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## **Revitalizing the Ganges Coastal Zone: Turning Science into Policy and Practices**

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# Multiple actors, conflicting roles and perverse incentives: The case of poor operation and maintenance of coastal polders in Bangladesh

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## Abstract

The government of Bangladesh invested in large scale coastal embankment projects in the 1960s and 1970s. The polders that were developed played an important role in protecting coastal communities from water-related disasters and in increasing agricultural productivity. However, over time maintenance of these infrastructures became a major concern leading to the creation of a national policy that requires local communities to participate in their operation and maintenance.

In this paper we are interested in understanding what determines the poor state of affairs of the polders. One way to examine this will be through the lens of operation and maintenance (O&M) and the practical strategies adopted by different actors for O&M. This paper consequently discusses the roles and responsibilities of these multiples actors in operation and maintenance of water infrastructure in the coastal zone of Bangladesh. The analysis is based on primary data collected in 2012 and 2013 in nine study sites from the coastal zone. Qualitative data was collected in these nine sites through focus group discussions and key information interviews.

An in-depth analysis of how operation and maintenance activities actually take place reveals that the multiplicity of actors involved in operation creates overlaps and conflicts, resulting in the strategic deferral of maintenance by different actors and eventual disrepair and degradation of the infrastructures. Ultimately, the unclear demarcation of roles and responsibilities for these actors curtails the short and long term sustainability of water management in the polder area. The paper recommends revising the legal water management framework, improving coordination and giving a formal role to local government institutions.

**Keywords:** water management, community-based natural resources management, decentralization, actors, power

## 1. Introduction

In the coastal areas of Bangladesh inundation, salinity intrusion and severe flooding are frequent occurrences. To overcome these challenges, the Bangladesh government has invested in coastal zone management through construction and rehabilitation of polders. A polder is a low-lying tract of land enclosed by embankments that create an independent hydrological entity. Gates and sluices ensure both irrigation and drainage of the area. In the 1960s the former Government of East Pakistan through its Water and Power Development Board (WAPDA), now Bangladesh Water Development Board (BWDB), constructed polders to protect agricultural crops, land and human settlements. Efforts intensified in 1967 with the Coastal Embankment Project, which was funded with USAID assistance (Islam 2005; Chowdhury and Rasul 2011). In total 123 polders were built along the coastal zone. Much later, in late 1990s and early 2000s, the Local Government Engineering Department (LGED) of Bangladesh also constructed polders, but on a smaller scale, which were therefore called sub-projects.

Benefits from the polderization of the coastal zone were short lived. The structures delinked the wetlands from the rivers and caused drainage problems and waterlogging. This further added to the natural processes of river erosion and siltation in the very active delta, resulting in the need for continuous rounds of rehabilitation to preserve the infrastructures (embankments, gates and canals). In many developing countries,

with Bangladesh no exception, large-scale public irrigation systems are often characterized by “inefficient, unreliable, and inequitable water service; chronic underinvestment in maintenance; rapid deterioration of infrastructure; and reduction in service areas” (Araral 2005: 113).

In conjunction with a shift in donor discourses, the continuous challenge of operation and maintenance of water infrastructure induced regular shifts in water management governance in the coastal zone and the introduction of new actors. What had been a local and indigenous system prior to the 1960s became a top-down, engineering-driven system in the 1960s and 1970s before returning to a decentralized and depoliticized community water management system in the 2000s (Dewan et al. 2015).

In this paper we are interested in understanding what determines the poor state of affairs in the polders. One way to examine this issue is through the lens of Operation and Maintenance (O&M) and the practical strategies adopted by different actors toward O&M. The concepts of O&M are often considered together although they are quite different: whereas operation has short term benefits and involves daily acts in this context, maintenance is less immediate and its effects are only perceived in the medium to long term. Apart from their timeframes, the incentives for the different actors to undertake O&M and their funding sources also differ. Consequently, we consider separately activities related to O&M and analyze how different stakeholders contribute to these two sets of activities.

The article is organized as follows. Section 2 discusses the methods used for data collection and analysis. The third section then provides context on water management in Bangladesh and the main actors involved in the sector. Section 4 focuses on the results with an emphasis on the roles of actors in operation and section 5 focuses on the actors involved in maintenance. Finally section 6 concludes the analysis and provides policy recommendations.

## 2. Methods

This analysis is based on primary data collected in 2012 and 2013 in the coastal zone of Bangladesh. Fieldwork was conducted at nine study sites: five large polders built by BWDB and four sub-projects (less than 1000 hectares) under the supervision of LGED. These nine locations were purposely selected from three different agro-ecological zones in order to capture differences in environmental constraints (e.g. salinity and waterlogging) and institutional backgrounds (small scale vs. large scale; project coverage). The location of the study area is given in Figure 1. Table 1 summarizes the agro-ecological and institutional features of these study sites.

Qualitative data were collected in these nine sites through 57 Focus Group Discussions (FGDs) and 92 Key Informant Interviews (KIIs). Data collected was representative of different contexts in terms of distance from the main rivers and sluice gates, level of siltation of the surrounding canals and concentration of various types of cropping systems. The KIIs were held with different stakeholders: farmers, women-headed households, Labor Contracting Society group members, gatemen, *Union Parishad* members, Water Management Organization (WMO) members, and BWDB and LGED officials. Apart from the qualitative primary data, secondary data such as government and donors reports and statistics were also used to support our analysis.



