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05 Outcomes and Impact from Participatory Water Management

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The chapter includes the outcomes and impact of improved water management and institutional

development, mostly derived from the Blue Gold [WMG survey of 2021](#), complemented with some findings from the endline survey of 2020. ^[Notes 1] This chapter explores the extent to which the management of water resources has been improved, including the reduction of water-related constraints to crop production in different seasons. This chapter also reports on how coastal communities are engaged in and control local water management, on their membership of community organizations, their participation in training programmes and the rate of adoption of new technologies for agricultural and homestead-based production.

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Increased resilience against climatic variability: outcomes and impact of rehabilitation work on water management [[edit](#) | [edit source](#)]

One of the central objectives of the Blue Gold Program (BGP) was to create an enabling environment for the coastal communities for economic development through the improvement of water resources management at the local level, especially to remove water-related constraints to crop production. BGP has especially funded repairs to sluice gates, re-sectioning and repairs of embankments and re-excavation of drainage khals within the 22 BGP polders, with the objective of draining excess water, preventing flooding, while improving access to water for irrigation. At the time of the surveys in 2021, these works were about 90% complete. Apart from these works, water management groups (WMGs) have undertaken minor works using their own labour, while some other agencies, such as Local Government Institutions, have also supported water management improvements benefiting the BGP polders.

Many WMGs reported that they started getting benefits from BGP in 2013 or 2014. For other WMGs, the year of getting benefit is within 2015-2017. These dates precede the completion (or even start) of many water management infrastructure-related interventions by BGP. But even when the infrastructural works were not yet effective, WMGs may have seen benefits from their own water management initiatives, from Farmer Field Schools and from other interventions related to agricultural production or marketing.

Table 5.1: Severity of water management problems

		Pre-project situation (2013-14)					Current situation (2020-21)				
		1	2	3	4	5	1	2	3	4	5
Season	Rabi	2%	9%	25%	49%	15%	17%	66%	16%	2%	0%
	Kharif-2	1%	14%	37%	36%	12%	22%	59%	15%	3%	1%
	Kharif-1	4%	7%	26%	45%	18%	7%	39%	40%	10%	4%
	Total	3%	10%	29%	44%	15%	15%	54%	24%	5%	2%
Zone	Khulna	2%	12%	29%	42%	14%	12%	52%	27%	7%	2%
	Satkhira	8%	21%	19%	30%	21%	18%	45%	27%	9%	2%
	Patuakhali	1%	2%	33%	51%	13%	19%	60%	18%	2%	1%
	Total	3%	10%	29%	44%	15%	15%	54%	24%	5%	2%

Score: 1 = very good, 2=good (i.e. no problem), 3-=average, 4=bad, 5=very bad.
Percentage of WMG reports for each season Source: WMG survey 2021

Table 5.1 shows the improvement of water management through the severity of water management problems (ranked 1 to 5) for each season and each zone. The 2021 WMG endline survey showed that problems have been reduced compared with the pre-project situation. In the reporting per agricultural season, 69% of the WMGs found that the water management situation became good or very good (score of 1 or 2) compared with only 13% in the pre-project situation and with 56% in the 2019 WMG survey ([Technical Report 26](#)). The extent of completion of BGP infrastructural works will have contributed to these improvements over time; at the time of the 2019 WMG survey only 53% of these works were complete, whereas at the time of the 2021 WMG survey 90% had been completed.

The improvement has been the greatest in Patuakhali where only 3% of the WMGs rated their water management situation as good or very good before BGP, but now 79% are at this level. In Khulna 14% of WMGs reported their water management situation being good or very good before, compared with 64% now. Satkhira (the single Polder 2&2E) registered the lowest improvement, having had a relatively better position prior to BGP (29% good or very good) and now having 63% of the WMGs in these categories.

Overall, 79% of the WMGs reported that there was a reduction in the seasonal water management problems (Table 5.2), as compared with 68% in the WMG survey of 2019. There is a higher proportion of positive reporting for the rabi season (87%) and a lower proportion for the kharif-1 season (70%). A higher proportion of seasonal reporting from Patuakhali shows an improvement (84%), compared with only 65% from Satkhira. Compared with 2019, there has been a large improvement in Khulna: in 2019 57% of the WMGs reported improvements in the seasonal water management problems, compared with 75% in 2021. Improvements in Satkhira were relatively the smallest, with 65% of the WMGs reporting reduction in water management problems.

