



G3: Water Governance and Community Based Management

Literature review

The experiences of Water Management Organizations in Bangladesh

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1. Background

This literature review was commissioned by Project “G3 - Water Governance and Community-based Management”, one of several projects funded by the Challenge Programme on Water and Food (CPWF) in the Ganges Basin. The project seeks to understand the different modes and outcomes of water governance in selected polders and the role that communities play in such governance. Governance structures at this local level are challenged by high rates of poverty, dense human populations, highly variable fresh water availability, all coalescing into intense competition for water and land resources by a range of users. Facilitating efficient, productive, equitable and sustainable access to these resources thus needs to be a key orientation of these governance systems. This review of past experiences and the current status of Water Management Organizations (WMOs) in Bangladesh are intended to contribute to the context and process of understanding the different governance mechanisms that are in place to manage these conflicts and their comparative advantages and disadvantages.

2. Methodology

The contents of this report are drawn exclusively from the literature sourced through inter-library searches, the use of Google Scholar and Google web-based search engines and access to specific project documents from donor agencies.

At the outset, the intention was to consider WMOs not merely as water infrastructure management entities whereby performance criteria may be somewhat limited to issues of operation and maintenance (O&M) functions, but within the broader lens of rural development which call for rational water management and allocation mechanisms. In view of the inextricable links between water and other resources such as land, and the multiple inputs required for productive water use (e.g. technologies, finance, skills) that span a range of sectors and actors, a key interest in approaching this review was to what extent and how WMOs have meshed their functions with this broader development paradigm of poverty reduction espoused in government policies (examples) and undertakings such as the Millennium Development Goals at the international level.

The degree to which the above objective has been achieved in this review however has been limited by the relatively conventional approach to assessing WMO performance in much of the literature that was available for this review. Much of the literature is absorbed with the traditional issues of participation in project design implementation and especially operation and maintenance of water infrastructure. Assessments of the implementing agencies and descriptions of the various forms taken by WMOs are also abundant, as are project-specific studies that provide useful case-studies for this review. Information and analysis becomes scarce on the overall impacts of WMOs on the management of water as a multi-user resource and its impacts on local poverty indices. The only exception is the recognition of the traditional fisheries system as a key casualty of the government’s overall pre-occupation on flood control and agricultural expansion. Furthermore, while literature on the water sector policy, legal and institutional frameworks recognize the movement towards a more integrated water management approach, there is little discussion of how WMOs have or have not contributed to a truly integrated decision making mechanism, or how they

can be used to do so in the future. Another gap to emerge is that attempts to understand the drivers underpinning experiences with WMOs give significant attention to the institutional characteristics of the state agencies responsible for WMO formation, but far less on the influence of the beneficiaries' own characteristics, and the influence of heterogeneity within and between different water user groups. Assessment of this aspect is limited to recognition of elite capture of WMO functioning and its links with local government agencies and the function of land ownership in determining access to water. While this review does not claim to be comprehensive, the perception of this limited analysis in the existing literature appear to be supported by others such as Chowdhury and Rasul (2011) who observe that "despite increasing emphasis on incorporating social justice, there has been no systematic study on how social and environmental aspects are being incorporated in water management projects in Bangladesh".

Overall therefore, this review does not provide much information on WMOs within the broader developmental context as was initially anticipated. The content instead consists of tracing the evolution of WMOs; detailing the various forms WMOs have assumed; summarizing the key policy, legal and institutional frameworks in the water sector; using several case studies (selected based on availability of information) to extract a deeper understanding of WMO workings and results in terms of participation, O&M performance and to a limited extent poverty reduction, and identifying key features and lessons that may be relevant to the project's future activities. It is also proposed that the gaps in knowledge that appear to exist especially with respect to WMOs' broader developmental role could provide some direction to the project's research activities.

3. Introduction

As stated by DFID (2000), the water resource management system in the floodplains of Bangladesh at its simplest can be analyzed as one whereby choices are made or forced upon stakeholders relating to obtaining an adequate supply of water throughout the year, obtaining water-based products, such as crops and fish, and ensuring access to water for other livelihood activities. This situation results from a paradox in terms of availability of water which falls between the extremes of flood during the monsoon and scarcity during the dry season. Several drivers of scarcity have emerged over time to include human population growth, poverty and the promotion of agricultural intensification as a poverty reducing strategy leading to a rapid increase in water use for irrigation. In the post-monsoon period, soil-moisture content declines rapidly and the deficit needs to be compensated by irrigation (Choudhury 2005). Saline water intrusion in the south western region further exacerbates fresh-water scarcity, as does the emergence of shrimp cultivation as a major competitor to agriculture in the south western coastal polders. This has been largely associated with the increase in water and land salinity alongside the loss of biodiversity of that region (Alamgir 2010). Within this context of increased variable supply of and increased demand for water, water management and distribution issues have become crucial.

These same coastal areas have also to contend with severe flooding given the prominence of huge river flows, strong tidal and wind actions and tropical cyclones and their associated storm surges. Bangladesh's topography is formed by three of the largest river systems in the world. Moreover, approximately 93% of the surface water of the river systems comes from

outside the country (Chowdhury 2010), thereby further inhibiting the country's ability to manage river flows and water quality at a basin scale. Bangladesh shares 54 rivers with India and another 3 with Myanmar, and has to drain water from an area twelve times its size (Gupta et al. 2005). At other times, an ever-increasing upstream withdrawal of water from these rivers beyond the Bangladesh border is depriving Bangladesh of its traditional uses of water and causing stresses in water management within Bangladesh, particularly in the dry season (Choudhury 2005). Like flood management, the phenomenon of drought also brings into focus the inherent discord among different uses of water (Choudhury 2005).

This dichotomy of extreme flooding and scarcity has triggered investments in as many as 800 water infrastructure projects (ranging from less than 1000 ha to more than 15,000 ha) for flood control, drainage and/or irrigation over the past 65 years (Chowdhury and Rasul 2011). Part of these investments has been self-induced as the construction of the polders and embankments resulted in a massive anthropogenic impact to the natural water ecosystem in Bangladesh. The polder/enclosure systems began in 1961 when the government recognized the need for protection of the coastal areas. It intensified from 1964 with the Water Master Plan, prepared by the East Pakistan Water and Power Development Authority (EPWAPDA) with assistance from the United States Agency for International Development (USAID), focused on increasing agriculture production mainly through extensive flood control embankments combined with structures to facilitate drainage in the short run and public-financed medium- to large-scale irrigation in the longer run. This plan was prepared for a nation of fewer than 60 million people of whom more than 90% lived in rural areas producing mainly rain-fed rice with relatively rudimentary technologies. The plan did not reflect input from local stakeholders, since sustainability and related operation and maintenance issues were not addressed, nor did it consider inter-sectoral problems since the flood plain was extensive, fish were abundant, the road network was limited, and there were virtually no water-polluting industries. Also, the priority was to increase rice production. The plan was therefore highly prescriptive and focused on restricting flood waters to prescribed avenues through a clearly defined system of embankments designed to prevent flooding of agriculture lands and ignored the effects of drought on the production system. This approach was firmly embraced by most engineers within EPWAPDA and by its successor, the Bangladesh Water Development Board (BWDB) (World Bank 2005).

While the primary purpose of empolderment was to increase agricultural production by providing protection against tidal floods, salinity intrusion and sedimentation, the physical structures delinked the wetlands from the rivers and caused drainage problems and water logging (Islam 2005). Due to the embankments constructed on both sides of the rivers the natural process of tidal inundation was halted resulting in water logging and drainage congestion. Large sedimentation and drainage problems in the river beds caused some rivers in the region to die. All these modifications increased people's vulnerability to environmental disasters, and the bias towards agriculture at the expense of water for other uses, such as in fisheries, navigation industries, forestry, domestic water requirements and sanitation, livestock, poultry, horticulture, and other human and environmental services have also undermined the diversity of natural capital available for many traditional livelihoods. In addition, there is an accumulation of salt in the topsoil through capillary action causing increased soil salinity in the polders during the dry season (Alamgir 2010).

Water management projects in Bangladesh focused on maximizing economic benefits and are generally biased towards construction of infrastructure to control water for flood control and irrigation. Most of the projects were intended for creating a favorable environment for agricultural growth. As Chowdhury and Rasul (2011) appreciate, many of these infrastructure interventions aimed at flood control and irrigation for agriculture have been poorly planned with limited inputs from local people, and often ignoring the other uses of water, particularly those on which the subsistence of poor people are based (GoB, 2004, Chowdhury and Rasul 2011). While this approach has begun to change through the adoption of the Water Policy in 1999 and the Guidelines for Participatory Water Management (GPWM) in 1994 (revised in 2000), and the evolution of WMOs as will be discussed in this review, the conditions and constraints alluded to above broadly provide the physical and human contexts in which WMOs in their modern sense emerged and have since evolved.

4. Evolution of Water Management Organizations in Bangladesh

Choudhury (2005) notes that community participation in water management is not new to the people of Bangladesh. Historically, people especially in the tidal flood plains of the south and haors (depressions) in the northeast of the country built small earthen dykes around their paddy fields or along riverbanks under the leadership of Zamindars (landlords). At that time, water management was confined to protecting land from monsoon and tidal floods by small dykes and limited irrigation with indigenous methods. Over time, the socio-economic scenario changed dramatically leading eventually to the growth of large scale state public investments in the shape of massive coastal polders and large irrigation projects.

Modern WMOs in Bangladesh may be divided into two broad types: those adopting or adapting the Comilla model and those following other concepts. WMOs in the first category vastly outnumber those in the other category due to the government policy to expand irrigation coverage quickly through highly subsidized public sector programs during the initial years of the green revolution. The Bangladesh Agriculture Development Corporation (BADC) and the Bangladesh Water Development Board (BWDB) spearheaded this movement respectively for groundwater and surface water irrigation. Comilla type WMO were the principal institutional mechanism through which the expansion program was implemented (GOB 2006).

The Comilla model emerged from research conducted by the Comilla Academy for Rural Development, developed in early 1960s a model of cooperative that sought to resolve these problems. This model continues to provide the basic conceptual and structural framework for organizing farmers' groups. These WMOs registered under the cooperative laws are not the exact replicas of the Comilla cooperatives but represent slightly modified versions (GOB 2006).

The Comilla Model

The principal aim of this model is to bind farmers together into a functional unit, providing not only credit but also services to make the credit functional. Four fundamental features:

1. **Organization:** A two-tier cooperative system was introduced bypassing the traditional cooperatives. Farmers must organize themselves by forming the primary cooperatives, called Krishak Samabaya Samity (KSS) at the village level. These are then, over time, federated into a Thana Central Cooperative Association (TCCA) for credit support and supervision. The TCCA is the core of the Comilla Cooperatives' institutional framework. Its functions are the supply and supervision of credit and other inputs. Each TCCA is based at the TTDC and has jurisdiction over all the primary societies within the remit of the thana. The TCCA is run by a managing committee, chiefly consisting of elected representatives of the federating KSS. In addition, there are a few government officials who become ex-officio members.
2. **Access to credit:** It was recognized that if the production function in agriculture were to be raised through the introduction of new technologies, then new inputs will be needed and the farmer is in no position to afford them without having access to significant amounts of credit.
3. **Access to other Inputs:** Provision of credit was not considered sufficient for higher agricultural production. Farmers needed other inputs, such as fertilizer, seeds, pesticides and pumps for irrigation if they were to implement the new technologies. It was thought that initially subsidies would be required to induce farmers to use the new inputs but that the supports could be removed once their value in increasing production became obvious and their use widespread.
4. **Training:** As against the practice of bringing an outside 'change agent', the concept of the model farmer was introduced for creating such agents from within the community. There were also tailor-made courses for training the manager, accountant, pump driver and other officials connected with the TCCAs.

For more details see: Government of the People's Republic of Bangladesh. 2006. Institutional Studies for Legal Framework of Water Management Organizations Final Report. Second Small Scale Water Resources Development Sector Project.

In practice however, the rapid replication of the Comilla cooperatives in the 1970s throughout Bangladesh under the Integrated Rural Development Program (IRDP) effectively undermined each of the central features of the Comilla model. The fundamental obstacle to the institutionalization of the Comilla cooperatives lay in the contradictions involved in the requirements of a slow and cautious evolution of a new institution and the anxiety of a hard-pressed national government to increase productivity in quick time (GoB 2006).

The next phase of evolution began in the early 1980s when the Government and donor community recognized the need for mobilization and promotion of beneficiary participation in water management to realize the potential benefits of investment in water resources projects through sustainable operation and maintenance (ADB 2003b). It was surmised that the supplementary use of minor irrigation in combination with effective flood control and drainage would enable farmers to crop high-yielding varieties and reduce the risk of crop failure from flooding or drought at the beginning and the end of the monsoon season. O&M of water resource schemes was also usually a problem, and it was hoped that active participation of local governments and beneficiaries in the development of small-scale water control schemes would help overcome this burden (ADB 2007).

Various forms of beneficiary participation models have been experimented with. Success of the models for enhancing participatory water management, however, was limited and results could not be sustained and replicated (ADB 2003b). A key reason was the centralized, technical paradigm these models reflected (Chadwick et al. 1998), where participation was merely to expedite project implementation. Participation was generally marginal and frequently "added on" to projects, and where it was included, the formulation of these activities was extremely weak. They were also compounded by the fact that only farmers, and not all stakeholders, were involved in the process so that vital issues were excluded from the system and had these participatory processes worked, they would generally have widened, not lessened, local inequalities. Consequently, at a workshop on "People's Participation in the Water Sector: Lessons Learned from Experience" in 1997, the participants agreed that there had been no real participation in water sector activities in Bangladesh (Chadwick and Datta 2003). In many, if not most cases, establishment of water institutions were being agency-administered, highly directed, target oriented and deadline driven to form a predetermined hierarchy of Water Users' Organizations (WUOs) with a predetermined institutional structure, composition, tasks, and modus operandi (Quassem 2001).

