Southwest Area Integrated Water Resources Planning and Management Project in Bangladesh

Sharing Knowledge on Community-Driven Development

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CONTENTS

ABBREVIATIONS

ADB	Asian Development Bank
BWDB	Bangladesh Water Development Board
CDD	community-driven development
DMC	developing member country
FFS	Farmers' Field Schools
FSF	Field Schools for Fishery
IWRM	integrated water resource management
O&M	operation and maintenance
SWAIWRPMP	Southwest Area Integrated Water Resources Planning and Management Project
WMA	water management association
WMG	water management group

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The Southwest Area Integrated Water Resources Planning and Management Project

1. Introduction

Community-driven development (CDD) initiatives actively include beneficiaries in their design, management, and implementation. A distinctive feature of such initiatives is that they give community groups and local government agencies direct control over project planning and allocation of project resources.

CDD projects, in the view of the Asian Development Bank (ADB), have five defining characteristics:

- They are community focused—the beneficiary grantee or implementing agent is a community-based organization or a representative of a local government agency.
- They involve participatory planning and design.
- The community has direct control over key project decisions and in the management of funds and other resources.
- The community is directly involved in implementing the initiative through the supply of inputs, labor, or funds, or indirectly involved in managing and supervising the contractors or in operation and maintenance (O&M) functions.

Members of the Kalmitala Water Management Group during a consultation meeting with the researcher

- They employ community-based project monitoring and evaluation to ensure accountability to members of the beneficiary community.

An ADB study conducted in 2009 concluded that when compared to initiatives completed under conventional implementation arrangements, CDD initiatives

(i) result in more cost-effective delivery of international development partner funding;
(ii) are more responsive to local community demand, thus, allowing them to generate additional benefits;
(iii) instill a sense of beneficiary ownership that translates into better O&M and increased sustainability of the facilities established or upgraded;
(iv) provide a fund disbursement mechanism that promotes transparency and limits leakages; and
(v) result in projects with higher rates of return than other ADB-financed projects.[1]

Despite such benefits, other studies undertaken by ADB have identified two major difficulties in the wider application of CDD. These are (i) weak coordination among sector agencies in delivering basic services that effectively respond to local development needs, and (ii) limited knowledge of developing member country (DMC) officials in designing CDD projects and programs in a way that is appropriate to that particular country.

Given these difficulties, it is not surprising that DMCs are at varying stages of readiness when integrating CDD into development operations. Some countries—such as Indonesia and the Philippines—have accumulated extensive experience in implementing large-scale CDD initiatives. A number of other DMCs have either pilot-tested CDD, or have integrated CDD elements into larger projects. Other DMCs are keen to adopt CDD, but have yet to begin doing so.

In light of the above, numerous variants of the CDD model have emerged. While the foundation of all of these variants is the premise that communities should be at the forefront of their own development, the variants themselves differ widely in their geographic scope, time frame for completing project works, implementation arrangements, subproject selection mechanisms, funding flows, roles of secondary agents (i.e., national and local government agencies, and civil society organizations), and community decision-making processes. This divergence is a natural outgrowth of the fact that development requirements and priorities vary greatly from community to community and from country to country. The numerous variants of the CDD model that have emerged to date reflect the necessity of adopting a flexible approach to development that is tailored to local circumstances.

CDD has much in common with social accountability in that ordinary citizens monitor the government's conduct and performance, and hold public officials accountable

[1] ADB. 2009. *Supporting Community-Driven Development in Developing Member Countries: Community-Based Development in Water and Sanitation Project*. Manila. Examples of small-scale infrastructure facilities include classrooms, community irrigation systems, day care centers, health stations, postharvest facilities, rural roads, sanitation facilities, and water supply systems. CDD initiatives also include non-infrastructure investments, such as microcredit facilities, training, and other types of community-level investments.

for their actions since they are tasked to use public resources to deliver services, improve people's welfare, and protect people's rights. Similarly, CDD and social accountability share a common objective, which is to expand democratic governance and upgrade service delivery to community residents, most notably the poor, which invariably includes women.

Of late, observers of the overall economic development process have increasingly recognized the inherent limitations of traditional accountability mechanisms, an outcome that has in turn given rise to questions on the historical relationship between society and the state. The experience of civil society organizations suggests that accountability is best achieved by a type of "cogovernance" that blurs the boundary between these two actors. As a result, groups of ordinary citizens throughout the world are experimenting with inserting themselves more directly into the core functions and everyday workings of the state apparatus. This includes monitoring the state's previously opaque operations and using the results of such monitoring to influence official policy.