Table 5.2: Change in severity of seasonal water management problems

		Change in seasonal water management score								% of WMGs improving
		-3	-2	-1	0	1	2	3	4	
Season	Rabi	0%	0%	1%	12%	28%	41%	18%	1%	87%
	Kharif-2	0%	0%	1%	17%	34%	34%	11%	2%	82%
	Kharif-1	0%	2%	5%	23%	35%	28%	7%	0%	70%
	Total	0%	1%	2%	17%	32%	34%	12%	1%	79%

Zone	Khulna	0%	0%	3%	22%	34%	32%	8%	0%	75%
	Satkhira	1%	4%	6%	25%	26%	28%	10%	2%	65%
	Patuakhali	0%	0%	1%	8%	32%	40%	17%	1%	91%
	Total	0%	1%	3%	17%	32%	34%	12%	1%	79%

Source: WMG survey 2021

The average WMG water management problem scores are presented in Table 5.3 by season and zone. This shows that there has been a greater improvement in water management (i.e. reduction in the water management problem score) in the rabi season, followed by kharif-2, with the least improvement in kharif-1. Improvements in Satkhira were less than in the other two zones, with only a small improvement in the problem score since 2019. The overall average improvement is 1.35 (i.e. reduction in the problem score system of 1 - 5), compared with 1.06 in the 2019 survey.

Improvements in water management reported by WMGs were confirmed in the Focus Group Discussions (FGDs) held as part of the WMG survey 2021. Out of 23 FGDs covering all 22 polders, only in one FGD (in polder 28/1 in Khulna) the participants reported that there was no significant change in water management. This is also the polder (together with polder 28/2) in which BGP had the least impact in terms of increased cropping intensity and farm income. The 22 other FGDs reported that the BGP's interventions resulted in significant improvements in water management.

Table 5.3: Average WMG seasonal Water Management Problem Score

		2021 WMG survey			2019 survey
		2013-14	2020-21	Change	Now
Season	Rabi	3.66	2.02	1.65	2.45
	Kharif-2	3.44	2.02	1.42	2.34
	Kharif-1	3.65	2.64	1.01	2.79
Zone	Khulna	3.54	2.33	1.21	2.71
	Satkhira	3.32	2.33	0.99	2.29
	Patuakhali	3.74	2.05	1.68	2.33
Total	All WMG	3.58	2.23	1.35	2.53

Score: 1 = very good, 2=good (i.e. no problem), 3=average, 4=bad, 5=very bad. Source: WMG survey 2021

The WMG survey 2021 also gathered information on the type of constraints (waterlogging, flooding, water shortage and salinity) per agricultural season and on the overall severity of water problems (very good, good, average, bad, very bad). Table 5.4 shows the proportion of WMGs reporting the principal water management problem per season and per zone, before BGP and in 2021.

Table 5.4: Principal water management problems as reported by WMGs per season and zone

	Main problem	rabi	kharif-2	kharif-1	Khulna	Satkhira	Patuakhali	All
		Before 2013-14	Waterlogging	0%	87%	79%	54%	55%
Flooding	0%		3%	1%	1%	1%	2%	1%
Water scarcity	86%		6%	0%	31%	30%	31%	31%
Salinity	12%		3%	9%	8%	6%	8%	8%

	Waterlogging	0%	73%	76%	54%	62%	40%	50%
Now	Flooding	0%	20%	1%	1%	1%	18%	7%
2020-21	Water scarcity	89%	1%	0%	32%	24%	29%	30%
	Salinity	5%	1%	4%	3%	1%	4%	3%

Percentage of WMG reporting in each season. The percentages for zones are the average number of WMG reporting for each of three seasons. As some WMG did not report a main problem in all seasons, the totals in each column may not add up 100%. Source: WMG survey 2021

Data on the main type of water-related problem in Table 5.4 shows that, both prior to BGP and in 2021, water scarcity (for irrigation purposes) is, as would be expected, the main problem for farmers in the rabi (boro) season. Waterlogging remains the main problem in kharif-1 (aus) and kharif-2 (aman) seasons. The proportion of WMGs reporting on salinity as a main problem in the rabi season declined. There has also been a decline in the percentage of WMGs reporting waterlogging as their main problem in kharif-1 and kharif-2, whereas flooding became the major problem for 20% of WMGs in kharif-2 - and mainly in Patuakhali. Salinity was the major problem in kharif-1 and kharif-2 for only a small number of WMGs, and this problem has declined.