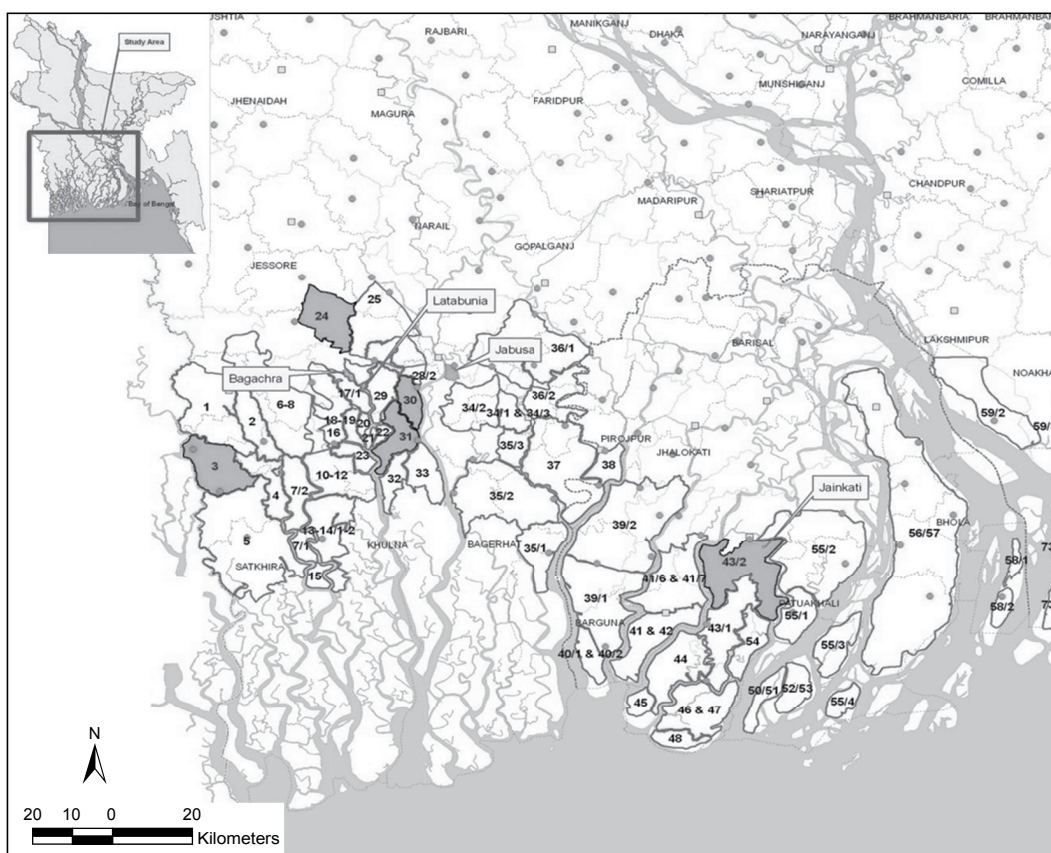


Fig. 1. Map of the study area, coastal zone of Bangladesh.

Source: Institute of Water Modelling

Table 1. Main characteristics of the study sites

Study site	Area (sq. km)	Approximate population (2011)	Number of sluice gates	Salinity levels	Agency	Project coverage for water management
Polder 3	194.3	39,584	32	Very high	BWDB	None
Polder 24G	258.56	61,867	8	Medium to low	BWDB	KJDRP
Polder 31	148.31	32,576	67	High	BWDB	4 <sup>th</sup> Fisheries
Polder 30	72.09	36,017	28	Medium	BWDB	IPSWAM
Polder 43-2F	56.22	28,485	11	Very low	BWDB	IPSWAM
Latabunia	2.0	446	1	Medium	LGED	SSWRDP
Jabusha	4.11	6195	5	Low to medium	LGED	SSWRDP
Jainkati	1.0	325	2	Very low	LGED	SSWRDP
Bagarchra	3.5	1299	2	Medium to high	LGED	SSWRDP

### 3. Water management of Bangladesh: a multiple actor framework

#### 3.1 Decentralization and formalization of water management

In parallel with and resulting from the physical, political and economic changes of the coastal zone, institutions involved in water management have witnessed several evolutions. The introduction of new institutions follows two historical trends: decentralization and formalization. In Bangladesh decentralization

has largely been a political tool employed by ruling parties (Islam and Fujita 2012). Political decentralization can be defined as the transfer of authority to a sub-national body. Political decentralization aims to give citizens, or more often, their elected representatives, more power in public decision making. In rural Bangladesh there are three local government tiers: *Zila Parishad* at the district level, *Upazila Parishad* at the sub-district level and *Union Parishad* for groups of villages. In spite of decentralization, local governments in Bangladesh are still largely dependent on central governance. For example, the central government can legally dissolve a local authority that is not able to meet its objectives (due to inefficiency, power abuse, financial bankruptcy, etc.) (Habibullah 1996). Therefore, the predominant sentiment is that Bangladesh's local government institutions were created to spread the control of the central state to remote locations, rather than for reasons of empowerment. In that respect, the lowest tier of rural administration, *Union Parishads*, are largely dependent on *Upazila Parishads* and thus play only a limited role in rural development programs (Islam and Fujita 2009).

Decentralization of Bangladesh's water management was initiated in 1999 with the formulation of the Bangladesh National Water Policy (GoB 1999) and then operationalized in 2001 with the Guidelines for Participatory Water Management (GoB 2001). These guidelines clearly state that communities are the main stakeholders. The National Water Policy of 1999 recognized for the first time the role of water in poverty alleviation and introduced inclusive water management (Quassem 2001). At the same time, these policies argued for a formalization of the community institutions involved in water management and *de facto* weakened existing formal and informal organizations. The guidelines opened participation in water management to a large range of actors, but also created confusion on the respective roles of each actor. It is also worth mentioning that despite the National Water Policy's focus on participation, the different steps defined in the Guidelines for Participatory Water Management gave more importance to communities for consultation rather than implementation and did not define effective mechanisms for transferring the decision-making responsibilities (Dewan 2012, Dewan et al. 2015).