The Southwest Area Integrated Water Resources Planning and Management Project (SWAIWRPMP) is an example of such emerging cogovernance where beneficiaries are directly involved in planning and implementing development initiatives. In this project, beneficiaries were directly involved in implementing water management in project areas and in managing the O&M of project facilities. At the broadest level, the benefits of such cogovernance include maximizing the beneficial impact of each dollar of development expenditure, and dissolving the monopoly that the government once held over an area of economic life that is fundamental to the life and livelihood of ordinary citizens.

Due to its wide beneficiary participation in the planning and implementation of project works, and in the monitoring of project outcomes, the SWAIWRPMP is, in fact, a CDD project although it has yet to be formally labeled as such in some circles.

This booklet briefly summarizes this project's planning, implementation, and monitoring, including its significant successes. At a broader level, it describes how applying CDD principles in managing water resource can both expand livelihood opportunities available to beneficiaries at no additional cost to the project, and bridge what historically has been a gap between project beneficiaries and project implementation agencies.

Community Participation in Southwest Area of Bangladesh

Project Director Kamalur Rahman Talukder of the Southwest Area Integrated Water Resources Planning and Management Project recounted that the project started with the aim of enhancing economic growth and reducing rural poverty in the southwest area by improving the productivity and sustainability of existing flood control drainage and irrigation systems. The project, he said, used the integrated participatory approach of matching water resources with different users—farmers, fishermen, women, and other users—and their needs, which are agriculture, fisheries, livestock rearing, and livelihood development.

At the operational level, the project's success in accelerating economic growth and reducing rural poverty depended heavily on the collaboration of a number of service providers, including the Bangladesh Water Development Board, the Department of Agriculture Extension, and the Department of Fisheries. However, from a broader perspective, the primary objective of the project was to create awareness of the benefits of directly involving beneficiaries in project planning and implementation in a way that mobilizes local community support for improving the livelihood of residents. This direct involvement and mobilization of beneficiaries took a number of forms, including (i) local community participation in preparing the subunit implementation plans; (ii) introduction of income-generating activities new to the project area; (iii) control of lower-level infrastructure by water management organizations; and (iv) capacity building through learning-by-doing, particularly in the of Agriculture Extension, and the Department of Fisheries. However, from a broader perspective, the primary objective of the project was to create awareness of the benefits of directly involving beneficiaries in project planning and implementation in a way that mobilizes local community support for improving the livelihood of residents. This direct involvement and mobilization of beneficiaries took a number of forms, including (i) local community participation in preparing the subunit implementation plans; (ii) introduction of income-generating activities new to the project area; (iii) control of lower-level infrastructure by water management organizations; and (iv) capacity building through learning-by-doing, particularly in the operation and maintenance of project facilities by water management organizations, and in the capacity development of these organizations. Finally, these water management organizations were made sustainable over the long term through mobilization of local resources, collective action by beneficiaries that expanded income-earning activities, and operation and maintenance of the infrastructure funded by the project.

2. Project Context

Water affects Bangladesh's rural population in numerous ways. First, the country is itself located on a vast floodplain at the confluence of three main rivers: the Jamuna, the Meghna, and the Padma. Together with significant seasonal variation in rainfall, this geographic location results in monsoon flooding, congestion of drainage facilities through sedimentation, erosion of riverbanks, saltwater intrusion into freshwater resources, water scarcity, cyclones, and arsenic contamination of groundwater that impacts 30%–50% of the country's population.

The above notwithstanding, water is critical to the livelihood of Bangladesh's poor population as it impacts their productive activities at the most fundamental level. More than 80% of the country's poor population lives in rural areas. As a result, the economic livelihood of these residents depends on the country's agriculture or fisheries resources. Although agriculture's share in Bangladesh's annual gross domestic product has now declined to 17%, this sector still accounts for 48% of all employment. Hence, access to—and effective management of—the country's water resource is essential to improving the lot of the country's rural poor.

In Bangladesh, management of the water resource is complicated by the sheer diversity of the economic and domestic activities that water users undertake. For example, the manner in which the country's water resource is managed directly impacts agriculture, boat transport, the drinking water supply, fisheries, industry of all types, and a broad range of nonfarm activities. Water is vital to the sustainability of the country's

A farmer collecting seedlings from a seedbed under the Kalmitala Water Management Group irrigation area at Dopakhola Village

ecosystem, and thus, to the future size and quality of the water resource itself.