Nevertheless, with hindsight these early forays in institutionalizing stakeholder participation in water sector programs can be seen as experiments in a learning process. While these initiatives are not viewed as successes in themselves, they did generate a momentum for further developing the institutional structures and implementing processes. For instance, the second conference of the Flood Action Plan in 1992 produced a set of guidelines for participation in management of projects. Although the Systems Rehabilitation Project (SRP) of BWDB started in 1992 was largely unsuccessful (Soussan et al., 1997), it too espoused the idea of people's participation, and participatory elements were included after a review in 1994 by the World Bank. This involved formation of WUOs, although these WUOs have been criticized as not being representative enough given that most of the WUOs consisted only of farmers rather than all water users (Hussain 2004).

A significant development in the 1990s was the emergence at the international stage of the idea of peoples' participation in the management of development projects as a strategy for poverty alleviation. This thinking was crystalized in the water sector by the 1992 Dublin Principles of water management which stated that "water development and management should be participatory, involving users, planners and policy makers at all levels". These developments influenced the transition of participation merely as a means of project implementation and to induce the beneficiaries to either fully or partly share the cost of operation of schemes that are beneficial to them. The emergence of participation as a core theme in development activities, in tandem with the concept of integrated water resources management (IWRM) brought to the forefront the complexity and diversity of interests among water resources stakeholders in Bangladesh, and the need for cross-sectoral perspectives and stakeholder consultation in water management interventions.

In 1994, the Government formulated the 'Guidelines of Peoples Participation' although they were applicable to water resources projects of BWDB only. Another limitation was that these guidelines mainly focused on irrigation projects and not flood control projects despite the critical nature of flood control and drainage aspects in Bangladesh. Consequently, new

Guidelines for Participatory Water Management (GPWM) were formulated in 2000 taking into consideration past experience, and applicable in all flood control, drainage and irrigation projects of the country. However, a World Bank (2005) assessment noted that while the Guidelines for Participatory Water Management constitute an excellent starting point for promoting local stakeholder involvement in water management infrastructure, they fall short of promoting meaningful participation. Rather than establishing mechanisms to improve agencies' ability to respond to local stakeholders, the guidelines approach the participation issue from the perspective of devising mechanisms and procedures to encourage local stakeholders to participate in achieving the objectives of the executing agency.

By this time, and in response to the mixed impacts of flood control infrastructure, the Bangladesh National Water Policy (NWP) of 1999 had already promoted a significant shift away from past practice with its goal of ensuring "progress towards fulfilling national goals of economic development, poverty alleviation, food security, public health and safety, a decent standard of living for the people and protection of the natural environment". It emphasized the establishment of stakeholders' participation for ensuring direct input from people and their fruitful participation at all levels of the water resources development and management through establishing water users institutions (Quassem 2001). The NWP, for the first time, recognized the role of water in poverty alleviation and called for inclusive water management, taking into consideration the national goal of poverty alleviation, along with other goals. The Policy recognized that the "ultimate success and effectiveness of public water resources management projects depends on the people's acceptance and ownership of each project". The Policy further requires that the "interests of low-income water users, and that of women, are adequately protected in water resource management", and states that an "enabling environment will be created for women to play a key role in local community organizations for management of water resources" (Nahar 2002).

Furthermore, under the policy, agricultural land everywhere is to be adapted to the existing flood regime. The National Water Management Plan has interpreted this to mean that no new flood control is to be introduced in rural areas, and that the emphasis now is on improving the performance and management of existing schemes. That is, within existing flood control schemes, different interventions are to be considered where required on a case-by-case basis and these interventions are to be driven by stakeholder wishes and their willingness to contribute to costs (World Bank 2005).

To facilitate the implementation of the NWP, the government approved a 25-year National Water Management Plan (NWMP) in 2004. The main elements of the NWMP, among others, include the multi-use approach to water (not just flood protection but also irrigation, drinking water and other uses) and an emphasis on 'soft' approaches instead of just hard engineering solutions. The NWP declares clearly the intention of the Government to pursue a policy of IWRM, and also envisages major institutional reform including the decentralization and transfer of water resources management schemes to the private sector and civil society. It states that the "principle that community resources should be managed by the community concerned, along with local government institutions unless a greater national interest prevails, should guide water resource management."

These represent key policy departures in the way water has been viewed and managed in Bangladesh. The NWP was a significant landmark that reflected a major shift in the approach to water resources management. In particular, the dominance of floods as the issue and infrastructure as the solution is challenged by the new policy that prioritizes a range of issues and recognizes the importance of, in particular, institutional change (Chadwick and Datta 2003). To ensure better O&M, NWP provides for handing over selected water management functions to stakeholders. Ultimately, the NWP envisages transfer of ownership of the small schemes (those below 1,000 ha) to local government and management to Water Management Associations (WMAs); transfer of management of schemes between 1,000 ha and 5,000 ha to WMAs, with ownership remaining with BWDB. Finally transfer of management of schemes over 5,000 ha to a joint team consisting of WMAs and Local Government with ownership remaining with BWDB.

The GPWM built on the NWP by setting out a three-tier institutional framework for WMO, namely Water Management Groups (WMGs) at the lowest level, Water Management Associations (WMAs) at the mid-tier and Water Management Federations (WMFs) at the apex. The combination of groups, associations and federations at a particular scheme are together known as its Water Management Organization (WMO). To provide a legal framework for the operation of these WMOs, the Cooperatives Ordinance, 1984 and Cooperative Societies Rules, 1987 were amended in 2001 to provide enabling legal provisions for alternative forms of water management groups, namely WMAs for schemes greater than 1,000 ha and water management cooperative associations (WMCAs) for schemes less than 1,000 ha (ADB 2003b). The Guidelines recommend that WMAs be registered under the Cooperatives Societies Ordinance and Rules until such time that separate rules for registration are established, and a large number of WMAs have been established under several water sector projects implemented by BWDB and LGED. The central objective of the Guidelines is to develop the long-term capacity of local stakeholders in the management of water resources, to develop a local ownership ethos and to ensure fair outcomes for affected persons (Lewins and Robens 2004).

Table 1. Duties and responsibilities of different units within a WMO

Water Management Group	Water Management Association	Water Management Federation
Initiation of stakeholder activities through preliminary discussions, meetings and motivational exercises	Preparation of budgets and participation in overall activities	Liaison with the implementing agency
Drafting the working procedures and the process of interaction.	Liaison with implementing agencies, NGOs, community level organizations and LGIs. Resolution of conflicts referred to it by WMGs.	Oversight of the WMAs. Mobilization of efforts to enforce rules and procedures regarding water management.
Preparation of documents and reports.	Signing of management transfer agreements on behalf of the WMGs with implementing agencies or LGIs as appropriate.	Coordination of stakeholder functions in water management.

Water Management Group	Water Management Association	Water Management Federation
Participation throughout the scheme cycle.	Formal representation of the beneficiaries and scheme affected people on all issues related to water management.	Formal representation of the beneficiaries and scheme affected people on all issues related to water management.
Preparation of annual crop/other production and operation and maintenance plans.	Preparation of annual production plans and/or collate the production plans emanating from the WMGs.	Preparation of annual production plans and/or compilation of the production plans emanating from the WMAs.
Mobilization of local resources and collection of member contribution towards investment and recurring costs.	Collection of beneficiary contribution towards scheme investment and operation costs, and collection of consolidated contributions from WMGs as appropriate.	Collection, where applicable, of beneficiary contributions towards scheme level operation and maintenance.
Maintenance of accounts.	Supervision and guidance on maintenance of accounts.	Financial oversight.
Work with implementing agencies, NGOs, community level organizations and LGIs.	Participation in the supervision of scheme implementation to ensure that the works are as per design and agreement.	Observation of scheme construction to ensure compliance with designs and agreements.
Progressive sharing of water management responsibilities.	Operation and maintenance of works in accordance with any leasing agreement.	On its completion, leasing of the scheme level infrastructure from the implementing agency and operate/maintain as per the terms of the lease.
Resolution of conflicts, election of office bearers, exploration of additional water based economic activities that could be engaged by the group.	Assistance with the arrangement of training and general capacity building initiatives with Government or NGOs for various stakeholders.	Assistance with the arrangement of training and general capacity building initiatives with Government or NGOs for various stakeholders.
Source: GoB 2006.		

The WMGs operate at the grass-roots and are meant to be directly involved in water management while the WMAs are to provide the necessary coordination at the scheme level. The highest common denominator (WMA) is the point of formal interface between a water sector agency and a WMO. This is the level where formal agreements relating to respective duties and obligations of the parties concerned are to be signed. For each scheme, there are to be at least one level of WMO. The number and level of WMOs to be formed in any scheme is to be decided by the stakeholders on the basis of their preference and in consideration of the size and complexity of the scheme.

Table 2. WMO structure according to project/scheme size as envisaged in the Guidelines on Participatory Water Management.

Sub-Project/Scheme up to 1000 ha	Project/Subproject/Scheme above 1000 ha but less than 5000 ha	Project/ Sub-project/ scheme above 5000 ha
<ul style="list-style-type: none"> • WMO at the lowest level for each smallest hydrological unit or social unit (Para/Village) • WMA at the apex level of the project/ sub-project/ scheme. 	<ul style="list-style-type: none"> • WMO at the lowest level for each smallest hydrological unit or social unit (Para/Village) • WMA either at the mid-level for each sub-system of the project/ sub-project/ scheme or at the apex level for the project/ sub-project/ scheme • If necessary, WMF at the apex level of the project/ sub-project/ scheme in case WMA is formed at the mid-level for each sub-system. 	<ul style="list-style-type: none"> • WMO at the lowest level for each smallest hydrological unit or social unit (Para/village) • WMA at the mid level for each sub-system of the project/ sub-project/ scheme • WMF at the apex level of the project/ sub-project/ scheme.
Compiled from Hussain 2004		

Table 3. Stages of Participatory Process in Scheme Cycle (Guidelines on Participatory Water Management).

Stages	Activities
Identification/ Pre-feasibility Study	<ul style="list-style-type: none"> • Local level meetings / discussions • Work with local interest groups and Local Government Institutions • Inventory of problems / constraints / potentials • Assessment and reconnaissance of social, agricultural, fishery, livestock and environmental issues
Feasibility Study	<ul style="list-style-type: none"> • Social assessment involving stakeholders through survey and PRA • Solicit opinion of local stakeholders • Assess capacity of local stakeholders for participation • Create environment for formation of WMO • Determine proposed scheme boundaries • Carry out detailed studies on technical, social, agricultural, fishery, forestry, livestock and environmental aspects • Identify opposition to proposed interventions and mitigation measures
Detailed planning, design	<ul style="list-style-type: none"> • Close interaction between design team and WMO • Feedback on proposed design • Delineate boundary in relation to WMO • Form appropriate WMO

Stages	Activities
	<ul style="list-style-type: none"> • Arrange registration of WMO Sign implementation agreement • Prepare production plans for agriculture, fishery, forestry, livestock and environmental plan based on the feasibility study • Develop compensation plan for negative impacts • Detailed design based on feedback from beneficiaries
Implementation and trial operation	<ul style="list-style-type: none"> • Further consolidate WMO activities • Assist in monitoring and supervision • Participate with cash or labor during construction • Prepare local resources mobilization plan • Put up suggestions for improvement and lodge complaint, if any • Develop O&M plan • Implement production plan • Implement environmental management plan
Operation and maintenance	<ul style="list-style-type: none"> • Realize O&M costs • Receive training • Carry out WMO activities • Transfer of ownership / management of schemes • Implement O&M plan • Implement production plans • Implement environmental management plans
Monitoring and evaluation	<ul style="list-style-type: none"> • Progress of membership of WMO • Progress of women participation in WMO • Progress of beneficiary contribution • Monitoring and evaluation survey • Progress of scheme construction work • Progress of productive activities • Progress of environmental management plan
Source: GoB 2006.	

The GPWM envisions a definite role for the Local Government Institutions (LGIs) consisting of Union Thana and Zila Parishads in facilitating the work of WMOs through the respective standing committees of the different Parishads whose members are expected to act as advisors to the concerned WMOs. The LGIs would also be involved at their respective levels in the transfer of ownership and management of different sizes of schemes.

Entry of the Local Government Engineering Department (LGED) in the small scale water sector through the Small Scale Water Resources Development Sector Project (SSWRDSP), saw the creation of an alternate WMO model to that recommended in the GPWM. Known as Water Management Associations (WMAs), these are a one-tier institution developed for all its subprojects. Both BWDB and LGED are following the concept of the Camilla model but with significant deviations in structural composition from the original model. While the LGED follows a one-tier system, the BWDB has followed the three-tier model in all its recent projects, focusing on the formation of the WMGs as the primary unit of WMO. The difference in approach between the two agencies might reflect the different types of schemes being handled by them. While LGED is dealing with small schemes having a

command of 1000 ha or less, BWDB is looking after very large systems, a few of them having a command of more than 50,000 ha. (GOB 2006).

WMOs can obtain legal status by registering under one of four laws: the Societies Registration Act 1860; the Trust Act 1984; the Companies Act 1994 and the Cooperative Societies Act, 2001. After examining various options, LGED opted to get the its WMOs registered under the cooperative law. In a somewhat different form, the WMOs under the BWDB schemes are also registered under the same law.

5. Selected case studies in WMO creation, operation and results

The BWDB and LGED are the implementing agencies for large scale and small scale projects respectively and the case studies attempt to explore their respective approaches to establishing, operationalizing and supporting WMOs. These examples will also provide information on the end results from a water management and development perspectives and identify underlying drivers of these results, to the degree information is available.

5.1 LGED's Water Management Co-operative Associations (WMCAs) under the Small Scale Water Resource Development Sector Project (SSWRDSP)

Funded by ADB and currently in its third phase, the SSWRDSP was in many ways an experimental project for testing new approaches and processes for participatory water management in small-scale water schemes (Akhter et al. 2000). The Project provides flood control, drainage or irrigation infrastructure to subproject areas less than 1,000 ha. The approach relies heavily on local stakeholders' initiative to identify interventions, ratify engineering design, demonstrate commitment to operating and maintaining infrastructure by contributing a specified amount of funds in advance of physical construction, and to sign a post-construction lease agreement for managing, operating, and maintaining the infrastructure. The project's strategy includedes not only the process of organizing stakeholders and beneficiaries, mostly poor people and small farmers, into effective co-operative organizations, but also the introduction within LGED of responsibility for, and commitment to the development of small-scale water resources development schemes and supporting WMCAs in their operation and maintenance (ADB 2003b). In total 280 WMCAs were formed.