### *3.2 Defining the actors: top-down scale, formalization and power*

Actors are defined here as individuals or group of individuals actively involved in water management who influence water access and water control based on their degree of power. Actors can be formal or informal and they are classified in this paper on a scale of formal and informal institutions<sup>11</sup>. The definition of power used in this paper is drawn from Lukes (2005); power manifests itself by shaping the values, norms and preferences of a group. It is close to the form of power illustrated by Foucault (1975) who argues that power is not the apanage of a central state, but rather is consolidated in the daily enforcement of social and political practices. Therefore in this paper we are interested to assessing power in the Foucault sense, where institutions and power are closely interrelated.

Bangladesh Water Development Board (BWDB) is the oldest actor in water management in coastal zone, and a key formal one. BWDB can be considered a governmental implementing agency in terms of water management. It started its operations in 1959 as the water wing of the erstwhile East Pakistan WAPDA. BWDB has held the responsibility of executing flood control, drainage and irrigation projects to boost productivity in agriculture and fisheries through major investments in the water sector supported by the Ministry of Water Resources and international donors. It was and still is predominately an engineering, construction-oriented agency, characterized by a centralized structure that was suited to the type of large-scale investments implemented in the 1960s and 1970s (Chadwick and Datta 2003). As per the National Water Policy, BWDB is responsible for water management in polders larger than 1000 hectares. BWDB implemented the Integrated Planning for Sustainable Water Management (IPSWAM) project from 2003 to 2011 and now leads the Blue Gold project funded by the Dutch Embassy.

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<sup>11</sup> Institutions in this paper are referred to by the "rules of the game" (North 1990). We recognize that the terms formal (i.e., modern, bureaucratic) and informal (i.e., social and traditional) may sometimes be misleading; indeed traditional institutions can also be formalized though not necessarily in the bureaucratic forms that are considered here (Cleverly 2001).

Local Government and Engineering Department (LGED) entered into the water management arena in the 1980s. LGED is also an implementing agency in terms of water management but pertains to the Ministry of Local Government Rural Development and Cooperatives. LGED formalized its role in the water sector through the Small-Scale Water Resources Development Sector Project (SSWRDSP), which began in 1995. Through this project, LGED has provided flood control, drainage and irrigation infrastructures to sub-project areas of less than 1000 hectares. Their approach relies heavily on local stakeholder initiative to identify interventions and support engineering design (De Silva 2012).

As previously mentioned, *Union Parishads* are the lowest tier of elected local government institutions. In that respect they are a formal actor and stand at an intermediate level between the government and the communities. *Union Parishads* are under the supervision of the Ministry of Local Government. They are comprised of 12 members: nine members from nine wards of the union and three women members, one each from three wards. All members are elected through direct universal adult suffrage (Mujeri and Singh 1997). As defined by the Guidelines for Participatory Water Management (GoB 2001) *Union Parishads* were supposed to be 'advisors' to the Water Management Organizations. In addition, in command areas of less than 1000 hectares, they were to gradually receive ownership of the infrastructures. However, facing a lack of legal mechanisms and resources to take on these roles, the *Union Parishads* are only informally involved in water management. Their limited role is not only contrary to the intent of the policy but also to the wishes of most community members (Dewan et al 2014).

As part of the process of decentralization in the water sector and following the Guidelines for Participatory Water Management (GoB 2001), Water Management Organizations (WMOs) were also created (de Silva 2012). These WMOs are intended to function as the institutional mechanism by which local stakeholders participate in water management. In areas of more than 1000 hectares, WMOs should ideally be comprised of Water Management Groups (WMGs) and managed by BWDB; in areas of less than 1000 hectares they should be comprised of Water Management Cooperative Associations (WMCAs) and under LGED management. They are intended to hold decision-making power at all stages of local water resource management and are responsible for planning, implementing, operating and maintaining local water schemes (GoB 2001). Previous research highlighted how these organizations have failed to enhance the participation of the most vulnerable community members (notably women and the landless) and have resulted in elite capture (Dewan et al 2014). Due to the process of decentralization of the water sector in Bangladesh, LGED follows a one-tier system, whereas BWDB follows a three-tier model: associations (WMA) welcome representatives from the different WMGs, with federations (WMF) at the upper-most level. In spite of their institutional differences, all these WMOs are registered as cooperatives<sup>12</sup> and are therefore formal institutions.

Apart from the above-mentioned formal actors, there are many informal actors, individuals or groups involved in water management in Bangladesh. Gate committees, *gher* committees and *beel* committees are some examples of informal actors. Some of these actors are related to formal institutions whereas some are not. It is typical however to find individuals within these informal groups who have a formal role in other institutions.

Figure 2 locates the different actors in a two-dimensional space. The first dimension is related to the level of decentralization; the actors are located in a top-down scale. The second dimension is the formal recognition of the actors, for which a formal-informal scale is applied. As noted in the following sections, the power of these actors is context-specific, determined at a small scale and is not consistently aligned with their location in this framework.

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<sup>12</sup> Since February 2014 and as per the Water Management Rules (GoB 2014), Water Management Organizations initiated by BWDB or its projects are not required to register with the cooperative department but must register with the local Water Management Department.