For the three BGP zones, taking the average for the three agricultural seasons, waterlogging was the major issue for over half of all WMGs in all three zones, with water scarcity the main issue for around 30% of WMGs. An increased number of WMGs in Satkhira report that waterlogging is now their major problem, with fewer reporting water scarcity. In Patuakhali, fewer WMGs say waterlogging is the major problem, but more report flooding. There has been little change in Khulna. Compared to the 2019 WMG survey, more WMGs now report waterlogging the major problem, but fewer report water scarcity problems.

Apart from the principal problems, also other water management problems were reported, which are shown in Table 5.5. In the rabi season salinity was, and still is, the main other problem. But this salinity problem seems to have now largely been eliminated in some polders: 31P in Khulna and 47/4 in Patuakhali, but remains a significant issue in polder 47/3 in Patuakhali. In the Patuakhali zone, water scarcity is still an issue in some polders, and seems to have become more widespread, although possibly this problem is more felt now because more farmers now want to grow irrigated crops.

Table 5.5: Other water management problems

Other problems	Season			Zone			All
	rabi	kharif-2	kharif-1	Khulna	Satkhira	Patuakhali.	
Before	Waterlogging	0%	0%	0%	0%	0%	0%
2013-14	Flooding	0%	2%	7%	4%	1%	2%
	Water scarcity	0%	9%	2%	1%	3%	7%
	Salinity	8%	3%	0%	4%	0%	5%
	Waterlogging	0%	0%	0%	0%	0%	0%
Now	Flooding	0%	2%	6%	3%	2%	2%
2020-21	Water scarcity	0%	14%	1%	1%	3%	12%
	Salinity	4%	1%	0%	2%	1%	1%
	Other	8%	0%	5%	6%	1%	3%

Percentage of WMG reporting. The percentages for zones are the average number reports for each of three seasons. As many WMG did not report other problems in all seasons (but some WMG reported multiple other problems), the totals in each row do not add up 100%.

Source: WMG survey 2021

The FGDs held in the context of the 2021 WMG survey showed that in Khulna BGP had been able to meet between 25% and 100% of the WMGs expectations regarding improved water management infrastructure. In Patuakhali this ranged from 60% to 90%, and in Satkhira from 80% to 85%. The remaining problems include some khals not being excavated and further work needed on some sluice gates and culverts, whereas also significant areas of land remain waterlogged. In some locations proper drainage is impeded by siltation and rising bed levels in the rivers outside the polder. There are also some problems in situations where land levels within a WMG command area vary, so those with high land may want water for irrigation at the same time as those with low land need water to be drained out. In addition, fish ghers can obstruct the drainage of crop land.

Organised coastal communities: outcomes and impact of institutional development[\[edit | edit source\]](#)

The role of communities in improving water management infrastructure[\[edit | edit source\]](#)

[Section D](#) (chapters [14](#) - 20) of this BGP's lessons learnt report focuses on Participatory Water Management and elaborates how BGP organised coastal communities for participating in water management for development. The WMG survey 2019 reviewed the roles of WMGs and WMAs in better water management in the BGP areas. Detailed information on the participation of the communities in water management was collected by this 2019 WMG survey.

According to the 2019 WMG survey, the most widely reported improvement in water management infrastructure was re-excavation and de-silting of khals. A significant percentage of WMGs (30-50%) also reported khal cleaning, sluice repairs, new or repaired culverts, better sluice operation and repaired embankments (Table 5.6). Digging out the responsible organisations behind the improvements illustrates the roles of the WMGs in improved water management.