The ultimate objective of the WMCAs is to increase agricultural production through proper O&M of the infrastructure created for management of the water resources, which will in turn contribute to reduction of poverty (ADB 2003b). The arrangement of the village meetings to discuss various issues related to the project was the major task of the WMCAs (ADB 2003a).

Participation was based on three principles:

- Subprojects are identified by local people and their elected representatives in the Union Parishad;
- Local people, beneficiaries and project-affected people are to be involved in all stages of sub-project development; and

- The overall approach tried to combine institutional and technical issues which was a significant factor missing in many previous projects.

To be a member of a WMCA, each person was required to buy a minimum of one share at a cost that varied between WMCAs. In most WMCAs, the maximum number of shares per member was limited to between 10 and 100, although some subprojects allow shareholdings up to the legally allowed maximum of 20% of total share capital per member. In at least two cases, the provision for allowing up to 20% of capital to be held by any individual has been used by the WMCAs to expand their capital base and thus the funds available for microcredit programs or WMCA commercial activities (ADB 2007).

A socio-economist worked with LGED and assisted the WMCAs to be registered under the Registrar of Co-operatives, and establish links with the Upazila level government officers who are their sector-based service providers (Akhter et al. 2000). LGED also enlisted the services of NGOs to motivate community members to form the WMCAs and to make the initial beneficiary contributions (ADB 2003b).

Once the WMCA is formed, the final design of the subprojects is presented to the first AGM of the WMCA which decides whether it is to be approved. If approved, and once the Managing Committee of the WMCA is in place (elected at the AGM), an agreement is signed between the WMCA and LGED to proceed with implementation. This process took between 14-16 months. The functions of the WMCA during implementation included collecting the beneficiaries' contributions (totaling one year's O&M costs) towards the construction work. The WMCAs are also responsible for monitoring implementation and resolving disputes over land that may impede implementation. After completion of construction, the project assists the WMCA for a year in O&M of the subproject. After this year, the WMCAs receive the project infrastructure, which include the actual water bodies and other LGED-constructed or repaired infrastructure on leasehold for a 20-year period. Usually the WMCAs have the sole legal right to use, operate and maintain the infrastructure for day to day management of the water for various kinds of water-using activities including cultivation and fisheries (ADB 2003b).

Each WMCA has one president and one secretary, but only some of them were found to have a treasurer. The number of female office bearers was only 3 of a possible 76 (ADB 2003b). Each WMCA is managed by a management committee. As per cooperative society rules, WMCAs hold elections every 3 years and regular annual general meetings during which the completed annual audit is presented. The functions of the management committee include: (i) organizing the beneficiaries of the subprojects, including their participation and sharing in the O&M activities of the infrastructure, (ii) helping their members in income-generation activities through microcredit programs, and (iii) facilitating training of their members. Nineteen of the 22 subprojects investigated (ADB 2007) were found to have an active management committee which functions regularly. The active WMCAs have various functional subcommittees such as the construction and observation, O&M, agricultural, microcredit/loan, and women's subcommittees. Some of the WMCAs have village committees for closer connectivity with the beneficiaries. Eleven of the 19 active WMCAs had paid employees. The other WMCAs operated through voluntary service (ADB 2007).

With respect to project development and implementation, in SSWRDSP Phase I LGED/Project officials approached the community with the offer to implement a sub project provided the community agrees to form a cooperative organization and fulfill other conditions, including raising of the O&M fund. The sub project proposal had to be initiated formally by the Union Parishad and approved by the Thana Development Coordination Committee (TDCC). A set of 12 conditions have to be met by the WMCA before an Implementation Agreement (IA) can be signed between LGED and the WMCA. One of these conditions stipulates that the plan and design of the sub project must be approved by the WMCA. This situation started changing during Phase II with initiatives coming from the community or a LGI which approaches LGED to implement a particular sub project. The 12 conditions clearly spell out the obligations the beneficiaries will have to discharge should they decide to accept a scheme. The IA in turn, underlines the responsibilities of the LGED with regard to the future upkeep of the scheme. This is thus meant to generate a clear understanding between the parties prior to commencement of any physical work (GoB 2006).

Many WMCAs adopted a micro-credit programme to support members' livelihood activities. The capital base for each WMCA microcredit program is made up of the proceeds from the sale of shares and the accumulated savings of individual members with the WMCA. Each member is required to contribute each month to a savings account, usually Tk10 but up to Tk100, depending on the WMCA by-law. Collection rates of WMCAs visited were generally high, but not 100% in all subprojects. The funds generated from monthly savings and purchase of shares are used to provide microcredit loans to members, with an interest rate of up to 15% (ADB 2007).

5.1.1 Results under SSWRDSP

WMO formation and participation: Implementation of a second phase (SSWRDSP-2) provided LGED the opportunity to learn from and incorporate the lessons arising from Phase I, and in that sense, Phase I fulfilled the experimental approach it was meant to. Information in the available literature however is lacking with respect to details of these adjustments. The external evaluation report for Phase I (ADB 2003b) for instance highlights the need for specific measures to ensure that poor people, small farmers and destitute women get benefit from the sub-projects, but the underlying structural and process weaknesses are not explored. The report does mention that interest groups influenced the sub-project preparation and selection processes, but no details are provided.

The same report found women in the membership to be low, but this appears to have changed subsequently (ADB 2007) through the WMCAs' women's subcommittees and in income-generating activities funded through the WMCA microcredit programs. This had resulted in higher self-esteem among these women who were able to contribute more to family incomes. In addition, women were more visible in their respective communities. The management committee of each WMCA had 3–4 women members as required by the Project. One of the subprojects was even chaired by a woman. This had enabled a number of women to actively participate in overall management and decision-making process in their respective WMCAs. Women were found to take part substantially in income-

generating activities through the microcredit programs. Many women had also been trained in cooperatives, income-generating skills, and environmental awareness.

The occupational pattern indicates the WMCA leaders to be non-poor (ADB 2003b). Their land holding pattern showed them to be affluent and quite atypical of the land holding pattern found in rural Bangladesh, with 54% of them owning more than 5 acres. The sample land holding pattern indicated that the leadership of the WMCAs is vested in the hands of the comparatively rich and influential people, although the WMCAs are supposed to work for the community (composed to a large extent of the poor) as a whole.

Despite these inequalities within the membership, the beneficiaries of the subprojects visited by a 2007 study (ADB 2007) were found to be moderately to highly motivated and interested in WMCAs overall. Such interest was partly attributed to their sense of ownership, which in turn was to some extent a result of the beneficiaries' involvement in their respective subprojects from planning to implementation and to O&M. The beneficiaries believed that the subproject has brought stability to production conditions and had increased food production and employment for the poor. These findings appear to be corroborated by a study the previous year (GoB 2006) which noted a significant increase in the membership of WMCAs from initial formation. The study found women constituted about 40 percent of the membership of the WMCAs surveyed, with membership increasing by 760% on average.

A subsequent study by Sultana and Thompson (2010a) however found that the local fishers (over 50 households in the study site, virtually none of whom joined the cooperative) reported declining catches due to operation in favour of agriculture. They claimed the WMCA completely ignored their interests, and excluded the very poor through its share system and decision making that was dominated by local elites. The same study found that conflicts between richer leaders and poorer cooperative members were serious in about 40 per cent of studied sub-projects, and this included competition for credit: in most cases very poor members did not get credit. Farmers and fishers both need water for their livelihoods but have contradicting uses and objectives. Fishers need water to enter the floodplain when farmers do not (e.g. during dry season paddy harvest when fish try to migrate in to spawn). None of the WMCAs had fully resolved this conflict of interest between fishers and farmers.

Operation & Maintenance: The findings of investigations into the WMCAs under the SSWRDSP appear to vary according to the time at which each study was conducted. The assessment of Phase I commissioned by the ADB (ADB 2003b) did not find the WMCAs to be working well. It found that in some WMCAs the O&M sub-committee was inactive, and half of the WMCAs had no O&M Plan. Little significance appears to have been attached to O&M by the WMCAs whose members seemed more interested in poverty alleviation, social development and micro credit programs. When interviewed, no one had highlighted sustainable water resource management through proper O&M as a priority. Though maintenance requirements for facilities of completed sub projects are determined jointly by the WMCA and LGED at present, WMCA contribution towards such maintenance was still found to be insignificant in 2006 (GoB 2006), generally in the region of 10 percent of cost. However, this report was of the opinion that the reason may not be the inability to do so as the report states that some WMCAs are already capable of meeting most O&M fund

requirements. A study in 2007 (ADB 2007) however found that all the WMCAs participated in O&M activities—the minimum being to keep the subproject running. Beneficiary contributions to O&M may be in cash, kind, or labor. Labor contributions constitute a significant portion of WMCA contributions to the cost of O&M, since much of the work required, especially for maintenance of embankments and canals, is manual (such as greasing and painting of sluices, repairing rain cuts and small damage to embankments, resetting protective blocks). Emergency works are done with LGED funds. This progression seems to be confirmed by a report two years later (ADB 2009) which concluded that WMCAs are capable of organizing and implementing routine O&M but they need the assistance of LGED for major items of maintenance work. Sultana and Thompson (2010a) confirm that the WMCAs appear to be flourishing, successfully maintaining and operating the flood control infrastructure.

Influence on water management: Literature which addressed this aspect could not be found, with the majority of project as well as independent reviews concentrating almost exclusively on levels of participation and the discharge of O&M functions. While conflict over access to water was referred to with respect to conflicts between agriculture and prawn farming, no detailed discussion was available of the role played by WMCAs in this process. A more general discussion of the role of WMCAs within an integrated water resources management framework was also absent.

Impacts on local development: As cooperative associations, WMCAs are entitled to carry out all normal activities of a cooperative which includes credit activities. Under SSWRDSP almost 80 per cent of WMCAs had some kind of micro-credit programme. Mainly the members of the WMCA who are poor, needy and also pay the savings regularly can obtain a loan (ADB 2003b).

Nowreen et al. (2011) found that fish culture features as a prominent activity, although the profits were not equally and fairly distributed. Not all landowners of the flooded rice field were allowed to be included as members of the WMCA due to a pre-set limit on the number of members. As a result non-members, the majority of whom were the local poor and marginalized farmers, did not get any profit. While by mid-June, once the water covers the rice fields, the land had traditionally become a common property fishery. The culture fish however tends to exclude a large number of poor households and fewer and fewer households have access to what previously were common pool fisheries. In contrast, business rather than agriculture is the primary source of income of the dominant members of WMCAs (ADB 2007, Sultana and Thompson 2010a, Nowreen et al. 2011). They have in fact diversified livelihoods away from agriculture and have accumulated more financial capital. This had enabled this group to capture control of the project through control of the WMCA and limited its members to 500 to ensure their influence is not diluted. This enabled them to control the operation of existing sluice gate for flood control and drainage in line with their shrimp culture operations. The benefits for the landless appear to be restricted to an increased demand for agricultural labor following the intensification of agricultural production. In addition, the Project helped improve access of the rural poor to credit through the microcredit program of the WMCAs, which supported income-generating activities (ADB 2007). No details of these activities were available.

While the overall benefits may have been positive at the community level, the scenario at the household level was quite different with the level of benefits higher for the large land owners and those who successfully adopted shrimp culture compared to and often at the expense of the poorer farmers and the landless. This inequality may have been offset to some extent by the micro-credit programs that have generated tangible benefits such as opportunities for tree plantation, poultry raising, kitchen gardening, and livestock rearing and fattening. By securing management of flooding, drainage, and other aspects of water management in the subproject areas, the Project has established safe conditions for increased investment by households in both agricultural and nonagricultural activities (ADB 2007).

Interestingly, despite the differentiated distribution of benefits, a review by ADB (2009) found that all land owners had a positive view of WMCAs – large landholders saw WMCAs as facilitators of O&M while small landholders saw WMCAs as a good source of micro-credit no matter how small available funds were, as WMCA micro-credit is often cheaper than similar NGO supported programs.

Sustainability: An external review of SSDWRDSP (ADB 2003b) is of the opinion that even after the first seven years of the Project, even the most successful sub-projects and WMCAs will require additional support to help them to further develop into the required responsible and resourceful organizations in charge of sustainable operations and management of the small-scale water management schemes. The areas requiring support were (i) management and administration of co-operatives; (ii) technical assistance for identification and implementation of the water-related infrastructure; (iii) assistance related to identification and implementation of community development activities, and (iv) management and administration of the associated micro-credit facility, and interagency co-operation.

By 2005, Choudhury concluded that the WMCA development process has been effective in enough cases to confirm its viability, noting that many of the interventions have also contributed effectively to increased food production and to poverty reduction. An ADB review (ADB 2007) also believed that the WMCAs are generally sustainable, taking into consideration the WMCAs' survival for the past 5 years. It states that the Project on the whole was responsible for the institutionalization of beneficiary participation in small-scale water projects. One reason for this may be that by 2006 the functions of the WMAs were no longer confined to water management alone. They had evolved into multipurpose cooperative societies, with multifarious activities, micro credit being a significant activity for most. Increased enrollment of new members in the WMCAs also suggested the presence of mutuality of interests among the partner organizations which is an important precondition of their sustainability (GoB 2006).

Since not all WMCAs performed the same however. Some factors adversely affecting the sustainability of the Harisona-Kandial WMCA included a non-resident chairman; change in Union Parishad leadership and default of loans provided from external sources. While acknowledging the existence of shortcomings in SSWDRSP I, the authors of this report were of the view that LGED seems to recognize these problems and has tried to avoid those in SSWDRSP II. The insistence on strict adherence to the steps in the project development cycle in the right sequence and the rigorous application of the requirement of fulfilling 12

conditions prior to signing the Implementation Agreement was seen as evidence of recognition of lessons from past mistakes and adopting corrective measures to avoid them in future (GoB 2006).