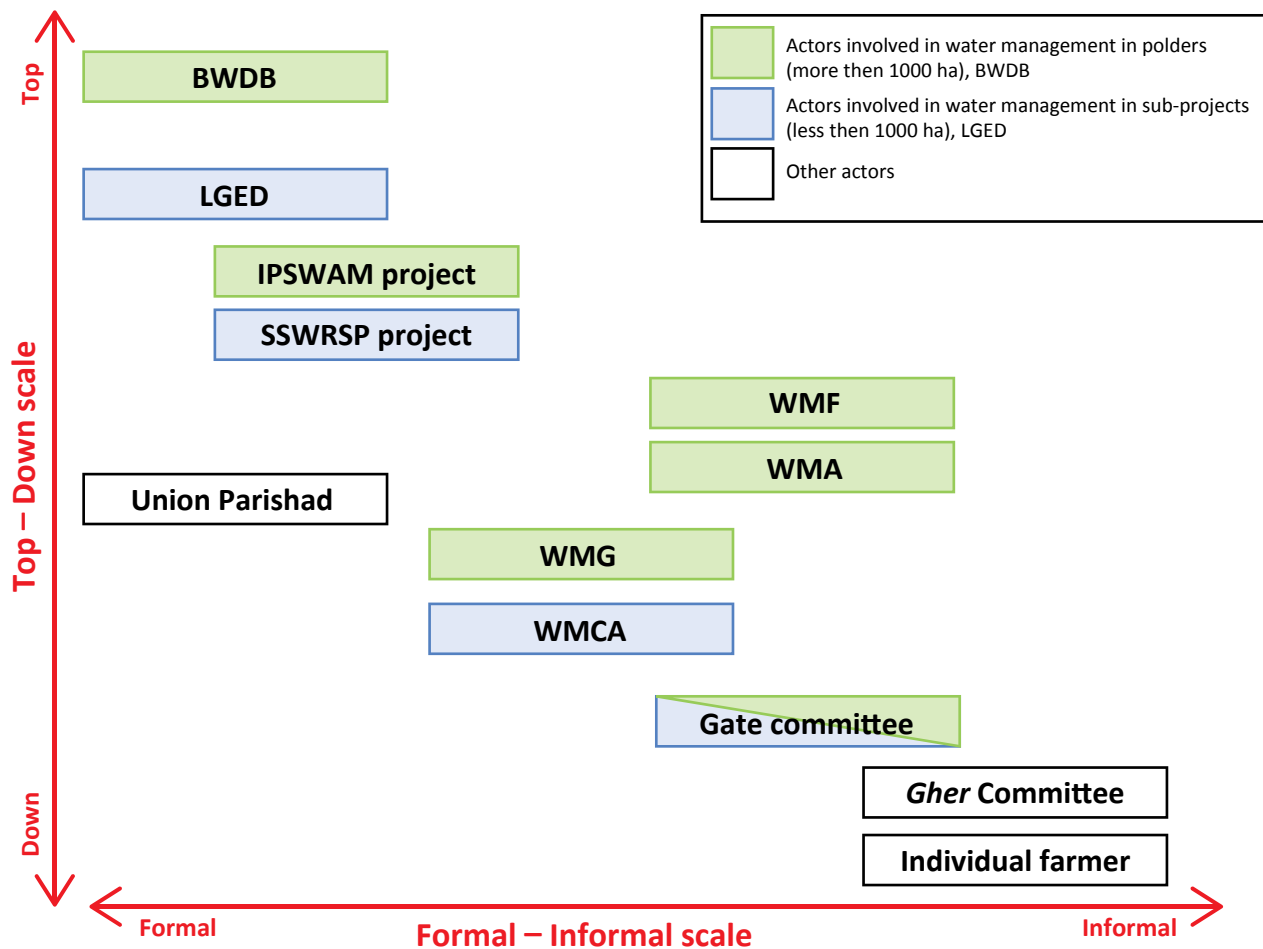


Fig. 2. Actors involved in water management in the coastal zone of Bangladesh.

#### 4. Actors in operations: from decentralization to informal management

##### 4.1 Centralized and formal operations: the former khalashi system

Initially, after the creation of polders in the 1960s, BWDB employed government-funded gatemen called *khalashis* to operate the gates based on local requests. At this time the government did not expect communities to be involved in the day-to-day management of water infrastructures. The *khalashis* system worked efficiently, as there was someone responsible for the operation of the gates and the communities did not hold financial responsibilities for O&M.

*“There used to be khalashis in the BWDB sluice gates but not anymore. They were paid by the East Pakistan government and the system was quite efficient.”*

*-Polder 43/2F, KII, 10-04-2012*

However, the 1990s saw a push for decentralization and people’s participation, which led to a structural adjustment process requiring BWDB to downscale its activities and payroll, and ultimately to change its approach to water management (Dewan et al 2015). As a result, the system of state funded ‘gatekeepers’ was abolished and the responsibility was placed with communities.

##### 4.2 Formal water management groups, the principal actors in operation

According to the Guidelines for Participatory Water Management (GoB 2001), WMOs are responsible for

internal water management; in sub-projects WMCAs are singularly responsible, while in BWDB polder the responsibility is shared between the different levels (WMG, WMA, WMF). In reality, this means that the WMOs are responsible for operation of the gates as well as for preliminary discussions required to reach a consensus on operation. This situation is indeed happening in some locations. For example, in polder 43/2F a farmer described the WMG's coordinating role for reaching consensus on operation.

*"We open the sluice gate at the time of preparing seed beds in the month of Chaitro (March-April). Usually the group's members sit together, discuss among themselves and make decisions on opening the gate. The beneficiaries residing beside the canals attend the meetings. Sometimes people are divided in their opinions regarding opening of the gate. But with discussion, we are able to reach a consensus."*

*-Polder 43-2F, FGD, 10-04-2012*

Similarly in sub-projects, LGED has given responsibility for opening and closing the gates to the WMCAs and there is no strong monitoring of these activities by local-level LGED officials. Through the inclusion of different stakeholders in the WMCA, this system can be effective in balancing power in the decision-making process.