Table 5.6: Organisations responsible for infrastructure development

		Khal excavation	Khal cleaning	Culvert	Sluice works	Sluice operation	Embankment
	Main responsible organisation						
1	WMG with own resources	4.5%	60.6%	6.9%	7.0%	66.4%	10.8%
2	BWDB-BGP with WMG support	73.1%	0.0%	5.6%	36.8%	15.0%	12.2%
3	BWDB-BGP without WMG support	11.9%	12.6%	16.7%	40.4%	1.9%	56.8%
4	BWDB with no BGP involvement	1.4%	0.0%	2.8%	1.8%	0.0%	2.7%
5	BADC	3.7%	0.0%	11.1%	3.5%	0.0%	0.0%
6	Local government	3.4%	5.5%	54.2%	8.8%	0.0%	14.9%

7	Farmers by themselves	1.7%	21.3%	0.0%	1.8%	16.8%	2.7%
8	Other (LGED, ADB, NGO)	0.3%	0.0%	2.8%	0.0%	0.0%	0.0%
		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: WMG survey 2019

Most of these works and tasks were undertaken by BWDB-BGP with WMG support, with the WMGs themselves mainly being responsible for khal cleaning and better sluice operation. Khal re-excavation (including de-silting) was the main type of work reported and was largely done using BGP resources, usually with support from the WMG. Khal cleaning (removal of weeds, cross-dams etc) was mostly done by the WMGs with their own resources (i.e. voluntary labour) and/or by groups of farmers. The same is true for the improved operation of sluices. This is an outcome of BGP's work in establishing and strengthening the WMGs. The construction and repair of culverts was primarily done by Local Government Institutions (i.e. Union Parishads), as culverts usually cross roads which are a government responsibility. WMGs tend to communicate with these LGIs to inform them on the need to construct or repair such works; WMGs subsequently help to implement the works, with partial-funding of the LGIs. Where BGP funded work on culverts, this was usually channelled via Union Parishads and with WMGs having an active role in identifying the need for such works as well as in the implementation. The same is also true for other agencies such as BADC, LGED (responsible for water management schemes of up to 1,000 ha), ADB (may be funding LGED schemes) and NGOs occasionally funding water infrastructure. Qualitative interviews also mentioned DANIDA in this context.

Water management by communities [\[edit\]](#) | [edit source](#)

Having control over the operation of sluices is significantly related to improved water management as well as to the institutional development of the WMGs. The 2021 WMG survey found that there has been a total change, with all WMGs reporting that the sluices that drain their land are controlled by their WMG, another WMG or by a group of WMGs (Table 5.7). The 2019 WMG survey results reported a much lower level of sluice control by WMGs, whereafter BGP staff paid special attention to supporting WMGs in taking control of sluices and most 2021 FGDs confirmed that most sluices were now under the control of WMGs or catchment committees involving a number of WMGs. Still, one out of 10 FGDs in Patuakhali, three out of 11 in Khulna and both of the two FGDs in Satkhira reported that sluices were not fully under the control of WMGs. Furthermore, even if sluice gates are under the control of WMGs, another five FGDs in Khulna said that at least some of the drainage khals were under the control of others, including where khals had been leased out to influential individuals, usually for fish production.

In these cases, WMGs are not likely to control the sluices at all times according to the community needs. There are some conflicts. The khals are leased out by the Upazila administration, not by the BWDB, and there is a lack of coordination among the Upazila administration and BWDB. In some cases, WMGs solved the problem (not leasing out the khal anymore) by submitting an application to the Upazila administration to undo the leasing-out. Some FGDs expressed their fear that WMGs may lose control of water management infrastructure in the future.

Table 5.7: Control of sluices

Sluice control by:	Khulna	Satkhira	Patuakhali	Total
WMG interviewed	47%	44%	86%	60%
Another WMG	20%	36%	11%	19%

Group of WMGs	33%	11%	3%	21%
Total	100%	100%	100%	100%

Percentage of WMGs reporting (n=506) Source: WMG survey 2021

Membership in community organizations[[edit](#) | [edit source](#)]

Coastal communities are actively engaged in community organizations including the water management organization (Table 5.8). According to endline survey 2020, overall, two-thirds (67%) of households reported being members of at least one type of community institution. BGP has a strong focus on community participation in water management and has supported WMGs over the entire area in which it operates. However, membership of a WMG is voluntary and, just over half (54%) of sample households were WMG members. ^[Notes 2] This is more than any other type of community institution. The next most frequently reported type of community institution was NGO groups, with membership being reported by almost one third (32%) of households. NGO group are largely concerned with micro-finance services and other economic and social development schemes. Farmer group membership is reported by 17% of households. These groups may be set up by DAE as a channel for agricultural extension services. Other groups were reported by 7% of households and may be linked to other government agencies for the delivery of their services. Local samities tend to be informal savings and loan associations.