One condition that appears irrespective of the performance of WMCAs is that LGED, through its IWRMU needs to continue the long term maintenance monitoring of physical infrastructure in the interest of sustainability of WMCAs and subprojects (ADB 2009).

With respect to microcredit, a relatively recent evaluation (ADB 2009) concluded that LGED is not in a position to manage the microcredit programs of a large number of WMCAs to keep them active. Neither the LGED nor the WMCAs have that capacity to embark on professional microfinance programs. The report recommended that loan guarantee should not be used as an incentive for large-scale expansion of microcredit. This was following a study the previous year (ADB 2008b) which found that only a few WMCAs had microcredit operations that were rated as good performance. Although over half of the SSW-2 WMCAs were rated as “fair”, most of these showed signs of becoming “very weak” or “inactive” before long. The study found that direct support from project staff in such tasks as keeping accounts is helping this group to continue to function for the time being. It was also revealed that in 13 out of 30 WMCAs visited, bad debt had accumulated and members had lost their savings and share capital. In the more successful microcredit programs, the loans were limited to small amounts. These WMCAs were mainly CAD schemes where seasonal microcredit fits well with the business of selling irrigation water. Other types of scheme lacked such a regular business on which it is easy to attach a small microcredit operation. Significantly, the study failed to find a link between microfinance operations and sustainable subproject infrastructure O&M.

Inter-agency coordination: In the case of SSWRDSP Phase I, the external evaluation report (ADB 2003b) found that there appeared to be little consultation between LGED and WMCA or Fisheries Department concerning fishery aspects during project planning and implementation. In a few areas, poor fishermen (making a living out of natural fisheries) were opposed to culture fisheries. The report proposed developing fisheries capacities of the WMCA and stressed that marketing and transportation will also need to feature prominently. This example serves to highlight the critical need for investments well beyond access to and management of resources if the actual value of these resources are to be realized for peoples’ development. The situation appears to have changed by 2006 when another evaluation (GoB 2006) reported that LGED and DOC appear to be working closely together in formation and nurturing of WMOs. They had in fact jointly issued a circular regarding the procedure for formation of LGED WMOs. This had engendered a positive attitude among the officials of both the organizations at the field level for a more harmonious and coordinated approach for the further development of the WMOs.

No reference was available on the relationships with the other agencies relevant to the water sector and more broadly to rural development. These include the agencies in charge of land, agriculture and fisheries, and the local government organizations.

5.2 The Systems Rehabilitation Project under BWDB

The Systems Rehabilitation Project in the early 1990s was implemented by BWDB aiming at sustainable O&M in rehabilitated projects by forming local Water User Groups (WUGs) comprised of farmers organized around hydrological units. As noted by Soussan et al. (1997) the scale of WUG formation was “amazing” especially during 1995-96 when 1,386 WUGs were formed during the year. By the end of June 1997, 3,506 WUGs had been registered in 35 sub-projects. According to Lewins and Robens (2004) however, although participation was established very early in project implementation, it was primarily an attempt to hasten the identification of land for the sub-projects, and to introduce a mode of negotiation and reduce conflict between the plot-owners. Hussain (2004) further observes that as the process of establishing WMOs became target-oriented, the effectiveness and functionality of groups after formation was lost. The same author notes that these are characteristics found in many similar projects and that the WMO formation process has had little success in initiating a community based management of the operation and maintenance of water control structures.

The assessment of the participatory mobilization and group formation process within SRP has been characterized as one where local elites are selected into a largely nominal organizational structure which is presented as representing the "people" whilst the vast bulk of the population is not aware of the existence of these bodies and has never participated in any activities associated with their formation or functioning (Soussan et al. 1997). There was therefore a lack of any coherent vision on why the WUGs were being formed, and they had no function and quickly became disillusioned. This was also compounded by the fact that only farmers and not all stakeholders were involved in the process, thereby excluding other water users from the WUG system. The participation process reflected the centralized, construction-oriented character of both the project and the BWDB which was responsible for implementing it. This approach paralleled that found in other water sector projects at that time (Soussan et al. 1997).

5.3 BWDB's Ganges-Kobadak Project (G-K) and the Pabna Irrigation and Rural Development Project (PIRDP)

In the late 1990s, the BWDB sought to institute participatory water management in G-K to promote sustainable improvements in irrigation performance and rapid adoption of new HYV technology in rice and wheat. To that end, existing Outlet Committees were re-named as WMGs comprised of nine members: one-third each from large, medium and small farm categories. 10-15 WMGs from each of the tertiary canals were then formed into Water Management Associations which were expected to manage water distribution in all field outlets from head to tail attached to the same tertiary canal. The WMGs and WMAs worked under close supervision of the BWDB officials, responsible for distribution of water up to the tertiaries and their expansion in the project areas. These institutional changes at the field level were expected to help increase crop production and productivity for all categories of farm households, especially the poor farmers, given equitable access to water and irrigation water use efficiency. Furthermore, the differences in irrigation performance between the head and the tail end reaches were expected to be narrowed as a result of improved water distribution, provided the farmers are equally responsive to improving agronomic practices and input use. Distribution of irrigation water for crop use from available flows in the canals in both G-K and PIRDP was determined by the WMGs and the corresponding WMAs in

collaboration with the BWDB field officials. Irrigation water was to be distributed to the crop fields on the basis of requirements with reference to land quality, given the availability of surface water in the tertiary canals. Any conflict relating to the distribution of water was to be addressed by BWDB in consultation with the WMGs (Hussain 2004).

According to the study conducted by Hussain (2004), the situation in G-K showed that in the 'best' performing canal area, access of households to WMGs and WMAs was the highest and the member farmers were well-informed about the relevant issues. In these canals, success was determined largely by the active participation of water users through WMGs and WMAs and the efficiency of the BWDB officials in supporting them. In the 'worst' tertiary, proper formation of WMGs and WMAs had not occurred and the farmers did not have access to systematic irrigation information. It was further noted that only few meetings of the general bodies of the groups and associations were held in GK. In PIRDP performance of the WMGs and WMAs was found to be poor. Institutional constraints such as poor performance of the concerned government officials, problems with the patwary, theft of water etc., had not been addressed. Collection of the water charges was poor in both G-K and PIRDP. In G-K as a whole, annual rates of collection in the 1990s ranged from 5 percent to 15 percent of the targeted sum; moreover, the collection rate had fallen overtime. In PIRDP, collection was to only 9 percent for 2000/01.

The study found that overall, the head tertiaries performed better, while improved performance was also exhibited by the middle tertiaries, while a mixed picture emerged from the tail tertiaries. Although larger landowners benefit more, small landowners had also secured irrigation water. The land-poor and the landless had also derived benefits from increased employment resulting from more HYV varieties being cultivated. The benefits they derived however remained limited given their very limited access to land. Moreover, the study concluded that proportional sharing of benefits of irrigation accruing to different sizes of farms may not necessarily happen due to various reasons such as shortage of irrigation water in the canal leading to its chaotic distribution, improper location of outlets and irrigation channels, mismanagement by the BWDB staff, and unfavorable land topography. This was exacerbated by land distribution being highly skewed in both G-K and PIRDP. Small farmers (owning 0.21 to 1.0 ha/household) and the landless (defined as owning less than 0.2 ha/household) constituted 71% of all farmers in G-K. This 71% in G-K owned just 25 percent of the irrigated land, while 78 percent of farmers owned 45 percent in PIRDP.

These findings appear to be corroborated by a study (GoB 2006) that surveyed 39 BWDB WMOs (21 cooperative organizations and 18 informal groups) distributed in 5 projects (GK, MDIP, PIRDP, CPP, CDSP). WMOs in 4 of the projects were either virtually non-existent or dilapidated. Most WMOs had no office of their own, meet infrequently if at all, and had very little in terms of institutional training. Their activities appeared to be limited to surveillance of the embankment and operation of gates. Collection of member contributions was only 15-25%. The same study states that of the 5 BWDB projects surveyed, the 3 FCDI projects (GK, PIRDP and MDIP) were implemented unilaterally without any thought to stakeholder or beneficiary participation, and efforts to form WMO and realize water rates or service charge began many years after project completion (GoB 2006). It found that differences in terms of institutional context, time, circumstances and opportunities for the creation of the WMO will give different outcomes unless the negative factors are skillfully handled and

neutralized. Evidently, BWDB did not think through these inherent impediments and come up with any pragmatic work plan to overcome them.

6. Discussion

While Bangladesh provides many projects involving WMOs over the past 30 years, review of the available literature suggests that the case studies selected for this review are indicative of the experiences to date. Overall, the documentation suggests poor O&M performance, although a distinctly different set of results for LGED and BWDB emerges, with the former's approach appearing to generate some tangible positive results on the ground, be it subject to some lingering concerns. The continued weak results from the BWDB projects on the other hand do not show the same progress in learning and adapting from experience. By 2001, in excess of 550 projects had been undertaken by BWDB but there was seen to be a serious problem with the lack of local O&M for completed infra-structure and facilities. This section highlights some of the key features underlying these experiences as articulated in the literature.

6.1 Project specific factors

Clarity of purpose and its relevance to stakeholders: Soussan et al. (1997) point out that an effective participatory process will only be effective where the purpose of participating is clear and regarded as useful by local people. These characteristics have been noted to be generally absent in BWDB projects. Committee members often are assumed to have common interests and goals, overlooking social difference and heterogeneity of communities as well as environments. Different water users often have different interests, and because of these assumptions of homogeneity by donors and implementers, inter-group conflicts tend to be suppressed, so that the interests of the less powerful are forgone and existing inequalities are reinforced in name of social cohesion (Sultana 2009). Reference to elite capture indicates that this was an issue with the WMCAs is not clear from the reviewed literature.

An out-dated vision of participatory water management and inadequate empowerment: Both the BWDB WMOs and LGED WMCAs appear to be captive within a narrow conceptualization of what their contributions to local water management should be (i.e. O&M), compared with the accumulation of water user conflicts that are multi-dimensional and multi-actor in nature. The one significant difference has been the flexibility to engage in micro-credit and attract new donor funding enjoyed by the WMCAs. However, while some WMCAs may have had more success in sustaining themselves and their O&M functions through these strategies, they appear to join the BWDB's WMOs in having little influence on local water management issues. A fundamental cause appears to be the failure to envision a role for these organizations as water managers in their own right in keeping with the conceptual evolution of participation at the global (e.g. 1992 Dublin Principles) and national (e.g. 1999 Water Policy, 2004 National Water Management Plan) scales. Instead, they remain dependent on the centralized management in government irrigation systems.

Exclusivity in participation: The BWDB's definition of water users (exclusively farmers) and integrated water management (surface water for crop production) are at odds with the

realities of rural life in Bangladesh (Wood 1999) and exclude key groups of stakeholders (such as fishermen, landless and boatmen) and key aspects of water resource management such as groundwater utilization, domestic water supply, fishing resources and navigation (Soussan et al. 1997). Such factors contribute to the complex realities where access to and control over water resources vary by multiple, interlocking and hierarchical systems of differentiation. Similarly, participation involves processes of inclusion, exclusion, negotiation and resistance, which are insufficiently understood or addressed. Community members are expected to participate in projects in order to enhance equity and efficiency, as well as to feel greater ownership towards projects, which is also expected to lead to better water resources management and greater ecological sustainability. According to Sultana (2009), participation invokes notions of inclusion, of people's abilities to make decisions, and to voice opinions/concerns that are heard. As such, participation is linked to notions of deliberative democracy. Participation has become hegemonic in development discourses, yet generally conceals the processes of unjust and illegitimate exercises of power. With respect to the WMCAs, while the literature on SSDWRDSP does not address participation in water management decisions within the WMCAs, the operation of microcredit programs appears to have provided a common point of reference for community members.

The spatial factor highlighted by Coupe et al. (2005) to explain the historical lack of organised civil society groups at the local level is another factor affecting participation. The authors point out that Bangladesh has open villages with a dispersed, linear pattern of settlement, different from the close or corporate villages found in other parts of South Asia. Villages in Bangladesh are not administrative units and settlement is based on the *para* (a cluster of hamlets). This militates against tight integration of the population and common identity within a local space.

Power relations and power struggles: Coupe et al. (2005) conclude that the formal and informal institutions function not as opposites, but in a mutually reinforcing grip on local resources. The functioning of formal institutions is shaped by local informal leaders who establish patron-client relations which maintain the marginalised segments of the community in a chronic state of dependence. Stated from the perspective of participatory water management, while notions of community in water management may be externally defined by implementing organisations, they are implemented through local power relations, where different people with various strengths and weaknesses based on their structural position in village society will negotiate their positions within such projects vis-à-vis the costs and benefits in the context of their overall lives and livelihoods. As a result, it is important to look at the ways that community institutions operate in creating boundaries, exclusions, inclusions and regulation (Sultana 2009).

Ability to generate benefits: The SSDWRDSP's ability to offer tangible benefits, thereby making the subprojects useful to the WMCAs emerges prominently (GoB 2006, ADB 2007, ADB 2008b). WMCAs with good income generating activities were found to be in a better position to perform O&M activities, although there is some concern (and uncertainty) as to whether micro-credit (the primary income-generating activity for most WMCAs) has distracted their memberships from their O&M responsibilities. While some WMCAs tend to focus more on income generating activities especially where leadership lies with

entrepreneurs rather than with farmers, the broad mandate of WMCAs¹ has enabled especially the well-functioning WMCAs to attract other sources of funding from different donors. For instance, ADB's Project Performance Evaluation Report (ADB 2007) reports that some WMCAs attracted funds from the Japan Fund for Poverty Reduction (JFPR). The JFPR's Livelihood Improvement for the Poor Project aimed at reducing rural poverty in selected subproject areas through livelihood improvement activities by the poor farmers of well-functioning WMCAs, and strengthening the capacities of WMCAs, through self-governance, to manage the poverty-focused activities of the poor.