*"WMCA takes the decision regarding when to open and close the sluice gates. There are influential people in the WMCA. But nevertheless at least to some extent the WMCA has created a situation of balance of power to control water management of rivers and canals. Large and influential farmers cannot totally dominate the decisions of the associations."*

*-Bagchara-Badurghacha Sub-Project, FGD, 25-03-2012*

#### *4.3 Responsibility of operations delegated to gate committees*

Given that Water Management Groups may supervise water management for several villages, they are often responsible for operating several gates. Consequently, they frequently delegate their gate operation role to lower-level gate committees. This delegation should simplify the decision making process by reducing the stakeholders to the users of this particular gate. These committees can sometimes be informal but they can also be formally related to the formal WMG. Even if gate committees are supposed to report to the WMG, by holding the decision on operation, these small groups also hold the power.

*"Gate committees are the most powerful in operating gates as they are in charge of everything."*

*-Polder 43-2F, KII, 10-04-2012*

WMCAs also delegate their responsibility to decide on the operation of gates, including their opening and closing, to gate committees. For example, in Jabusha sub-project which has 10 gates, there are sub-committees i.e., gate committees formed with local farmers and fishermen. Opening and closing the gate is generally done through voluntary work, without a fixed gateman, and the responsibility of operating the gates rotates amongst the members. In these cases, no remuneration is given to gate operators. In some other cases, the committee assigns the responsibility to the owners of a house located close to the gate. When opening of gate is required, people approach the gateman and he opens the gate, if needed with the permission of the gate committee president or with the agreement of the other members, as in the case of Jainkati.

*"The gate committee has a gateman but he is not specified. They do not receive any allowance. Any fisherman or farmer can be a gateman."*

*Jabusha sub-project, FGD, 30-03-2012*

#### *4.4 Informal operations and elite capture*

If the inclusion of all the stakeholders in the WMOs is supposed to ensure a balanced decision making process, in practice WMOs are not always able to prevent elite capture in operation of the gates. For example, it was commonly found that *gher* owners or local elite dominate the decision over the operation of gates.



*“The influential people make the final decision about the closing and opening of the gate. They take the decision as they have the economic power and direct connections with the Union Parishad chairman. This badly hampers water management. Moreover it is the large land owners who have unlawfully grabbed the khal<sup>13</sup>.”*

*Polder 30, KII, 15-04-2012*

Due to elite capture, gate operation often fails to reach an efficient and fair outcome. In Jainkati, the WMCA only controls one of the two gates due to a land dispute involving influential families. In Jabusha, factions within the WMCA have resulted in canals being blocked and used for aquaculture, disrupting irrigation through the main canal.

Officially, WMCAs are supposed to make decisions regarding flushing and draining of water during different farming seasons and within farming seasons. However, the adjoining *gher* owner effectively holds effective control in Latabunia. In Latabunia where approximately 50% of land belongs to outsiders, elite capture over water control is a clear source of conflict. Conflicts occur between outside leaseholders or fish farmers and local paddy farmers, particularly regarding the drainage of water from the *gher* before planting *aman* paddy. In these cases, the theoretical role of conflict resolution that lies at the WMOs level is unlikely to be seen.

The data collected establishes that elite capture is prevalent in most of the polders but this is predominantly in areas where no water management project was implemented and consequently where no WMOs have been formed, such as polder 3. In these polders operations are informally managed and capture by influential elites is the standard. Diverse situations have been observed with different degrees of informal management and capture. For example for some gates in polder 3, a BWDB section officer gives a decision or intervenes on decisions regarding the opening or closing of particular gates. Although the BWDB officer insists on keeping the gate closed in the dry season, it can be opened any time if the interested person bribes the staff or gives tips to the proxy gateman.

*“In order to get the gate open, if one pays a bribe to the proxy gateman he opens the gate. A prominent gher owner pays 1000 Taka and the gateman open the gates.”*

*-Polder 3, FGD, 17-02-2012*

Thus in polder 3, larger *gher* owners are often the elite and the main decision makers regarding the opening and closing of the gates. In the absence of any formal WMOs informal committees have been formed under the leadership of *gher* owners who require frequent renewal of saline water in their *ghers*.

*“We do not have any formal committee. Gher owners have an informal committee to open and close the gates. It is usually the gher owners who decide when and where water is needed. The one who owns more ghers is the most powerful, leads the decision and calls the final shot.” --Polder 3, FGD, 18-02-2012*

Some of these informal committees hire a gateman for the operation of the gate, who is paid through fishing rights or given cash remuneration. In some villages in polder 3 it was also found that *gher* committees collect contributions from the *gher* owners, sometimes based on the size of their land under operation.

The same phenomenon occurs under informal management when formal WMOs become inactive after project withdrawal. In those cases, informal committees tend to take over operation and benefit from the vacuum of power regarding water control and access. For example, informal *beel* committees decide the opening or closing of gates in polder 30 and in some villages of polder 43-2F; these committees are supported by *gher* owners or large landowners rather than all local stakeholders. Again, the involvement of informal actors means that influential elites dominate decisions related to the operations of the gates. This is apparent from a large number of focus group discussions.

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<sup>13</sup> Khals are internal canals, mainly found inside the polders.

#### 4.5 From collective to private operations

Community water management, even when the decisions are subject to elite capture, induce collective decisions over control and access of the resource. Although it has been noted that a large number of decisions related to water access are taken out of the collective sphere and can therefore be considered to be private operations. Indeed, private actors develop their own strategy in terms of water management to fulfil their water requirements. In polder 31 there are about 24 private gates and seven pipes according to the mapping done for this analysis. Respondents indicated that the private gates are operated by neither the gate committees nor by the WMGs; they are privately operated by individual *gher* owners.