Since the 1950s, Bangladesh has undertaken substantial public investment in managing the country's water resource. Since that time, a total of 9,500 kilometers (km) of river embankments, 11,500 km of canals, 60 km of revetments, and more than 13,500 hydraulic structures have been constructed. However, the performance of the infrastructure has been suboptimal as a result of continuing quality deterioration of these facilities. This deterioration has largely resulted from the lack of ownership by water users and the result of inefficient planning and water use. In light of such outcomes, the efficient management of Bangladesh's water resource critically depends on the participation of water users. This means that sustainability of the country's flood control, drainage, and irrigation infrastructure—on which improvement of the livelihoods of the country's poor population depends—likewise requires the participation of water users.[2]

Bangladesh's southwest area comprises 4 million hectares (ha) or 27% of the country's total land area. Approximately 51% of the 28.6 million residents of this area—which account for 23% of Bangladesh's total population—are poor. While agriculture is the dominant form of livelihood in the southwest, the sector's productivity in this region lags that of the sector nationwide. This outcome is primarily due to the dominance of traditional low-yielding crop varieties, vulnerability to flooding, and expansion of irrigation facilities at a pace that lagged that of the country's other regions.

The southwest area has 78 flood control, drainage, and irrigation systems. Nevertheless, the area suffers from acute water management problems, including (i) water shortages due to reduced flows in the tributaries of the Ganges River; (ii) saltwater intrusion into freshwater

A Farmer Shares Experience from the Project

Yusuf Ali Shikder, a farmer, is a member of the Mirapara-Aterhat water management group under the Bagdanga Regulator.

On his small landholding near his house, Shikder began cultivating cucumber after undergoing training in homestead gardening, farm management, grading, and marketing provided under the project. His venture into homestead gardening was a success. He said, "I am getting much more income from this land than before. I am managing my activities nicely and well beyond my expectations. This is the contribution of the project, and I am truly grateful, especially to the facilitator who encouraged me to diversify my cropping pattern."

[2] A flood control, drainage, and irrigation system is an enclosed water management system that is surrounded by natural or artificial polder-type embankments.

resources; (iii) environmental degradation and resulting loss of economic activity; (iv) flood inflows from the Ganges River during the monsoon season; (v) deterioration of existing flood control, drainage, and irrigation systems; (vi) congestion of drainage facilities due to sedimentation; (vii) reduced tidal sweep volume; (viii) arsenic contamination; and (ix) vulnerability to cyclones and tidal surges. Ameliorating the adverse impacts of these issues requires improving the overall management of the water resource.

In 2005, prior to implementing the SWAIWRPMP, the total area planted to rice in the Narail and Chenchuri Beel subproject areas was 34,248 ha. Rice yields averaged 2.1 metric tons per hectare (ha). However, as the area's average cropping intensity for rice was 190% at that time, its total annual rice output was 72,103 metric tons.

Similarly, prior to the SWAIWRPMP, the area's 2,527 ha devoted to capture fish production produced an average of 1.92 metric tons annually, which translates into 4,876 metric tons of total fish output. Of this total 2,527 ha devoted to fish production, pond culture accounted for 1,263 ha, *gher* (a particular type of fish pond) accounted for 1,159 ha, and borrow pits for 105 ha.[3]

A preproject household survey done in 2009 revealed that the average monthly household income in the project area was Tk3,107 ($40). The area's poor population—including the landless and indigents—numbered 5,215.

Following devastating floods in 1987 and 1988, large-scale coordinated initiatives—including those of international development partners—for systematically addressing the water management problems referred to above were undertaken during the 1990s under the government's Flood Action Plan. For its part, the government initiated a comprehensive water resource management policy and institutional reforms consistent with the prescriptions embodied in the Flood Action Plan. The government's 1999 National Water Policy set out goals and principles for participatory and integrated water resource management (IWRM), and sustainable facility O&M arrangements that featured progressive transfer of governance and management of water infrastructure to water management organizations. These activities led to the finalization of the National Water Management Plan in 2004.

In response to the National Water Policy and the National Water Management Plan, external funding agencies such as the ADB, the Government of the Netherlands, and the World Bank harmonized their support to the sector.

For example, the Government of the Netherlands provided cofinancing for the rehabilitation of medium- and large-scale flood control, drainage, and irrigation systems serving 380,000 ha under the World Bank's Water Management Improvement Project, which for the most part benefited Bangladesh's rural areas.