A Government of Bangladesh study (GoB 2006) found that those WMCAs that were thriving through diversification of their activities had more group cohesion and were in fact performing their water management responsibilities well. Since water management activities can engage WMO members for only 4 to 6 months in a year, the year round activity and interaction through micro-credit programs appears to help foster and maintain group cohesion and sustainability. An IFAD study² in 2008 found that WMCAs in Command Area Development subprojects have complemented their water responsibilities with seasonal loans for marginal farmers through microcredit. Moreover, the surplus that may be generated by these other activities help meet the O&M costs and also contribute to the socio economic development of the WMO members. The IFAD study did however caution that despite the continued support from LGED project staff to WMCAs to continue microcredit in SSW-2, the sustainability of WMCAs remains a concern.

The WMCAs prepare and maintain a Poverty Reduction Plan Book which plans and monitors all poverty reduction activities. Although this was found to require significant effort by WMCA members, LGED field staff, project staff and consultants (ADB 2007), their use was recommended since it provides the beneficiaries a clear indication of impacts on poverty reduction.

Moreover, the Microfinance Study commissioned by the ADB (2008b) saw some dangers in this strategy:

- there was competition from other microfinance providers with access to large amounts of capital;
- there was a lack of paid and trained staff;
- non-adoption of good microfinance practices such as holding group meetings and monitoring loan repayment;

The Study also questioned the assumption that microcredit will help keep WMCAs active and felt there was no clear evidence that because of the presence of a microcredit program that O&M is being properly carried out. A review by ADB (2003b) however observes that the WMCAs may be compelled to provide credit to gain community support. This would apply particularly to people without much land who may have little or no benefit due to the water resource development. Moreover, given that WMOs are essentially externally-defined

¹ There is no legal bar for a WMCA, as defined in Rule 3 (16) of the Co-operative Societies Rules 2004, to undertake activities other than water management.

² A microfinance Study funded by IFAD delivered its Final Report in August 2008. As referred to in ADB 2008b. Full citation to report could not be found.

organizations, they need to establish a legitimacy in the eyes of the local stakeholders. The expansion of livelihood options through micro-credit appears to be the primary strategy to do this.

The WMCAs prepare and maintain a Poverty Reduction Plan Book which plans and monitors all poverty reduction activities. Although this was found to require significant effort by WMCA members, LGED field staff, project staff and consultants (ADB 2007), their use was recommended since it provides the beneficiaries a clear indication of impacts on poverty reduction.

Ineffectiveness of water infrastructure: An ADB study (ADB 2003a) notes that there has been very little progress in the revival of the local government system. Many of the water schemes are not properly functioning; so the intended beneficiaries are not deriving any benefit from those. Many of these had fallen in serious disrepair and some may actually be generating dis-benefits and dampening interest in participation by the intended beneficiary groups. Stakeholder participation will have little sustainable impact on investment efficiency if the infrastructure with which they are provided is either inappropriate or dysfunctional. This is especially the case considering, as described by Hussain (2004), the colonial attitude that "any property built/developed by the government is not people/community's property but property of the government" has also contributed to lack of community ownership and awareness. He opines that the common attitude of the community continues to be that management, maintenance and operation of those projects are supposed to be performed by the government. Moreover, Mukherji et al. 2010 observe that low, uncollected irrigation service fees, growing deferred maintenance, rampant anarchy and inequity in water distribution in Asian surface irrigation are symptoms of a larger malaise that PIM/IMT seem unable to address. This is a key component when understanding the practical boundaries in which WMOs are expected to operate.

Capacity building: A significant aspect of LGED WMCAs is the heavy training input provided to office bearers and members of the WMCA. Most Managing Committee members have received training on cooperative laws, rules and procedures. Members of the WMCA have also received training on such areas as cooperatives, gender, sanitation, agriculture, fishery, livestock and poverty alleviation indicating a significantly broader role in local development than for the BWDB's WMOs. Of particular importance has been the training of women members on sanitation and hygiene that has had positive impacts on rural housekeeping (GoB 2006). The beneficiaries were also trained in fish production techniques, and pond fish culture and fingerling production (ADB 2007). Capacity building was also extended to LGED officials and consultants (GoB 2006). No such investments are associated with BWDB in the reviewed literature.

Orientation and capacities of BWDB and LGED: A critical determinant of successful and sustainable WMOs is the orientation, interest and attitude of the sponsoring entity in general and of its senior management in particular (Gob 2006). The senior management at LGED appears to have recognized the imperatives of peoples' participation and community organization in the conception, execution and management of projects, and tried to acquire the capability to foster such peoples' participation and community organization. This is seen through the provision of a strong technical assistance team at LGED headquarters, the

provision of a Sociologist at the district level, a Community Organizer at the thana level and a NGO facilitator for each sub project/WMCA. The BWDB on the other hand seems to view this more as a donor conditionality that has to be met. More often than not BWDB appears to go through the motions of meeting the requirement without any conviction. Consequently, as in the cases of G-K and PIRDP, hundreds of WMO were created in days without adequate preparation to meet a deadline. The senior management in BWDB does not appear very interested in, or aware of, these non-engineering activities (Gob 2006).

LGED is also at a distinct advantage being a relatively new entrant in the water resources sector, having been given a formal mandate for projects up to 1,000 hectares through the NWP, although it had started implementing water schemes several years prior to acquiring this formal authority (GoB 1996). By the time LGED entered the water sector, the concepts of people's participation in project formulation and management had become a major issue. LGED therefore had the opportunity of developing and implementing projects incorporating the concepts of peoples' participation in formulation, implementation, operation and management, and without any historical organisational culture to inhibit this process. The fact that LGED sub projects are relatively small in size and generally complete in themselves makes it possible to have the rather simple arrangement of one single tier WMO for each sub project as the appropriate institutional arrangement.

BWDB in contrast is challenged with unburdening itself of a very different institutional culture that was in place during its creation in 1959. Most BWDB projects (particularly the FCDI projects) were implemented many years ago, when there was little talk or requirement of peoples' participation. Both PIRDP and MDIP for instance were completed and became operational many years back, while the WMOs were formed during 1998 to 2000 (GoB 1996). Unlike with LGED, BWDB's projects were large, complex and, according to the philosophy prevailing at the time, implemented unilaterally. Beneficiary participation was sought to be introduced by BWDB as an afterthought without acquiring the necessary skills for doing what is a challenging task. Formation of a WMO anew for a project that is in operation for many years is also more difficult than forming a WMO prior to project implementation. Making people pay for a service they have enjoyed for free is also difficult. The preparation for formation of the WMOs was also inadequate. In contrast to the LGED projects, the size and complexity of BWDB projects makes this task infinitely more difficult. BWDB projects may have hundreds of WMOs, with each WMO dealing with only a small part of the project and dependent on the overall project to provide benefits.

Apart from the difficult nature of the task itself, BWDB seems not to have the orientation or the in house capability to manage the transition to participatory water management. It is fundamentally not suited to developing and managing a participatory process in the opinion of Soussan et al. (1997). Institutional deficiencies relate to lack of understanding of water management issues, persistence of inappropriate skill mix of their professionals, inadequacy of non-engineering water management personnel in the field and lack of training of the such professionals (GOB 2006). Local-level BWDB staff are squeezed between the emerging need for local accountability and joint decision-making and their accountability to the centre and lack of full local decision-making authority in a highly centralized organizational culture. There are therefore profound contradictions between expectations of the role of the

participatory organizations and the operational characteristics of the BWDB (Soussan et al. 1997).

Although the BWDB Act of 2000 promotes participatory water management, and the Land and Water Use Directorate has been converted into the Water Management Division for institutionalizing participatory water management in BWDB projects, this needed to be supported by reorientation of the staff of the new Division to the principles and precepts of participatory water management. During the past two decades, the BWDB has tried to cover its staffing deficiencies for water management by hiring temporary help from outside, mainly NGOs or consultants. Unfortunately, there never have been any counterpart permanent units in the project organization who were to own and preserve the valuable and expensive outputs generated by outside help for internalization within the Board and continuous dissemination afterwards. Despite huge investments on community mobilization over these years, there is hardly any capacity building within the organization (GoB 2006).

LGED's commitment to adapt to implementation challenges contrasts quite significantly. The organization's management has thrown its weight behind the necessary internal reform processes (ADB 2007). Through the SSDWRDSP, the management has ensured investments in LGED's present capacity at all levels to implement small-scale water resources development activities with the participation of beneficiaries. A process for beneficiary participation was developed under the SSDWRDSP, which LGED has adopted as an integral part of the subproject cycle. LGED has institutionalized coordination mechanisms, including the use of ICT, in keeping with organizational theory. Its particular strength is in standardization of inputs: training of staff and other stakeholders, including beneficiaries and contractors. In spite of the rigid GOB's rules, LGED exercises discretion in providing both direct and indirect staff incentives: early promotion, private use of official vehicles, training opportunities, official recognition, welfare services by the staff association, and good working environment, among others. LGED's group cohesiveness, collective decision-making practices, internal communications, leadership, and organizational culture have impacted positively its effectiveness, thus complementing the division-of-labor system and coordination mechanisms (Fujita 2011). Not surprisingly then, most of the LGED staff trained under the Project is still with the organization (ADB 2007).

In 2003, LGED established the Integrated Water Resources Management Unit (IWRMU) with the support of SSW-2. This Unit is dedicated to the process of identifying and implementing water resources development. The Unit is also a key difference between LGED and BWDB. It monitors completed projects and is to ensure they are being operated and maintained in accordance with agreements signed between LGED and local stakeholders, and provides maintenance support. The monitoring framework includes monitoring the health of the WMCAs as well as the operability of the infrastructure. Under the SSW 2 project, it has been recommended that ten "revenue" positions for Socio-economists be created in the field at regional centers, and two positions within IWRMU at National level, one a Socio-economist and one a Gender and Development Officer. These field appointees will monitor the performance of subprojects within their region. During the implementation of SSW-2, a DAE officer was permanently assigned to IWRMU, and this arrangement is to continue for the Project's duration. In addition it has been agreed that a Fisheries Specialist from the Department of Fisheries will be seconded to IWRMU under a similar arrangement (Fujita

2011). Recognizing the plight of affected people engaged in floodplain fisheries, LGED signed a memorandum of understanding (MOU) with the Ministry of Land in October 2002 to ensure user rights to water bodies within the subproject area of the affected people. The MOU helps ensure that the beneficiaries have priority access to these water bodies after paying standard fees to the Ministry of Land (ADB 2007).

LGED has also recognized the need to actively seek additional funding through the Livelihood Improvement for the Poor through Water Management Associations Project. Of the total JFPR budget of US\$1.05 million, almost \$500,000 was given as small loans to the Project's WMCAs to help promote the WMCAs' sustainability, which in turn is hoped to translate in to the sustainability of the subprojects. The anticipated availability of additional resources as a result, it is hoped, will increase the WMCAs' ability to channel some of their funds for the O&M of their respective subprojects (ADB 2007).

More fundamentally, as argued by Suhardiman (2008) and Mukherji et al. (2010) with respect to WUAs in general, policy makers assume the relationship between the state (usually irrigation) agencies and the WUAs to be neutral and apolitical as the state agency tasked with creating the WUAs is assumed to lack any identity or interests of their own. This assumes erroneously that new WUAs can be empowered by the very institution these organizations are formed to replace. In reality, management transfer has been characterized by power struggles between the state agency as the existing power holder and the WUAs as the designated future decision makers in irrigation systems management. While this aspect is not explicitly discussed in the literature with respect to WUAs in Bangladesh, it is a relevant additional perspective in considering especially BWDB's failure to adjust to the evolving discourse on local stakeholder participation in the water sector outside of and within Bangladesh.

6.2 Other dimensions affecting WMO formation and functions

While the discussion above focuses on project-specific results and learning, the following discussion covers aspects that emerge as more generic and provide the broader policy, institutional, socio-economic and biophysical contexts in which WMOs function and in deed appear to exert significant influence over their performance.

The gulf between challenges posed by context specificity and complexity and a panacea imagined by external actors: The literature provides examples of but does not adequately explore what Sultana (2011) describes as "the complexities, entanglements and messy relations that constitute political ecologies of resources management". Water hardship, conflicts and marginalisations are found to be products of social processes (that are gendered, classed and spatialised) as well as natural processes (local geohydrology, depth of arsenic sediments), in addition to the very ways that community and participation are conceptualised and practised (Sultana 2009). The same author concludes that conflicts over resources are therefore grounded in emotional geographies of places, people, and resources, enabling us to better understand the ways resources and emotions come to matter in everyday survival struggles.

The complexity involved in water management and in the relationship between water and human well-being is reflected in that access to safe water in rural Bangladesh is predicated

upon a variety of factors, such as ownership of land, ownership of a tubewell, socio-spatial location in relation to surface or ground water, membership in a water committee, or kinship and/or patron–client relations that enable access. While access is often discussed in terms such as proximity, distance, time needed, and physical burdens, it is also linked to socio- cultural factors such as class barriers, power relations, gendered spaces, and the emotional labor needed to negotiate water rights (Sultana 2011).

Onto this highly contextualized canvas has been imposed what Wood et al. (2010) have described as ‘the tyranny’ of the participation and empowerment approach as best practice in the organizational form of WMOs. The literature on WMOs in Bangladesh begins to show that these structures, conceptualized based on an imagined typology of local stakeholder interests and behavior (Mukherji et al. 2010) rather than on any specific context, are unable to deal with the messiness of ground scenarios. Viewing community ahistorically, as well as out of its social and political context, can reinforce existing asymmetrical social/power relations. As noted by Sultana (2009), these relations that play out in water management can challenge notions of democracy and equity that are increasingly embodied in national water development policies uncritically espousing community and participation. Similarly, Mukherji et al. (2010) conclude that “farmers’ participation became the goal, rather the means of IMT, thereby obliterating the basic fact that farmers are interested in receiving adequate and reliable supplies of water in order to increase their production and not interested in participation for the sake of it.” Based on case studies and readings of history of IMT policy, the same authors claim that it is not so much of an implementation failure of IMT/PIM as it is a flaw in the conceptual idea behind it. They argue that the policy discourse on IMT has stagnated at the level of consensual discourse given that its policy assumptions are never questioned or even discussed, even though from the farmers’ side there is little motivation to perform regular maintenance, as this does not significantly increase the actual water flow in the canal, despite the link between maintenance and irrigation systems efficiency. In practice, they find that farmers solve their water scarcity problem either by approaching the irrigation agency staff for additional water supply, or by arranging it illegally, rather than through regular maintenance. Coupe et al. (2005 quoting Shivji 2002) thus conclude that it is “counterproductive to attempt to resolve contentions over common pool resources through ad hoc measures such as creating project led village natural resources committees...outside the regular organs of village governance. Whatever the short term successes of such measures, in the long run, they are neither sustainable nor politically viable and, much less rooted in local politics.”