Similarly, despite operating within a smaller area, sub-projects also face issues of private operations. There are number of private gates in LGED polders, which are apparently under the control of the landowners. In Latabunia, the embankment is crossed by tens of underground pipes, some temporarily closed with mud and some with more sophisticated closing systems. Individual *gher* owners decide the opening and closing of these pipes without any coordination with their neighbours. This situation makes the WMCA, who is hardly in control of one gate, powerless in preventing salinity intrusion and in draining the area for paddy cultivation. Therefore, private operations are tied up with vested interests and prevent multiple community stakeholders from efficiently controlling their access to water.

#### 4.6 Union Parishads in operation: substitutes, elite capture and conflict resolution

As previously stated *Union Parishad* involvement in water management is supposed to be limited to an advisory role. In many places, *Union Parishads* do not even play this role and are absolutely removed from the operation of the gates. However, the data collected also suggests that in the absence of any formal and functional WMO, the *Union Parishad* can also become an important substitute for operating the gates. Thus a number of local gate committees are related to or headed by *Union Parishads*. The *Union Parishad* as an organization is not involved in operating the sluice gates but the *Union Parishad* chairman and the members of the concerned union could be involved. For example, *Union Parishad* representatives can be found in the *beel* committees and some local gate committees are headed by a *Union Parishad* member or by the *Union Parishad* chairman. However, as noted in the below quotation from polder 30, the involvement of *Union Parishads* in water operation does not always result in balanced power.

*“Most of the committees are no longer functioning. The Union Parishad chairman controls the gates and he gives responsibility for opening and closing of the gates to his favorite people.”*

*-Polder 30, FGD, 16-03-2012*

Indeed, there is often a clear overlap between influential people and *Union Parishad* members. For example in polder 3, *Union Parishad* members tend to be *gher* owners and are also members of the informal gate committees leading the operation of the gates.

The same can also be true when there are functional WMOs. Even if the *Union Parishad* as an organization is not directly involved in gate operation some elected representatives could be members of the WMOs and can consequently influence the opening and closing of gates. These situations have been identified in polder 30 and Jabusha sub-project.

Finally, in terms of operation *Union Parishads* play a role in conflict resolution. Conflicts relate to paddy versus shrimp farming, to low land versus high land water access or drainage, and to timing depending on the cropping pattern chosen by the farmer and on the maturity of the crop. When these conflicts cannot be resolved locally by mutual agreement between farmers then mediation from the *Union Parishad* is required, which *de facto* involves the local government institution in operation.

#### 4.7 Gaps and overlaps in operation

Institutional arrangements for regarding gate opening and water management decision making vary across and within polders. Indeed, from one gate to another one, the institutional arrangement that leads to a decision and to the physical operation of the gate is never exactly the same. The national policy, and especially the Guidelines for Participatory Water Management (GoB 2001), locates the responsibility for operation at the community level, making it a decentralized decision making process. But in all the locations, whether BWDB polders or LGED sub-projects, the informal, elite actors tend to dominate the operation of the sluice gates. Operation of the gates is vital to the livelihoods of those in the coastal zone. Taking advantage of this fact as well as the missing or unsustainable formal groups and of the vagueness of the policy, several actors have tried to put forward their own water management strategy that services their own interests. In some places this leads to conflicts between different actors, as in the case of Polder 31, Latabunia or Jabusha.

Thus, the multiplicity of actors involved in operation produces overlaps and conflicts. Due to the structure of power in rural Bangladesh, these overlaps and conflicts contribute to the benefit of private interests.

### 5. Actors in maintenance: deferred and substituted responsibilities

#### 5.1 Breach at the central level: deferred major maintenance

Institutionally, BWDB owns the water-related infrastructure in the polders. In each district BWDB has a special wing called Operation and Maintenance for the polders and an O&M office headed by an executive engineer. However, findings from this fieldwork indicate that BWDB executes repair work only occasionally, when funds are available. These funds are typically only given some disaster takes place or when minor maintenance becomes major and attracts the attention of higher authorities or donors. BWDB engages contractors by tender or Labor Contracting Societies to carry out such maintenance. There is also a general view among community members that BWDB staff are outsiders, lacking both local knowledge and ownership.

*"The employees of BWDB comes on motorcycles and just take rounds and do nothing. They do not represent us."*

*-Polder 3, FGD, 18/02/2012*

As per the LGED's handover agreement with each WMCA, WMCAs hold responsibility for minor maintenance and repair while major repairs remain a responsibility of LGED. LGED also supports community organizations to design their maintenance plans for maintenance expenditure each year. For example in Jainkathi sub-project, to monitor, supervise and plan maintenance work, LGED staff visit the sub-project twice a year. A post-monsoon assessment of damages is established, which informs cost estimates and yearly budgets. The WMCAs typically inform LGED of their repair needs, raise demands for repairs, lobby if needed, and thus get funding allocated by LGED, usually once a year. However the funds allocated are often less than what is required for maintenance and may take time to reach the community. This is the case, for example, in Latabunia:

*"LGED does not maintain the gates directly. But if the closing device of the sluice gate is damaged or it is oxidized or the plaster comes off, then LGED gives money to repair. But we have to communicate with them many times to get the work done."*