The Government of the Netherlands also provided support to the Bangladesh Water Development Board (BWDB) in preparing and implementing a comprehensive action plan. This plan included integrated planning and rehabilitation of medium-scale

[3] Borrow pits are areas from which sand, dirt, gravel, or other terrestrial materials have been removed for use at a different location, thus leaving a shallow depression in which water from rain or runoff collects.

flood control, drainage, and irrigation systems, and the development of estuaries. Similarly, the International Development Agency assisted in upgrading the financial management system of the BWBD. ADB—with cofinancing from the Government of the Netherlands—supported the improvement of small-scale flood control, drainage, and irrigation and river bank protection systems; two large-scale flood control, drainage, and irrigation systems; and the development of irrigation command areas through the government's Local Government Engineering Department. The role played by ADB in promoting the policy reform framework necessary for transferring the management of flood control, drainage, and irrigation systems to water management associations (WMAs) was likewise significant.

Ultimately, the SWAIWRPMP became the first initiative to successfully incorporate beneficiary participation into all aspects of management of large-scale flood control, drainage, and irrigation systems. The overall objective of the project was to ensure the sustainability of flood control, drainage, and irrigation systems by transferring their O&M to water management organizations. While this is a dramatic change from more conventional implementation arrangements for projects focusing on flood control, drainage, and irrigation systems, the SWAIWRPMP was built upon the successes of similar initiatives relating to smaller-scale systems. These predecessor initiatives demonstrated that direct involvement of project beneficiaries in managing ADB-supported flood control, drainage, and irrigation infrastructure development initiatives resulted in significant gains in both efficiency and sustainability of such facilities.

The Bangladesh Water Development Board Experience

Md. Ismail Hossain, director general of the Bangladesh Water Development Board, recounted that "the Southwest Area Integrated Water Resources Planning and Management Project has been effectively implemented by adopting the community-driven development approach to enhance participatory and integrated water management." He noted that coordination occurred in three different spheres: (i) coordination on the uses of water for agriculture, fisheries, and associated livelihood activities; (ii) coordination of the water users—farmers, fisherfolk, and other beneficiaries; and (iii) coordination among line agencies, such as the Department of Agricultural Extension and the Department of Fisheries, and again, their coordination with the beneficiaries. Hossain pointed out that for the first time in Bangladesh, a network of water management groups has effectively undertaken the operation and maintenance of infrastructure in large-scale flood control, drainage, and irrigation schemes. This, he concluded, has led to the sustainability of these water management facilities, while enhancing the institutional capacity of the Bangladesh Water Development Board to work together with user-beneficiaries and partner line agencies in managing valuable water and water resources of the country.

3. Project Activities

With the assistance of ADB and the Government of the Netherlands, BWDB initiated the SWAIWRPMP during fiscal year 2006–2007. The date targeted for the completion of project implementation was June 2015.

In broad terms, the project's overall objective was to accelerate economic growth and reduce rural poverty in the southwest area of Bangladesh by improving agricultural productivity and ensuring the sustainability of two existing flood control, drainage, and irrigation systems. In operational terms, the project's primary goal was to renovate the Narail and Chenchuri Beel flood control, drainage, and irrigation systems, which together serve a total area of 57,000 ha.

Ultimately, the project aimed to transfer the responsibility for the O&M of the facilities to water management organizations, of which the beneficiaries would be the sole members. To achieve this, the project organized beneficiaries into water management organizations based on hydrological boundaries rather than on government administrative boundaries.

Located in Bangladesh's southwest region, the two subproject areas included the districts of Narail and Jessore. Each of these subproject areas comprised a number of independent subunits, each of which was controlled by an individual hydraulic structure such as a regulator.

A subunit implementation plan was then prepared for each independent subunit with the full participation of the beneficiaries who lived in that subunit. A WMA

Fisherman harvesting fish from the borrow pit fish culture area managed by the Surjamukhi Water Management Group

was then established in each subunit. The area served by each WMA was further divided into smaller hydrological units, each of which was managed by a water management group (WMG).

The Mulia Water Management Association

Rabindra Nath Adhikary, chairman of the Mulia Union Parishad and president of the Mulia Water Management Association said that before the Southwest Area Integrated Water Resources Planning and Management Project was implemented, rice yields in the area were 1.80–2.20 metric ton/hectare (ha). Presently, he said that these have increased to almost double, at 2.80–3.40 metric ton/hectare (ha). Moreover, a huge uncultivated area has become productive, and most of the previously single-cropped areas have been converted into double-cropped and triple-cropped farms, thus, enhancing employment opportunities for agricultural labor and the poor.