Broader hydrological realities: The National Water Policy acknowledges that Bangladesh, as the lower riparian, has limited control over rivers entering its borders and that it is affected by the significant upstream diversions and abstractions that reduce water availability during the dry winter months; by the absence of upstream hydrometric data that inhibits responses in periods of both flood and drought; and by the general poor quality of water entering the country from upstream in some of the basins (World Bank 2005).

Political legacy of centralized government: Soussan et al. (1997) note that rural areas of Bangladesh have lacked strong civil institutions which are representative of all stakeholders, and the absence of a tradition of accountable state organizations which have a clear mandate understood by the rural population. The Union Parishad (a local council covering

about 10 villages) remains the only locally elected form of government (Thompson et al. 2003). With the enactment of the Gram Sarkar (village government) Act (February 2003), the government commenced a program to form 40,000 gram sarkars. However, these are not intended to be a separate tier in the local government but rather a component part of the Union Parishad (World Bank 2005). The development of effective organizations for participation in water resource management and good working relationships between such local organizations and WMOs will thus be a long process. The experience of LGED since the 1999 Water Policy however suggests it is an exception to this observation, although the same cannot be said of the BWDB.

Conflicting national policies: Prominent examples are the trade policies stimulating growth of shrimp cultivation that are in conflict with the goal of the BWDB. While BWDB seeks to prevent saline water intrusion, without any change of the rules concerning water management, saline water was taken in the polder areas for shrimp cultivation. Shrimp cultivation was initiated by either the local elites with large landholdings or big investors from outside with political power. The profit interest of these investors in shrimp sector and the state's interest in foreign currency given the increased demand and high price for shrimp on the international market, resulted in an expansion of shrimp culture even without putting into place any policies regarding water, shrimp and agriculture at the beginning. Although BWDB has been working in building water infrastructure to bring in saline water in the polders in the areas where fisheries projects have been implemented, in the National Water Policy (1999) their objective still remains a check on salinity (Alamgir 2010). Wide-scale land use conflicts and social unrest have now emerged even though shrimp farming is now established as an important industry, contributing 5.2% to GDP, and is the second-highest foreign exchange earner of the country (Islam 2005). The study by Nowreen et al (2011) referred to below suggest that WMOs have been used as vehicles to transform local land and water use from agriculture to commercial shrimp production.

Structural constraints of donor support: Most public sector investments in the water sector have been provided through (relatively) short term projects with donor support provided through centralized executing agencies. The government, burdened with the responsibility of providing counterpart financing for the implementation of these projects, under significant time pressure to implement sometimes unrealistic schedules, and unable to predict what priorities the donor community would next assume, has been poorly positioned to manage long-term operation and maintenance of public sector-financed water management interventions (World Bank 2005).

Institutional conflict and poor integration: One level of this has been noted between the LGED and the BWDB which sometimes find themselves as joint implementing agencies. Inadequate levels of cooperation between these two organizations over the operation and maintenance of the water structures owned by one institution in the project area of another had led to distrust, confusion and conflict that results in low performance of the whole physical system (Akhter et al. 2000, Nowreen et al. 2011).

More broadly, not all issues can be or should be addressed at the purely local level and there is consequently a need to develop structures which integrate local institutions into the wider fabric of the state and civil society. Alamgir (2010) observes that one of the main

reasons for conflict over water is the absence of coordination among different institutions. The Upazila Executive Office carries out projects like dredging canals to provide support to the poor but it is not coordinated with BWDB's polder management plan. Similarly, Department of Fisheries is responsible for leasing out public water bodies, which is not planned with the active participation from officials from Department of Agriculture and BWDB. Sultana and Thompson (2010a) submit that the ability of the various resource management institutions (RMIs) to address different floodplain resource management issues is affected by their origins and remit. The water sector RMIs seem to take a narrower approach to resource management than the wetland and fishery management RMIs. They found that decision making appeared more balanced and participatory in the fishery-related projects, which took a more integrated view of floodplain resources. A small scale was not necessary for successful resource management, since in the two larger areas the combination of local community organizations and higher co-management bodies appeared to allow local decision making and appropriate rules to be coordinated between lower RMIs and government. Alamgir (2010) thus points out that the struggle between stakeholders for water relating to livelihoods is constituted within these contradictions in institutional arrangements and conflicting policies. Related to this, Soussan et al. (1997) emphasize the need to integrate the process of WMO development and local water resource governance into the wider framework of local agencies and civil society. They point out that since in the water sector issues are inherently multi-dimensional and dynamic, actions in any one place potentially affect other interests upstream and downstream. Therefore, participation at the local level needs to be integrated into a wider process of reform of decision-making structures and institutional mandates.

Corruption: The issue of shrimp cultivation also bring to the surface the influence of corruption that, according to Alamgir (2010) occurs in the Upazila Executive office in permitting large shrimp farms and also not resolving the cases of conflicts between rice cultivators and shrimp cultivators. The same author states that corruption also takes place in the Department of Fisheries, Upazila Executive Office and Union Council with respect to leasing out water bodies, and in creating gates and opening sluice gates in the embankments which are related to the BWDB officials.

Land as a source of power and elite capture: Blair (1985) in his analysis of attempts to establish local government structures by successive Bangladesh governments between 1958 and 1985, demonstrates the political and bureaucratic complexities involved in putting a culture of local level participation into practice. Those that did exist were captured by the rural elite to reinforce the status quo and strengthen the position of the dominant elites at the local level.

Alamgir (2010) shows that determining which water will be available in the water system and the distribution of the available water is shaped by relations of power which are strongly linked to land ownership. Farmers' access to water is found to be determined by their ownership of land. Ownership of land as a productive resource not only facilitates access to water but is also crucial for production of power to determine control over the water resources. Thus it has been observed that the land rich people are connected to the local politics and the local administration. The Union Council was also aligned with the land rich people. Therefore, the larger land owners have power to manipulate local

administration and rules pertaining to the access to and allocation of water. Rich farmers usually control the operation of flood control, drainage and irrigation structures that are simple and relatively small. In this way, public goods are used as private goods and operate against attempts to reduce existing inequalities in the distribution of project benefits (Chowdhury and Rasul 2011). Although the Union Council has a crucial role to play in increasing participatory management of water and allocation of water resources, this responsibility appears to be at odds with those who control the decision making.

A study by Nowreen et al. (2011) of two neighboring projects (Mondolbari Drainage and Kakuibunia-Chinguri) implemented in 1999 by LGED under the first phase of SSWRDSP, illustrates the operation of these power dynamics with respect to shrimp farming. They report that the WMCA agenda in Mondolbari Drainage was heavily biased towards their own economic gains neglecting the social impact they have. The WMCAs were mostly controlled by the power group in the community (Rahman et al. 2007). Continuing culture fish in the floodplain water body system is an example of this. Most of the benefit, if not all, of this culture fish goes to the influential and wealthy farmers creating social issues such as access to floodplain fisheries by the poorer traditional fishermen. This has jeopardized household nutrition, public health and general social well-being of communities, in particular, widows, single women and children. The power group controlling the WMCAs has been able to divert the project objectives in favor of culture fish, ignoring the requirements for Aman rice cultivation even though the project's original objective was to enhance agriculture. In contrast to Mondolbari Drainage, the absence of any institutional conflicts (e.g. between BWDB and LGED), the presence of religious homogeneity (e.g., mostly Hindus) and discontinuation of culture fish in the rice fields helped the Kakuibunia-Chinguri project to be successful (Nowreen et al. 2011).

Reference to institutional and policy conflicts made earlier are played out in the arena of land use and ownership, and the many diverse uses of the very limited land especially in the coastal zone creates the potential for conflict, with each land use having manifold implications for socio-environmental conditions.

6.3 Progress

Although the above sections focus on the existing challenges to WMOs realizing their potential to contribute to local water resources management and overall development, past experience also represents a process of evolution through experience. It could be argued that this is evident in the removal of two of the most important causes of poor beneficiary response: the repetition of the phenomena of inducting beneficiary groups as an after-thought towards the close of the scheme, and the transfer of funds collected from the beneficiaries to the treasury (GoB 2006). Involving the scheme beneficiaries from the very conceptual stage of a scheme through the entire scheme cycle has been made mandatory through the National Water Policy and the GPWM. The new generation schemes in the water sector are mostly designed to meet this requirement, at least on paper. Regarding the use of service charges collected by scheme authorities for providing irrigation services, until 2003, scheme authorities were not allowed to retain the revenue for O&M and were required to deposit the entire amount in the government treasury. The beneficiaries were reluctant to pay in as much as they did not see the money being used for the benefit of the scheme. The Imposition, Collection and Use of Service Charge Regulation (2003) now enable

the scheme authorities to retain the fund locally and use it for O&M of the scheme by following prescribed government guidelines (GoB 2006).

The GPWM represents progress in that they recognize the central importance of participatory decision making, and emphasized a need to move the approach to participation beyond BWDB's "blue-print" approach of establishing target numbers of Water User Groups, Water User Committees and Water User Associations each with fixed membership rules and remits (Lewins and Robens 2004). However, by codifying the process and structure to be followed in establishing WMOs, the GPWM is rather prescriptive without appreciating the highly contextual nature of the tasks involved. As such, they may be seen as still oriented towards achieving the objectives of the executing agency rather than establishing mechanisms to ensure that the agencies are better able to respond to the local stakeholders. The disparity between the guidelines (what should happen) and practice (what does happen) is also explained (ADB 2003a) as a logical outcome of the lack of emphasis on training. The guidelines, as with many institutional and policy changes, are promulgated by the Government but the individuals responsible for implementing these are not provided with an understanding of how this is to be done (ADB 2003a).

Furthermore, Chadwick and Datta (2003) are of the view that whereas in the past government agencies were hostile to concepts of local level involvement in decision-making, today, whilst there are still formidable barriers to the emergence of widespread and sustained participation, a consensus has been reached in Bangladesh, at least in principle, of the need for such a process, and this consensus is reflected in the new National Water Policy. The emphasis has been shifted from flood control to water management; from purely structural solutions to combinations of structural and non-structural measures, designed to meet a broader range of water management needs; and from project development purely on considerations to the stakeholders' participation during in all stages of the project development. The participatory water management approach is now considered as an effective way to manage the complexity of water management in Bangladesh (Choudhury 2005). Chadwick and Datta (2003) further emphasize that the importance of the direction this new policy provides cannot be over-stated. What has not yet emerged is a robust process through which meaningful participation can be achieved.

The National Water Policy adopted in 1999, talks of water rights, but not specifically about irrigation rights and obligations. It is necessary to spell out equitable irrigation rights and obligations at the policy level and involve WMOs and WMAs at the field level in the process of ensuring that the codified irrigation rights and obligations are properly observed by all concerned to ensure equity in water distribution and efficiency in water use. (Hussain 2004)

7. Conclusions

Perceptions of success will depend on the criteria applied to assess an intervention or policy. In this study, there are two sets of criteria: the first in line with the original functions of O&M assigned to WMOs when introduced in Bangladesh; the second, the far broader challenge of being a key, if not the primary, local institution for rational and sustainable water resources management. As such, one could argue that the first criterion is historical and retrospective in nature, while the second is more an expression of current needs.

Many of the assessments of WMO performance in Bangladesh available for this review are limited mainly to the historical perspective. While noting that the history of participation in modern water resources management programs in Bangladesh is relatively recent, the literature suggest that a robust process through which meaningful participation could be achieved has not yet emerged. Success has been elusive in the many attempts to achieve effective long-term operation and maintenance of flood control and drainage interventions (World Bank 2005). With respect to the broader criteria, the experiences, especially under SSDWRDSP, seem to suggest that indirect poverty reduction through private investment in and maintenance of small-scale water control systems may work under certain conditions. SSDWRDSP has demonstrated that, in general, the best WMOs should have the following characteristics: (i) subprojects offering direct and tangible benefits, (ii) good and strong leadership, and (iii) support from proactive implementing agency and project staff. It was also noted that the WMCAs with good income-generating activities were better positioned to conduct O&M activities, although we have already recognized the fine balance that exists between income generation activities and attention to core responsibilities. All the above factors identified, moreover, will be applicable to any institutional structure expected to operate in this context, and are not peculiar to WMOs.

From the iterative approach of SSDWRDSP and the ‘one-size fits all’ approach of BWDB emerges the fundamental importance of treating each WMCA on its own merits, avoiding generalized solutions. This includes assessing what maintenance the WMOs are capable of doing and what is beyond their financial and technical capability. This will help define more practically, the continued investments required from the government for a specific scheme. More fundamentally however, there appears to be an urgent need to recognize that there is no logical reason why WMOs in the Bangladesh polder context should succeed any more than any alternative institutional mechanism. As is the case in much of South and Southeast Asia, WMOs in Bangladesh do not represent a natural evolution of institutions out of the local context. They are imposed from outside, and as Mukherji et al. (2010) state, can often have no relationship with the ground realities in which they are expected to operate. In most cases, they represent a panacea articulated in the imaginations of actors (mainly donors) far removed from local realities. As Mukherji et al. (2010) conclude based on a review of 108 case studies, IMT/PIM is in fact far from a panacea to all problems and there is no magic formula for crafting successful WUAs. In fact, they found that farmers were often unwilling to take over management of water infrastructure (mainly irrigation systems), but did not have a choice about whether or not they were interested in IMT. These paradoxes manifest themselves through overall poor performance of schemes after transfer and in the difficulty in convincing farmers and irrigation bureaucracy alike about the virtues of managing public irrigation schemes on behalf of the government. This, they argue, requires us to re-assess our assumptions and focus on what the water users perceive as their interests, and the differentiation between and amongst various water users. This literature review is meant to be an expression of this line of argument in its intention to form a basis for seeking a deeper grasp of the details involved in making sound water resources management possible in the specific polders in which this project intends to work.