*-Latabunia, FGD, 27-03-2012*

#### 5.2 Water management groups: deferred minor maintenance

According to the Guidelines for Participatory Water Management, WMGs are responsible for planning, implementing, operating and maintaining local water resource schemes in a sustainable manner. WMGs are tasked with: (i) preventive maintenance of the medium and minor hydraulic structures, bridges, culverts, etc.; (ii) preventive maintenance of the main embankment and secondary embankment; (iii) routine/annual maintenance (desalting) of field channels, drains, etc.; (iv) clearing weeds, obstacles from secondary and

tertiary channels, canals drains, etc.; (v) regular greasing of gates; and (vi) annual painting and minor repair of minor gates and replacement of fall board. Even if these repairs are referred to as minor, they are most of the time beyond the capacity of WMOs. To finance minor and regular maintenance the WMOs relies on its own funds. These resources come from either contributions by the community or from some additional sources of income (e.g. interest from micro-credit, leasing of canals). For example, several WMOs started to propose saving accounts and offer micro-credit services to their members in order to generate sustainable maintenance funds. Nevertheless, respondents across the study sites stated that savings and loan services were defunct; default of loans was more frequent than repayment. This has occurred in sub-projects as well as polders.

*“In Latabunia polder, collection of monthly savings is effectively discontinued. The membership fee is not being generated as there are no new members and the existing members are not buying new shares. The microfinance program was intended to cover the cost of occasional repair and build up the capital of the WMCA. This objective has also not been achieved. The loan disbursed to members before Aila<sup>14</sup> has also not been recovered.”*

*-Latabunia, KII, 28-3-2012*

Similarly, where canal leasing has been implemented it has failed in the long run due to conflicts over the choice of tenant, water flow blockages and legal vagueness over who should be the leaser. Jabusha has experienced challenges with canal leasing.

Finally, very few WMOs have been able to maintain regular collection of contribution fees from their members. As such, all WMO sources of funding have dwindled over time.

The financial failure of the WMOs often reflects a more general situation. O&M fund inadequacy has been attributed to a general disinterest in assuming responsibility for maintenance and lack of competency in the case of WMCA management committees (ADB 2008; BIDS 2008). In an external evaluation commissioned by the Asian Development Bank it was found that some O&M sub-committees were inactive and half of the WMCAs had no O&M plan, despite this being a requirement for handover (ADB 2003).

Interestingly, the state of infrastructure in areas where WMOs have managed to obtain some sources of funds is not any better. In Bagachra-Badurgacha, despite considerable funds from canal leasing, additional funds were required from LGED. Similarly in Jainkati, where a fairly good system of contribution collection (based on land size) is in place, one gate is blocked due to property conflict and the canal from the second gate is silted. These situations bring into question the incentives that these WMOs may have for investing in minor maintenance.

In summary, the role of WMGS in minor maintenance is one of solving only the most urgent infrastructure problems and relying on rudimentary and unsustainable repairs. Exceptions occur during emergencies when WMOs uses their own saving fund, and collect special fees and material contributions from the community. They also play an important role in mobilizing people and organizing voluntary work in order to repair the embankments.

At a higher level, WMAs do not play any direct role in maintenance, as they don't have any dedicated funds for doing so. They nevertheless play a role in identifying needs and reporting them to BWDB. They can also be involved in supervising maintenance work. For example in polder 43/2F, through the IPSWAM project, once the funds were allocated to specific works the WMA made a list of Labor Contracting Society groups and members in the concerned area. The work was then allocated to the Labor Contracting Societies and the WMA monitored progress and reported on quality, which determined BWDB payments.

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<sup>14</sup> Cyclone Aila struck the coast of Bangladesh in May 2009. Numerous villages were completely submerged. Apart from the short-term impact of lost housing and belongings the cyclone has had a long-term effect on households by increasing the salinity levels of both land and water.



### 5.3 Informal and local level involvement: safety net for essential maintenance

The deferred maintenance that has resulted from central actors as well as community-level formal organizations not fulfilling their roles has resulted in a lack of trust from water users and community members. Many community members believe they must rely on themselves to conduct maintenance activities.

*“The local people work voluntarily to maintain the embankment. LGED does not work as it used to do earlier. Moreover the WMCA is also not working well, and we cannot complain against them, we have to work by ourselves.”*

*-Jabusha, FGD, 30-03-2012*

Communities often report that they have to protect themselves with low-cost repair work done on their own initiative. For example, in Bagachra-Badurgacha sub-project most households own land and it is therefore understood that they have to work voluntarily toward maintenance of the infrastructures in order to protect their land. For example, local farmers build bamboo pilings to prevent damage or to repair damaged parts of the embankments.

The role of individual community member becomes all the more crucial in emergency situations. Whereas formal and centralized levels need time to mobilize resources, the informal community level has more flexibility. Moreover, while households may have difficulties in valuing their interest in contributing to maintenance on a regular basis, emergency situations bring clear and short-term incentives.

Then, similar to operation, the main users and the ones for whom maintenance is essential take over formal organizations to finance maintenance. Thus the *gher* owners are very often involved in maintenance or repair of the gates. In the case of BWDB gates, the landowners and *gher* owners provide financial contributions for repairing or re-excavating the canal when it becomes essential and risks threatening their interests. These influential people can also play a role in mobilizing the material and human resources required for maintenance.

*“Local people manage the small amount of the cost of repair of the gate. We made a wooden shutter with our own initiative as the door of the gate was damaged. In this a local elite person [...] played a key role in mobilising people.”*

*-Latabunia, FGD, 27-03-2012*

### 5.4 Union Parishads: the constrained and substitute actor

*Union Parishads* play a supporting role in maintaining water infrastructure alongside the informal and local actors. The initial role of *Union Parishads* in maintenance was limited to emergency repairs. As the lowest level of public administration in Bangladesh, they are also the first level of relief. Their role was therefore important after the Sidr and Aila cyclones. Apart from mobilizing financial resources they also mobilized communities and organized the voluntary work. This was particularly important in Latabunia sub-project where the embankment and the village were submerged.