Table 5.8: Membership of community organizations

Zone	Community institutions	Type of community organisation						
		WMG	Farmer Group	NGO group	Other group	Cooperative	Local samity	Other organisation
Khulna	68%	55%	13%	28%	7%	11%	11%	1%
Satkhira	72%	66%	13%	35%	9%	5%	3%	1%
Patuakhali	64%	45%	24%	33%	5%	7%	7%	1%
WMG membership								
Member	100%	100%	30%	38%	9%	11%	9%	1%
Non-member	29%	0%	1%	24%	4%	5%	6%	1%
Land ownership								
landless	64%	52%	10%	33%	8%	7%	5%	0%
marginal	68%	53%	15%	36%	7%	7%	7%	1%
small	67%	54%	21%	30%	6%	10%	10%	1%
medium	71%	64%	24%	18%	6%	10%	11%	3%
large	69%	60%	23%	12%	0%	6%	6%	2%
Total	67%	54%	17%	32%	7%	8%	8%	1%

Source: End-line survey 2020 (n = 3156 households)

More households in Satkhira report being members of WMGs than in the other two zones. Although a slightly higher proportion of medium and large landowners are WMG members, membership includes at least 50% of the households in all landowning categories. It is worth noting that WMG members are more likely to also be member of all types of groups - underlining that these households are more engaged in agriculture and/or more motivated to join community organisations. WMG membership has more than doubled since the 2017 baseline survey, which recorded 21% of households as WMG members. It is also now more evenly distributed - in 2017 there were no, or almost no, WMG members in three of the seven polders covered.

Training and adaptation of new technologies [\[edit\]](#) | [edit source](#)

The following training was provided to community members in the BGP areas:

- BGP FFS run by DAE covering crop production, homestead vegetables and family nutrition
- FFS run by the Blue Gold TA team covering homestead vegetables, poultry, livestock, pond aquaculture, market orientation and family nutrition
- Other trainings from BGP, which covered the maintenance of water infrastructures, community organization development, partnership with LGIs and other line departments, gender, etc.
- BGP Farmer Field Days showing the results of successful demonstrations and pilots
- Other (non-BGP) training programmes of the government - primarily provided by DAE, but other departments were also involved
- NGO training programmes.

Data from the household survey 2021 show the proportion of households where members attended each of these different training events (Table 5.9). Most (63%) of sample households reported that members of their households attended Farmer Field Schools (FFS) organised under BGP by DAE and by the Technical Assistance (TA) Team.

Table 5.9: Household members attending training

Land ownership	Household member attended: (percent of all households)					
	FFS-DAE	FFS-TA	Other BGP	Field day	Govt	NGO
landless	47%	52%	22%	49%	14%	27%
marginal	64%	62%	39%	63%	21%	30%
Small	67%	70%	43%	69%	29%	35%
medium	79%	71%	54%	76%	35%	38%
Large	73%	69%	50%	68%	39%	38%
Total	63%	63%	38%	63%	23%	32%
Khulna	62%	61%	36%	74%	25%	43%
Satkhira	53%	57%	29%	60%	16%	33%
Patuakhali	69%	71%	46%	53%	25%	16%

** % of all households Source: HH survey 2021*

A same proportion of households had at least one member attending BGP Farmer Field Days, while over one third (38%) attended other BGP training. ^[Notes 3] Relatively more BGP FFS and other training took place in Patuakhali and least in Satkhira; but fewer households reported attending Farmer Field Days in Patuakhali. Compared with BGP training, training from other government programmes reached fewer households (23%), whereas NGO training reached 32%. Households owning less land are less likely to have received training from BGP, government and NGOs - possibly because they are less engaged in agriculture.