Another outstanding factor underpinning the experiences with WMOs in Bangladesh is the nature of the implementing institutions and their ability to respond to changing

developmental paradigms, as was the case with the emergence of notions of poverty reduction, participation, integrated water resources management and decentralization on the world stage through the 1990s in particular. The literature clearly demonstrates the strong implications for WMOs of the implementing institution's orientation and capacities. Here too, the contrast in approaches between BWDB's rigidity in the face of change and LGED's willingness to re-structure itself to suit changing needs has been instructive. In addition to the discussion of these features in the prior section, LGED's strategy of building on prior work through several phases of SSDWRDSP spanning well over a decade must be highlighted as a particular advantage when seeking to manage a dynamic resource within a heterogeneous and complex context. These cycles of project phases have allowed for periods of stock taking, learning and adjustments, and the opportunity to work continuously in the same locations provides the conditions for adaptive management.

The importance of decentralization and the strengthening of local organizations and collaboration between them also emerges as a critical contextual condition given that WMOs need to be better linked to the horizontal and vertical decision making processes. Water management is closely linked to all aspects of rural livelihoods systems and many formal and informal organizations are already in place that in one way or the other deal with water management. It however is also the case that decentralization will not in itself resolve local level resource conflicts given the susceptibility of local organizations to influence by dominant groups. Consequently, water management is subject to the same power structure as the rest of rural society, and competing demands on water resources for different uses in fact continue to intensify.

These dynamic processes of conflict over and co-operation around water resource scarcities, and their social and institutional expressions, are a dominant feature of life in rural Bangladesh. Some commenters believe they remain poorly-understood and little researched, and have to date been largely ignored at project and policy levels. This failure to understand and build upon these processes is seen as one of the principle reasons why past attempts at participatory development in the water sector have had so few successes. The review of literature for this report also supports this view that many of the socio-economic and political issues especially at local scale have not been appreciated. Almost all reports reviewed (numbering approximately 70) for this report present an assessment of WMOs confined to the traditional criteria surrounding operation and maintenance and related aspects such as collection of fees. This approach reflects water management from the limited technical perspective rather than the more expansive lenses of a) how WMOs have facilitated the resolution or management of local level conflicts over access to water, and b) how water as a resource contributes to local development overall and the narrowing of the gap between the rich and the poor. Despite references to power dynamics at community scale, no in-depth analysis of these dynamics was forthcoming, and consequently, there appears to exist a gap with respect to the role of heterogeneity as a core theme in the assessment of the participatory process that is to be embodied by the WMOs. It is moreover proposed that a more in-depth understanding of these dynamics will shed practical light on the nature of the policy, legal and institutional reforms that will also be needed to facilitate institutions like WMOs reach beyond their traditional roles. It may be argued that the SSDWRDSP experiences provide part of the foundation for doing this in its willingness to expand and explore the boundaries of its WMCAs' mandate. It is also suggested that there

still needs to be a shift or expansion in the vision on the part of government with respect to the role and contributions of local stakeholder should play not merely in the water sector, but in the overall development effort, if these institutions are to become meaningful investments in the eyes of these stakeholders. The issue of water management and poverty reduction in the polders however require us to question the value of the WMOs themselves. Thus, the question is not limited to how to improve WMO performance, but rather what institutional structures and processes are most suited to support an integrated approach to water management in the current local contexts specific to each polder. This review does not find any specific reason to continue assuming that WMOs are the only option or that they offer the best option simply owing to their existence. The evidence available in fact suggests the opposite.

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Appendix I: Summary of key Water Sector Policies

The focus of water sector policies in Bangladesh have been dominated by either combating natural disasters like floods and cyclones or attaining self-sufficiency in food production through dry season irrigation (GoB 2006, Chowdhury and Rasul 2011). Major initiatives like the 1964 Master Plan and the 1989 Flood Action Plan focused on flood management while the 1972 Land and Water Resources Sector Study and the National Water Plan Phases I (1987) and II (1991) emphasized agriculture production. What was common to these and other initiatives was the lack of a comprehensive approach to water as an inherent part of an ecosystem having multiple and competing uses. Since there was no framework for integrated water resources planning, the schemes executed under those plans did not bear any mark of an integrated approach, with agriculture remaining the dominant component (GoB 2006).

The influence of floods and agriculture

As explained by Chadwick and Datta (2003), the real beginning of water sector planning was marked by the completion in 1964 of a 20-year Water Master Plan which envisaged a strategy of massive flood control and drainage to be followed by irrigation in a later phase. However, in actual implementation of the plan, much emphasis was put on the construction of embankments and polders over much of the country. Although the activities carried out under the Master Plan generated results, later evaluations found a rapid rate of decline in performance, especially in terms of operation and maintenance, of much of this infrastructure. The orientation of all water sector development to this time was almost exclusively aimed at achieving the goal of increasing agricultural production to achieve national self-sufficiency. This bias towards agriculture meant that solutions tended to be in the form of flood control drainage and irrigation (FCDI) projects. In reality, emphasis was placed on flood control mainly. Then, as is still the case today, the majority of staff at the East Pakistan Water and Power Development Authority (now the Bangladesh Water Development Board (BWDB)) were civil engineers and the organization was inclined to seek structural engineering solutions at the expense of all alternatives.

The country's most devastating flood events of 1987 and 1988 put immense pressure on so-called structural flood intervention, necessitating further investment in flood defense works. The World Bank coordinated the activities of the donors to prepare a Flood Action Plan (FAP). A feature of FAP (1989–1994) was the construction of still more embankments and polders along the major rivers. However, after massive failures of the FAP and the huge economic losses sustained during the 1997 and 1998 floods, it became clear that structural interventions alone were not enough and a shift of emphasis from structural intervention to integrated planning with non-structural flood-control measures was required. This led to an emerging new consensus on the need for, firstly, an integrated water resources management approach which considers all aspects of water resources and uses, and, secondly, on the need for approaches which are built around the social, and not the technical, dimensions of water resources management. This consensus is reflected in both the new policy framework of the Bangladesh Government (reflected in key policy changes such as the 1995 Strategy Paper on Water and Flood Management; Water Policy of 1999 and the Guidelines for Participatory Water Management (GPWM) in 1994 (revised in 2000)).

Flooding has also been a major driver of agriculture policy. Water resources development and management initiatives in Bangladesh are strongly driven by the need for sufficient food grain production for the country's teeming population, and must be achieved in the context of perennial flooding. The monsoon rainfall is paramount for crop production and without it agricultural production would almost certainly stagnate. However, at the same time, its gigantic power of destruction usually creates floods of various magnitudes and extent (Sudip et al. 2011).

National Water Policy, 1999

The stated goal of NWP is "to ensure progress towards fulfilling national goals of economic development, poverty alleviation, food security, public health and safety, a decent standard of living for the people and protection of the natural environment". The NWP declares clearly the intention of the Government to pursue a policy of Integrated Water Resources Management (IWRM) and further pledges to take all necessary measures to manage the water resources of the country in a comprehensive, integrated, equitable and environmentally sustainable manner. Thus it provides a comprehensive policy framework for dealing with such issues as river basin planning, water rights and allocation, delineation of public and private domains, water supply and sanitation, preservation of the natural environment and the developmental concerns of fisheries, navigation and agriculture. It also provides guidance on its disposition towards water as an economic good, water pricing, and fuller participation by stakeholders, decentralized management and delivery structures. The Policy also formulates views on regulations, incentives, public investment plans and environmental protection and on the inter-linkages among them. Finally, the Policy enunciates the basic principles for reforming the water sector institutions, and specifically focuses on the participation by concerned stakeholders at the service delivery level. This concern is evident from the directive that the participation of all project affected persons, individually and collectively, is to be ensured in the planning, design, implementation and operation and maintenance of publicly funded surface water resources development plans and projects.

It is the intention of the Government that the policy will be given effect through a National Water Code which will outline the specific provisions of the water policy required to facilitate implementation. This code is likely to revise and consolidate the laws governing ownership, development, appropriation, utilization, conservation and protection of water resources.

National Water Management Plan

In 2001, the government introduced a National Water Management Plan, prepared by WARPO. The plan's aim is to implement NWPo directives and decentralize water sector management. It provides a framework within which line agencies and other organizations are expected to coordinate planning and implementation of their activities.

The Plan is intended to identify the needs and priorities for water resources management, the institutional structure through which these resources should be managed and the process through which both institutional reform and priority interventions can be realized. If successful, the NWMP will represent a radical break with the past and provide a framework

for the more effective management of these resources in the future. However, as already mentioned, the jury is still out on whether it will achieve this.

The intention is that it will provide advice on the actions required to successfully implement the policies outlined in the NWPo. WARPO is responsible for the development of the NWMP, which is to outline the strategy, management programme and principal works up to 2025. The main elements of the NWMP, among others, include the multi-use approach to water (not just flood protection but also irrigation, drinking water and other uses) and an emphasis on 'soft' approaches instead of just hard engineering approaches.

Appendix II: Summary of key Water Sector Laws

Embankment and Drainage Act, 1952

This Act provides for the construction, maintenance, removal, management and control of embankments and water-courses in order to improve the drainage and protection from floods, erosion or other damage by water.

Bangladesh Irrigation Water Rate Ordinance, 1983

The Ordinance provides for water charges applied to tenants or owners of land benefiting from water supplies on behalf of the Government, the BWDB and the Bangladesh Agricultural Development Corporation. Charges are determined by the government. In view of the high exposure to flood damage, the Ordinance provides for the partial or total tax remission in case of poor harvest or none at all.

Ground Water Management Ordinance, 1985

This Ordinance uses tube well licensing (granted by the Thana Parishad) to regulate groundwater abstraction. The Thana Parishad is required to conduct an inquiry before issuing a license. The criteria for the inquiry include: soil condition, distance to other well and benefiting area. The license may be granted if the Thana Parishad is satisfied that the installation of a tube well is beneficial, will not have an adverse effect upon the surrounding area and is otherwise feasible.

Water Resource Act of 1992

This Act established the Water Resources Planning Organization (WARPO), details of which are in Annex III.

Bangladesh Water Development Board Act (2000)

This Act clarified the functions of BWDB as including: waterworks for flood control, drought prevention, soil conservation, etc.; works for the improvement of water flows to assist fisheries, navigation, wildlife development, etc.; river bank protection; construction and maintenance of coastal embankment; prevention of salinity intrusion and desertification; harvesting of water for irrigation, environmental preservation, and supply of drinking water. It also called for the transfer of BWDB projects covering up to 1,000 ha to local authorities; the gradual transfer of the management of existing projects between 1,000 ha and 5,000 ha to beneficiary organizations, and the management of schemes over 5,000 ha by a joint committee comprising beneficiaries, BWDB, and other water-related agencies.

Draft National Water Act

This is meant to be a comprehensive Act to govern the use and management of water resources and to provide legal basis to operationalize National Water Policy while integrating the existing laws and regulations relevant to the sector and providing new framework for such issues as water appropriation and licensing, and water right administration. Under the proposed Water Act, unless otherwise provided by law, the state owns all water resources in Bangladesh, including surface water, groundwater, and sea water. Water may be legally appropriated for customary uses, but users must hold a water use-right. Use rights are naturally awarded to individuals for the collection of water for

domestic uses, for bathing, and for navigating small watercraft. For other purposes, use rights must be acquired through a general authorization or license.

Water rights are tied to land ownership, and individuals and communities can hold water rights based on their rights to the land. State-owned closed water bodies of less than 3 acres in size are to be subject to common-property principles, and poor people living in the area will be allowed to access the water for their domestic use. In addition, private individuals may have and control small household ponds.

Cooperative Societies Ordinance

Originally legislated in 1984, this Ordinance was revised in 2001 to better accommodate water user groups. Key changes are (i) individuals can now belong to more than one cooperative, (ii) registered water users cooperatives can exact an irrigation service charge from both members and non-members provided that all benefit from the irrigation services, and (iii) the Department of Cooperatives cannot take direct action against a water users group without the concurrence of the sponsoring agency. Together, these changes effectively removed earlier barriers to establishing and nurturing water users groups. Many of the WMOs are currently registered under this Ordinance.

Appendix III: Summary of key Water Sector Institutions

A number of agencies have interests in water, interests that are sometimes complementary but more often competitive. As many as 35 central government institutions, affiliated with 13 different ministries, have responsibilities and activities relevant to the water sector. Key development project implementation agencies of water management investments are the Bangladesh Water Development Board (BWDB), responsible for projects exceeding 1000 ha in size, and the Local Government Engineering Department (LGED) responsible for projects smaller than this.

To recast the NWP within the appropriate intersectoral focus, the MPO was restructured as the Water Resources Planning Organisation (WARPO) in 1991 with the mandate to "evolve national policies and strategies for utilization and conservation of water by all" (GoB, 1999, p15). (Chadwick and Datta 2003)

National Water Resources Council (NWRC).

In 1983 the NWRC was established as an inter-ministerial body. It is the water sector apex body chaired by Prime Minister to formulate water policy and ensuring inter-agency coordination. NWRC consists of representatives from all water-related ministries and is supported by an Executive Committee to ensure prompt action on routine matters. The NWRC led the NWP development process. It is also responsible for the continued development of water resources institutions and for providing policy directives for co-ordination across sectors. However, it is the responsibility of WARPO to determine the means by which the broad policy aims in the NWP are to be implemented and the Policy itself implies the framework within which this is to be achieved is through the NWMP.

The Executive Committee of NWRC (ECNWRC)

To support the NWRC, a 15 member Executive Committee of the NWRC (ECNWRC), headed by the Minister of Water Resources was constituted in 1997 by an order of the Government. In carrying out its responsibilities to the ECNWRC, WARPO is to provide a high caliber Secretariat and to ensure that routine matters are addressed without delay. It will also address the issues requiring the attention of the full council and will ensure that issues are properly presented, recorded and executed.