*“During floods our lives were saved because of the UP Chairman. He did some emergency work at the time of the disaster by organizing the villagers and took initiative in the repair work. Moreover we protected ourselves by collecting money, bricks and sand.”*

*-Polder 3, FGD, 18/02/2012*

Facing deferred maintenance in their unions, some *Union Parishad* members have gradually increased their involvement in maintenance in order to respond to the increasing demands of their voters. But *Unions Parishads* face a number of problems that limit their role in polder maintenance. First, as per the legislation, their role is to coordinate and to advise the WMOs; they therefore don't have any resources dedicated to

water infrastructure maintenance. In addition, embankments are under the ownership of BWDB, so *Union Parishads* cannot rehabilitate the embankments without BWDB's consent. They similarly have to coordinate with LGED for maintenance work in sub-projects. Despite these financial, technical and institutional capacity constraints, *Union Parishads* execute some repair work and re-excavation. Their involvement in maintenance uses at least two tools. The first is mobilization. The chairman of the *Union Parishad* often mobilizes people to repair embankments, work which is regularly done on a voluntary basis. In addition people donate bamboo, timber and other materials.

*"Villagers temporarily repaired the embankment in 2011 using bamboo fencing and UP chairman also mobilized people to do this."*

*-Polder 43/2F, FGD, 10-04-2012*

Another way of being involved is through dedicating rural employment schemes to water infrastructures.

*"UP has no fund by which sluice gate or embankments can be repaired but it still it conducts repair work to the road and the embankments by the 40 days programme."*

*-Polder 30, FGD, 16-03-2012*

Indeed, some *Union Parishads* use rural employment schemes such as KABHIKA (Food for Work), KABITA (Cash for work) and 40-days work, funds for which are allocated from the *Upazila Parishad* to maintain roads, repair embankments, and re-excavate canals. This happened for example in polder 3 and in polder 30. *Union Parishads* do so either by sub-contracting NGOs or LGED, or by directly forming Labor Contracting Societies made up of rural and disadvantaged community members.

Despite these examples, financial and institutional constraints mean the role of *Union Parishads* in water infrastructure maintenance remains limited. They are unable to carry out the regular maintenance of all infrastructures that is required to sustain the livelihoods of the coastal areas.

## **6. Conclusion and recommendations**

This analysis has shown that water management in the coastal zone of Bangladesh is much more confused than the procedures and roles defined by the policy may suggest. Indeed, a large number of actors anchored in different political, social, economic or administrative frameworks are involved in decisions and actions related to operation and maintenance. The roles of these actors have been assessed through a top-down scale to point out the level of decentralization and through a formal-informal scale. The multiplicity of actors involved in operation produces overlaps and conflicts; however the structure of power in rural Bangladesh results these overlaps and conflicts benefiting only private interests. On the maintenance side, gaps and deferred maintenance arise from the multiplicity of actors involved. This leads to disrepair and degradation of the infrastructures, which steadily weakens the sustainability of coastal zone livelihoods.

Thus we find that the policy has created confusion regarding the respective roles of each of these actors and does not take into account the social and institutional structure of Bangladesh and existing power relations. Where formal actors miss-fill their role and responsibilities, many informal actors, individuals or groups (gate committees, *gher* committees or *beel* committees) fill the gap. Similarly, while local government institutions have been largely overlooked in the policy, they remain informally involved in water management when required.

These results bring forward a number of recommendations. First, the water management policy must be revised and clarified. This policy has to take into account the particularities of the coastal zone and the existing power relations between central and decentralized actors as well as between formal and informal actors. Rethinking the water management policy may involve redefining the role of each stakeholder in terms of operations and maintenance. By deviating from the common discourse on the inclusion of all the stakeholders, the policy could be able to create a more efficient water management system.

Secondly, analysis from the qualitative data points out a lack of formal coordination between the different actors. A latent and rudimentary form of coordination occurs through conflicts but this type of coordination brings power relations into the game and prevents some actors from being taken into account. All actors involved in operation and maintenance should have access to a democratic platform for discussing and coordinating their actions. This coordination also requires a set of rules and a leader who will ensure that rules are respected. Following the Union Parishad Act of 2009, Union Development Coordination Committees were created at the union level to improve coordination in terms of development in the union. Water management is not clearly included as one of the mandates of these committees, but it should be formally included.

Finally, the role of local government institutions in water management should be formally recognized. The *Union Parishad*, the lowest-tier rural local government, closest to the rural people and elected by them, has a realistic possibility of playing a vital role in water management. *Union Parishad* involvement would ensure long term sustainability of the process and balanced adjudication. Nevertheless, this would only be possible through increasing their control over local resources and over choices regarding resource allocation (Ullah and Pongquan 2010).

Improved water governance and successful operation and maintenance in the polders requires the definition of a new legal framework that is more inclusive of the institutional realities of Bangladesh, improved coordination between all stakeholders and the formal recognition of the essential role played by local government institutions in water management.

## Acknowledgements

This article is based on data collected for the project "G3: Water Governance and Community-based Management in Coastal Bangladesh", part of the Ganges Basin Development Challenge of the CGIAR Challenge Program on Water and Food and the CGIAR Research Program on Water, Land and Ecosystems (WLE). The authors thank the NGO Shushilan for data collection throughout the southwest coastal zone of Bangladesh and the respondents. Camelia Dewan is also thanked for her work on the qualitative data and especially coding of the transcripts that are used here. We would like to thank Aditi Mukherji for her insightful comments on the earlier versions of this paper.

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