Table 5.10 shows the adoption of training as found by the household survey of 2021. This table shows that, overall, between 77% and 93% of households attending each type of training say they have adopted at least something from what they learned. This may over-state adoption rates as people attending training tend to exaggerate their adoption rates. Nevertheless, training seems to be successful. Adoption rates for BGP training appear a little lower in Satkhira than in the other two zones. More WMG members than non-members report adoption. There is a slightly lower adoption rate reported by landless households (and, to a lesser extent, by marginal households), suggesting

that they may find the content of training less useful, which may be linked to their less agricultural livelihood strategies, their more limited access to land and other resources, and lower capacity to take risks with new ideas.

Table 5.10: Adoption of ideas from training

Zone	Percent of households attending each type of training who report some adoption					
	DAE FFS	TA FFS	Other BG	Field day	Other govt	NGO
Khulna	90%	93%	86%	88%	78%	78%
Satkhira	81%	90%	84%	77%	88%	82%
Patuakhali	95%	94%	90%	91%	82%	72%
	WMG					
member	90%	93%	89%	87%	83%	78%
non-member	84%	92%	64%	81%	75%	75%
	Land ownership					
landless	76%	87%	78%	73%	57%	70%
marginal	87%	91%	86%	85%	74%	76%
small	97%	95%	91%	90%	88%	82%
medium	95%	97%	94%	92%	96%	77%
large	95%	100%	100%	100%	100%	75%
Total	89%	93%	88%	87%	82%	77%

Source: HH survey 2021

Informal interviews provided more detailed insights. These include:

(a) Khulna[\[edit | edit source\]](#)

New technologies that were adopted include: (i) crops: new paddy varieties, new types of vegetables, mustard after aman (some areas), watermelon, line sowing and bed sowing of vegetables; (ii) fish: fish after boro, new types of fish (koi, tilapia, pabda), rice-fish, mixed species fish culture; (iii) livestock/poultry: vaccination, cleaning poultry and cattle sheds, balanced feed, cow rearing and fattening, disease control, Napier grass, hajol for brooding eggs; (iv) homestead vegetables: vegetable beds, homestead and commercial fruit, tomatoes.

(b) Satkhira[\[edit | edit source\]](#)

New technologies that were adopted include: (i) crops - new types of vegetables including hybrids, new paddy varieties; (ii) fish: - mixed shrimp fish and crab, crabs in cages; (iii) livestock: - new breeds of cattle and chicken, beef fattening, rearing male goats.

(c) Patuakhali[\[edit | edit source\]](#)

New technologies that were adopted include: (i) crops: - new paddy and mung HYVs, boro paddy, hybrid watermelon, sunflower, maize, potato; (ii) fish: digital fish marketing and high quality fish seed - but not many other new things for fish; (iii) livestock: small scale commercial poultry, knowledge on disease; (iv) homestead vegetables: high quality vegetable seeds, new vegetable varieties, compost and bed system for vegetables, correct use of fertiliser and pesticides.

Overall, it seems that things that appear to be most readily adopted include new types of vegetables

and new varieties of vegetables and paddy (and mung bean in Patuakhali). However, there are exceptions - in some places, tomatoes and BR52 paddy were rejected. New breeds of poultry and cattle were also said to be popular, as was cow rearing and beef fattening. Small commercial poultry units are another innovation that is spreading, although without direct support from BGP.

Some new ideas were accepted in some areas but not in others. This includes raised beds for vegetable production and hajol for brooding of hatching eggs. The rabi crops of maize, sunflower and potato were said to be adopted in some places and not in others - although data from the questionnaires shows these crops, as well as mustard, are rarely grown. There were no reports of dragon fruit and mushrooms being adopted.

BGP Farmer Field Schools (by DAE and the TA team) have played a key role providing training and knowledge on new technologies. But respondents also said that they were in contact with staff of DAE, DLS, DoF and NGOs, as well as input dealers and other farmers. Although FFS provide detailed information on a range of topics, it is to be expected that farmers need follow-up advice which is provided by government staff and others who are permanently available. Farmers may well have been first introduced to these staff at FFS.