Ministry of Water Resources (MoWR)

The Ministry of Water Resources is responsible for flood management, irrigation, drainage control, erosion protection, land reclamation, integrated management of coastal polders, river flow augmentation, water sharing from transboundary rivers and wetland conservation through participation of local people and coordinated programs with all the ministries dependent on water resources. Major public organizations under the Ministry of Water Resources are WARPO, BWDB and River Research Institute (RRI). MoWR is entrusted under the NWPo with formulating a framework for institutional reforms to guide water related activities.

Water Resources Planning Organization (WARPO)

WARPO was set up under Water Resource Act of 1992 under the Ministry of Water Resources as the multi-disciplinary planning organization at the national level. Its mandate was further elaborated in National Water Policy of 1999 according to which, WARPO has two broad responsibilities: (a) to work as the exclusive government institution for macro level water resources planning and (b) to work as the Executive Secretariat of the WRC and its Executive Committee. WARPO has become the exclusive government institution for macro-level planning.

The preparation and updating of both the National Water Policy and the National Water Management Plan is a key responsibility of WARPO. It is also mandated to advise other water-related organizations in the development, use and conservation of water, and provide specialized multi-disciplinary and cross-sectional training to concerned functionaries. While WARPO is responsible for water sector macro planning, it is also expected to promote appropriate linkages between macro and micro level planning and provide guidelines for the efficient use of the country's water resources by all users and in all uses.

Bangladesh Water Development Board (BWDB)

The character of the BWDB was paralleled by the dominant approach of the government to water resources management in Bangladesh until very recently. Major investments in the water sector are made by the Ministry of Water through the BWDB which carries responsibility for the planning and execution of over 500 projects, ranging from flood control, drainage and irrigation to coastal protection and erosion control. As WARPO is responsible for national and regional level plans BWDB is supposed to develop projects fulfilling the requirements of their plans. It was and still is predominantly an engineering, construction-oriented agency. It has a large professional staff, almost all of whom are engineers by training, and a centralized structure which is suited to large scale construction-type activities but far less appropriate for any management functions which require significant devolution of responsibilities and the capacity to respond to local conditions and events (Chadwick and Datta 2003). Although the focus of water management has shifted towards joint management, user directed activities, transparency and efficient management techniques over the years, the organizational culture has been slow to change (ADB 2003A).

Over time, its original mandate has become inappropriate, as economic, social and demographic changes and the consequent increasing competition for water use added new and complex dimensions to its original basic tasks. With the formulation of National Water Policy, there have been attempts at institutional reform to achieve decentralized and devolved management with greater role for local government, community groups and the private sector. A major institutional step forward since the formulation of national water policy has been the revision of BWDB's mandate, as embodied in the new Act (ADB 2003b). In an attempt to adapt, BWDB has begun to partner with NGOs for such activities as mobilisation of beneficiary's group formation, and resettlement (Hussain 2004).

Under NWP, BWDB will no longer be the only key player, the overall policy, macro planning and strategy functions was taken out of BWDB (and given to WARPO), and even for implementation of water projects local government and water users themselves was to assume increasingly important roles (ADB 2003a).

Local Government Engineering Department (LGED)

LGED grew from a rural works programme started in the early 1960s. Located within the Local Government Division and is responsible for planning and executing rural works. With offices in every district and Upazila, it provides technical guidance and personnel support to Upazila Parishads in implementing rural WSS projects financed by Upazilas or government, and also seconds executive engineers to larger municipalities. LGED is also involved with stakeholder-driven small-scale surface water management projects with command areas less than 1,000 ha. It places a heavy emphasis on local participation, with representation on Upazila Co-ordination Committees. In regard to water sector projects, LGED draws its mandate from Upazila Parishad Act (24 of 1998) Second Schedule, Clause 23 items 4, 11 and 17 which makes LGED responsible for ensuring the best possible use of surface water, for adoption and implementation of minor irrigation project in line with government directions. The current program of activities of the LGED has been developed on the basis of policies approved for the sub-sector under the Fifth five-year Plan. The objectives of the policy include: Reduction of poverty in the rural areas; Productive employment generation in the rural areas and Self-employment creation for the rural poor. LGED works with local communities in the development of rural infrastructure and, more recently with promoting community participation at all stages of project cycles as it implements various projects.

As the local government system is reestablished and starts functioning, LGED's role will eventually have to change. When all the different tiers of the local government come into effect, the local development activities will be determined by the local councils and not through central mechanism of LGED as it happens now. LGED's role will be to assist the local government councils in all development projects (ADB 2003a).

Bangladesh Agriculture Development Corporation (BADC)

Operating under the Ministry of Agriculture, it took the lead in minor irrigation by introducing low-lift pumps and deep tube-wells through cooperatives. In the late 1980s, BADC withdrew its irrigation services, leaving all irrigation equipment to farmers' groups or individuals (Hussain 2004).

A summary of organizations and their roles in the water sector is given in the table below.

Organization	Current functions	Major issues/problems
National Water Council	Approving national water policies	Too few meetings and inadequate service support from the Water Ministry
Planning Commission	Establishing multisector investment priorities; recommending allocation of resources	Too much attention to routine and process matters; too little attention to strategic direction
Water Resource Planning Organization (WARPO)	Water policy formulation; National water planning; monitoring; formulation of water legislation and regulations; intersectoral coordination of water plans; central	Limited physical resources and staff capacity to perform required functions

Organization	Current functions	Major issues/problems
	data system	
Geographical Information System Unit	Collecting hydrologic, topographic, soil, and flood regime data	Support for continued existence after Flood Action Plan
Bangladesh Water Development Board (BWDB)	Physical modeling; river-training studies	Physical modeling for, among others, surface and ground water; inadequate funding
Institute of Water Modeling (under BWDB)	Mathematical river, flood management, irrigation system, national and regional, and environmental modeling; and survey and data collection; developing a national hydrological data base	Support for continued existence after Flood Action Plan
Flood Forecasting and Warning Center (under BWDB)	Collecting and disseminating information	Lacks proper coordination and linkage with the national Data collection and monitoring Units
Local Government Engineering Department (LGED)	Planning, designing, and implementing rural infrastructure development projects; Thana/Union drainage and embankment planning, irrigation planning, land and water use planning; small-scale water schemes, canal digging programs, town protection schemes	Little or no coordination with Bangladesh Water Development Board and other agencies; inadequate authority for enforcing water regulations
Roads and Highways Department (RHD)	Rural and urban water supply and sanitation	Little or no coordination with BWDB and other agencies; inadequate enforcement of water regulations
Water Supply and Sewerage Authorities (WASA)	Construction and upkeep of potable water supply, sewerage and storm drainage in major cities.	Lack of autonomy from Government control and financial dependency
Department of Agriculture Extension (DAE)	Disseminating information on agricultural technology, including water and land use	Little or no coordination with Bangladesh Water Development Board and other agencies
Bangladesh Agriculture Development Corporation (BADCO)	Operating low-lift pumps and tubewells; harnessing hill streams; controlling salinity; distributing water for irrigation	Little or no coordination with water sector agencies; inadequate responsibility for enforcement of water regulations
Bangladesh Inland Water Transport Authority	River conservancy work, including river training for navigational and meteorological information, including river charts; hydrographic	Inadequate coordination with water sector agencies; inadequate authority for enforcement of water

Organization	Current functions	Major issues/problems
	survey; programming for dredging and reviving dead or dying water bodies; developing, maintaining, and operating inland river ports; developing rural water transport	regulations
Department of Environment	Monitoring pollution in rivers and underground and drinking water; working with other water agencies to develop environmental protection measures; collecting and analyzing environmental data; monitoring and analyzing surface water for pesticides and heavy metals; analyzing wastewater samples for different agencies; helping agencies prepare environmental impact assessments	Insufficient coordination with other water sector agencies; inadequate enforcement of water regulations
Source: Water Resource Management in Bangladesh: Steps Towards a New National Water Plan, World Bank, March 1998.		

Service Delivery Institutions

The Public Health Department is responsible for rural and water supply. Construction and upkeep of potable water supply, sewerage and storm drainage are done by Water Supply and Sewerage Authorities (WASAs) in two largest cities. WASAs do not have autonomy from government control and financial dependency.

The activities of a number of other public sector agencies have an impact on or are supplementary to the agencies directly involved in the water resource development activities. The main agencies are the Department of Agricultural Extension (DAE), Department of Fisheries (DOF), Forest Department (FD), Department of Environment (DOE), Department of co-operatives (DOC), Bangladesh Rural Development Board (BRDB), Department of Livestock services (DLS) and Ministry of Land (MOL) etc. The role of these agencies in relation to water sector interventions is to deliver services in their respective fields of activity within the participatory framework set out in these guidelines. These may include assisting WMOs, i.e. WMGs, WMAs and WMFs, in identifying problems and providing potential solutions. The concerned implementing agency for the water resource development project will take the initiative to ensure necessary co-ordination and co-operation with the above public sector agencies (Hussain 2004).

DAE of the Ministry of Agriculture and the Cooperatives Division of the Local Government and Rural Development and Cooperatives are also implementing programmes focused on agricultural development. The DAE is mainly concerned with the promotion of new crop production technologies and improved and balanced input use; while the Cooperatives Division distributes credit to farmers' associations formed within the framework of its mandate, which are known as Krishak Samabaya Samity (KSS), for agricultural and rural

development. The involvement of BADC is highly concentrated in seed distribution. RKUB distributes agricultural credit according to its own programmes. It has both short-term and long-term credit programmes in the G-K and PIRDP areas as also elsewhere in Bangladesh. It does not provide any special credit for shallow tubewells and other agricultural equipment. Clearly, support for agricultural development in the area is dependent on public sector agencies such as BWDB, DAE, and RAKUB.

Cooperatives Division of the Local Government and Rural Development and Cooperatives

The Cooperatives Division distributes credit to farmers' associations formed within the framework of its mandate, which are known as Krishak Samabaya Samity (KSS), for agricultural and rural development.

Department of Cooperatives is the most important partner in the development and continued sustainability of the WMO. Technically, its principal role, so far as these relate to WMO affairs, is regulatory in nature. It is charged with the responsibilities of timely registration of the cooperative associations and closely monitoring their activities through inspection of their activities and regular audit of their accounts. Other responsibilities include education and training of the sponsoring agency officials, members of the cooperative associations, advisory and consultancy services and assistance in arranging finances for development work by the associations. Timely discharge of all these functions is essential for the smooth operations of the WMOs. The DOC is one of the oldest Departments of the Government. However, there has not been any recent effort at its institutional development suiting to the challenges of the times. Like most other departments of the Government, the DOC also follows a standard staffing pattern, each Thana having two Cooperative Inspectors. However, deployment of field staff of the DOC should be based on the volume of active case load. The main reason hampering the DOC officials in discharging their duties more efficiently and at regular intervals were lack of logistics (GoB 2006).

Although BWDB is the main organization with responsibilities in polder management, Union Council and Upazila Executive Office are also involved in maintenance work indirectly by taking canal excavating projects for creating jobs for the poor that have consequences on the water availability for cultivation (Alamgir 2010).

Unfortunately, there is hardly any institutional base for local level planning, although the district and thana level offices of the central government agencies make some efforts at involving the local people in various stages of the scheme cycle. Except for the Union Parishad, the Thana and Zila Parishads have had no elected representation for long. These parishads are run on an adhoc basis by members of the bureaucracy (GoB 2006).

Department of Cooperatives

The Department of Cooperatives is the principal government organization responsible for the promotion, development, and registration of cooperative societies in Bangladesh. It works directly under the supervision and control of the Rural Development and Cooperative Division of the Ministry of Local Government. Parliament passed the Cooperative Societies Act in 2001

Local Institutions

Local government has historically had a marginal role in the process of implementing water management investments, though it is forecast that this role will become more dominant in accordance with the directives of the National Water Policy. Local Governments (Parishads) are to be principal agents for coordinating the participation of project-affected persons in planning, design, implementation, and operation and maintenance of publicly funded surface water development plans and projects (ADB 2003a). According to the NWPo, water management and allocation will be devolved to the local administrative level although this 'local administrative level' is not defined. Four tiers of local government institutions are being established in Bangladesh: district, sub-district, union and village. Only one level of institution (union) is found to be active. As per the assessment in 2000, the District, Sub-District and Village Acts exist, but elections to the councils at these levels have not been held.

District Level Inter-sector Project Evaluation Committee (DLIPEC)

Inter-agency coordination of water resource interventions at the local level occurs through local level through the District Level Inter-Agency Project Evaluation Committee (DLIPEC) meetings. Staff from all relevant line agencies at the district are invited to participate in these meetings. In some cases, the water users organizations that have been established to manage water management investments have served to resolve local level disputes (ADB 2008a).

The DLIPEC was established by the Planning Ministry in 1999, in anticipation of inter-sectoral conflicts between LGED and BWDB, both of which are entrusted to construct FCDI schemes up to 1000 ha, but the BWDB is responsible for all other schemes. The directive establishes a conflict resolution formula as follows:

- Committees are constituted by the lead agency of the proposed project comprising a chairman, plus eight members including representatives from the District Administration, Department of Agricultural Extension(DAE), Local Government and Engineering Department (LGED), BWDB etc.
- There are no representatives of the intended beneficiaries or of the concerned Local Government Institutions (LGIs) on the Committee.
- The committee is empowered to prepare and submit PCPs. However, this is unlikely to happen in the near future.
- If the Committee cannot reach a consensus on any project proposal, the matter would be referred to the BWDB Zonal Chief Engineer for resolution.
- As a last resort, there is provision for a Central Co-ordination Cell to take the final decision. The Cell comprises seven members, including the Director General WARPO as the Chairman.

Union Councils

It is through local government i.e. Union Councils that the applications for construction of shrimp farm, for leasing in public water bodies or public land, for installation of a government funded pond sand filter are verified. Leasing out the water bodies affects the availability and accessibility to water for both shrimp and rice cultivation. Union Council is