeker 2-3 weken nodig zijn om voldoende data te genereren.

- Voorstel consultant en ToR: Eind november 2022
- Contract: Begin december (deadline betalingen 2022 6 december)
- Inceptierapport: Januari 2023
- Veldbezoeken: Januari – februari 2023
- Rapport: Maart 2023

Producten

Het eindrapport (max 30 pags) dient de onderzoeksresultaten en analyse helder weer te geven in de Engelse taal. Conclusies moeten hieruit herleidbaar zijn en in een apart hoofdstuk gepresenteerd.

Het onderzoek zal vanuit IOB begeleid worden door Joep Schenk en Pim de Beer met ondersteuning door Ferko Bodnar.