Barriers to adoption of new technologies include lack of suitable land or ponds. Some new crops or enterprises need inputs that may not be available. Pests and diseases are said to hinder adoption of new technologies in crops, vegetables, fish, livestock and poultry. In a number of instances, respondents said that, even after training, they still lacked the required knowledge. The poorest households with little land and no ponds may find that many crop and fishery technologies are not relevant and they may also lack the required capital and capacity to take risks. Lack of time was cited as an adoption barrier by some respondents, while others said modern machinery was needed to ease labour constraints.

Notes[[edit](#) | [edit source](#)]

1. [↑](#) Section B Introduction and Summary provides an overview of the studies conducted through the Blue Gold Program, and the studies and reports which were the main sources of information for Section B.
2. [↑](#) The 2019 WMG survey covered virtually the entire BGP area and recorded that 61% of households were WMG members.
3. [↑](#) 13% of sample households were not WMG members, and so are unlikely to have attended BG training events. This means the percentage of WMG members being reached by BG training will be higher (i.e. 72% attend FFS).

See more[[edit](#) | [edit source](#)]

Previous chapter:

[Chapter 04: Policy framework, history of interventions and project definition](#)

[Blue Gold Lessons Learnt Wiki Section B: Development Outcomes](#)

Next chapter:

[Chapter 06: Outcomes and Impact from Agricultural Development](#)

<p>Chapter 05: Outcomes and Impact from Participatory Water Management</p>	<p><u>Chapter 06: Outcomes and Impact from Agricultural Development</u></p>	<p><u>Chapter 07: Inclusive Development Approach: Outcomes and Impacts from Homestead Based Production</u></p>
<p>1. Increased resilience against climatic variability: outcomes and impact of rehabilitation work on water management</p> <p>2. Organised coastal communities: outcomes and impact of institutional development</p>	<p>1. Changes in crop agricultural production</p> <p>2. Change in cropping pattern and crop types</p> <p>3. Increase in Cropping intensity</p> <p>4. Increase in Crop yields</p> <p>5. Increase in employment through agricultural development</p> <p>6. Economic return of improved agriculture production</p>	<p>1. Homestead vegetables production</p> <p>2. Homestead fruit production</p> <p>3. Commercial fruit production</p> <p>4. Poultry rearing</p> <p>5. Goats</p> <p>6. Cattle and buffalo</p> <p>7. Pond fisheries</p> <p>8. Feedback from FGDs on homestead production</p> <p>9. Problems of agricultural and homestead production</p>
<p><u>Chapter 08: The Outcomes and Impact on the Livelihoods of Women</u></p>	<p><u>Chapter 09: The Overall Outcomes and Impacts on the Livelihoods of Coastal Communities in Blue Gold Polders</u></p>	
<p>1. Women's role in economic activities</p> <p>2. Main Occupation of women</p> <p>3. Equality in food consumption</p> <p>4. Decision making regarding assets and land</p> <p>5. Mobility and participation</p> <p>6. Overall empowerment of women</p>	<p>1. General features of coastal households</p> <p>2. Land ownership and land tenure</p> <p>3. Improvement in household income and asset</p> <p>4. Enterprise development</p> <p>5. Improvements in Living Standards</p>	
<p>Blue Gold Wiki</p>		

Executive summary: A Call for Action

<u>Section A: Background and context</u>	<u>Section B: Development Outcomes</u>	<u>Section C: Water Infrastructure</u>
<p>Summary</p> <ul style="list-style-type: none"> • Chapter 01: Overview, Purpose and Structure of Report • Chapter 02: Institutional Setting • Chapter 03: Social, Physical and Environmental Context • Chapter 04: Policy framework, history of interventions and project definition 	<p>Summary and Introduction</p> <ul style="list-style-type: none"> • Chapter 05: Outcomes and Impact from Participatory Water Management • Chapter 06: Outcomes and Impact from Agricultural Development • Chapter 07: Inclusive Development Approach: Outcomes and Impacts from Homestead Based Production • Chapter 08: The Outcomes and Impact on the Livelihoods of Women • Chapter 09: The Overall Outcomes and Impacts on the Livelihoods of Coastal Communities in Blue Gold Polders 	<p>Summary</p> <ul style="list-style-type: none"> • Chapter 10: Coastal Infrastructure • Chapter 11: Investments for Polder Safety and Water Management • Chapter 12: Survey, Design and Procurement • Chapter 13: Construction: Progress, Modalities and Lessons Learnt
<u>Section D: BGP Interventions: Participatory Water Management</u>	<u>Section E: Agricultural Development</u>	<u>Section F: Responsible Development: Inclusion and Sustainability</u>
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<u>Section G: Project Management</u>	<u>Section H: Innovation Fund</u>	<u>Files and others</u>
<p>Summary</p> <ul style="list-style-type: none"> • Chapter 28: Project Management Arrangements • Chapter 29: Technical Assistance: Context, Scope, Contractual Arrangements and External Service Contracts • Chapter 30: Evolution of TA Organisational Arrangements • Chapter 31: Capacity Building • Chapter 32: Agricultural Extension Methods and Communication • Chapter 33: Horizontal Learning • Chapter 34: Monitoring and evaluation • Chapter 35: Management Information System • Chapter 36: Environmental Due Diligence 	<p>Summary</p> <ul style="list-style-type: none"> • Chapter 37: Purpose, fund evolution and management • Chapter 38: Overview of BGIF Projects • Chapter 39: BGIF Lessons Learnt 	<ul style="list-style-type: none"> • File Library • Glossary and acronyms • Frequently Asked Questions

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

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

Blue Gold Program

an environment of policies, regulations, norms, institutions, and overall economic governance which allows market systems to function and perform well

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

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

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

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

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

The first part of the kharif season (mid-March to mid-June). Rainfall is variable and temperatures are high. The main crops are aus, summer vegetables and pulses. Broadcast aman and jute are planted.

The second part of the kharif season (mid-June to mid-October) characterised by heavy rain and floods. Aman is the major crop grown in this season. Jute is harvested.

Focus Group Discussions - in which a group of participants from similar backgrounds or experiences gather to discuss a specific topic of interest, guided by a group facilitator who introduces the topics for discussion and helps the group to participate in a lively and natural discussion amongst themselves

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

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

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

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

a rice crop planted in March/April under dryland conditions. Matures during pre-monsoonal showers and is harvested in June/July. Insensitive to daylength.

a rice crop usually planted in March/April under dryland conditions, but in areas liable to deep flooding. Also known as deepwater rice. Harvested from October to December. All varieties are highly sensitive to daylength.

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

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

A process by which the local stakeholders are directly and actively involved in identification, planning, design, implementation, operation & maintenance and evaluation of a water management project.

The strapline of the Blue Gold Program for a transformative approach to smallholder agriculture which combines water infrastructure and locally-led initiatives for better water management, using modern agricultural technology and a business-orientation.

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

drainage channel or canal

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

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

Bangladesh Agricultural Development Corporation

Local Government Engineering Department

Non-Governmental Organisation

Local Government Institutions - Union Parishad, Upazila Parishad etc

hectare

Danish International Development Agency

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

association or society

association or society

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

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Technical Assistance

Within BGP this refers to enhancing insights of especially FFS participants in how markets work, how to collect market information, facilitating linkages with market actors and increasing negotiation capacities

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

Refers to socially constructed and therefore learned roles and responsibilities ascribed to men and women, girls and boys based on their sex. Gender is not the same as sex, the physical and biological attributes that make someone female, male or both. Gender comprises the expectations, roles, attitudes and behaviours of women and men. Gender roles change over time and vary within and between cultures, societies and classes.

Farmer Field Day - Exchange events organized at the end of each Farmer Field School to share the FFS learnings with other community members

Household

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

A hajol is an unfired earthenware nesting vessel for egg hatching, with small receptacles for water and seed to provide the immediate needs. The hajol saves the hen effort and time for searching food, thus ensuring proper hatching in less time, thereby reducing egg waste.

Department of Livestock Services, a government department under the Ministry of Fisheries and Livestock responsible for the livestock industry in Bangladesh

Department of Fisheries, a government department under the Ministry of Fisheries and Livestock

responsible for regulating the fisheries industry in Bangladesh

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Variants

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Blue Gold Program Wiki

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

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