Adhikary also noted that prior to the project, most of the local agricultural labor had out-migrated to other areas. "Today," he said, "a large percentage of the agricultural labor in the project area consists of in-migrants who have found opportunities for livelihood here. Landless and other poor residents have benefited by cultivating the agricultural lands of rich people or absentee landowners. In terms of sharing, the cultivators receive two-thirds of the total production, while the landowner gets the remaining 1/3 of the total product."

He added that since the project began, community residents who used to buy rice from the market for 6 out of 12 months every year no longer need to do that. They no longer buy rice from the market since they now have at least 1.6–2.1 metric tons of paddy in storage.

For other livelihood opportunities, he cited the many poor and indigent women who have started homestead gardening of vegetables, duck raising, and beef fattening with initial support from the project. They have even been recruited as agricultural labor, especially for the collection of jute. "The project is a blessing to us," he said, "it led to changes in our livelihood patterns and lifestyles. Now, we own the project, and by our heart and soul, we will keep the project running—by the people and for the people."

The subproject on the Chenchuri Beel system covered an area of 36,580 ha, included 7 subunit implementation plan areas, 59 WMGs, and 7 WMAs—having 15,329 total members. The subproject relating to the Narail system covered an area of 19,362 ha, included 7 subunit implementation plan areas, 43 WMGs, and 7 WMAs—with a combined membership of 10,095.

The project's expected major outputs were (i) an integrated participatory water management system plan within each hydrological unit, (ii) improved livelihood of project beneficiaries through created opportunities for income-generating activities, (iii) improved planning capabilities, and (iv) responsibility for O&M of facilities funded or upgraded by the project transferred to water management organizations.

Overall, the project's objectives included (i) participation of beneficiaries in the planning of project works; (ii) improved management of water resources; (iii) renovation of existing flood control, drainage, and irrigation systems; (iv) development of the capacity of water management organizations to operate and maintain facilities funded or upgraded by the project; and (v) delivery of services that supported income-earning opportunities in the agriculture and fisheries sectors.

Ultimately, the project delivered all the outputs listed above. This resulted in the (i) preparation of participatory integrated water management plans, (ii) establishment of productive and sustainable water management systems, (iii) strengthening of project-related management systems and institutions, and (iv) establishment of effective procedures for joint planning for the improvement of water management systems by beneficiaries and government agencies alike.

On item iv above, the project successfully introduced participatory planning for water management. The two major characteristics of this type of planning include (i) participation by stakeholders, beneficiaries, local government institutions, and local offices of government agencies both in the planning of project activities; and (ii) establishment of water management organizations based on hydrological rather than on administrative boundaries.

The basic assumption underlying the project was that organizing beneficiaries into water management organizations and developing their collective management capacity would lead to both sustainable water management organizations and sustainable O&M of water facilities.

From its inception until June 2015, the SWAIWRPMP supported the (i) construction and resectioning of 34.66 km of river embankments; (ii) re-excavation of 245 km of canals; (iii) repair and new construction of 18 regulators; (iv) construction of 29 check structures, culverts, and footbridges; (v) construction of seven inlet and outlet structures; (vi) construction of 3,088 km of river bank protection; (vii) installation of 122 arsenic-free tube wells; and (viii) construction of 32 office buildings for WMGs and WMAs.[4]

The project also established sustainable water management systems through preparation of 14 subunit implementation plans. In these plans, beneficiaries

[4] These were information provided by the project management office.

participated in identifying local problems, needs, and opportunities, and in preparing implementation plans for each hydrological subunit. Water management infrastructure in the two subproject areas was either constructed or rehabilitated. Programs that support the expansion of outputs in the agriculture and fisheries sectors were established, while programs identified in the subunit implementation plans for improving the livelihood of beneficiaries were implemented.

The project resulted in the formation of 14 WMAs and 102 WMGs in the two subproject areas. These associations and groups include a total of 25,424 members, including 10,119 women. More than 80% of the farmers in the subproject areas are members of WMGs, 40% of these members are women.

Finally, project support to the WMAs and WMGs expanded beneficiary opportunities for income-generating activities since livelihood training for members of the water management organizations were provided. Collective action plans for income generation were introduced and implemented as a means of ensuring the sustainability of the WMGs. The capacity of the organizations to operate and maintain the infrastructure financed by the project were also improved, since a share of the profits from these income-generating activities were used to augment the O&M funds of the water management organizations.

Each WMG engaged in collective action that (i) provided services to individual members and groups engaged in income-generating activities in the agriculture and fishery sectors; (ii) undertook their own collective income-generating activities, such as operation of fish ponds, producing and distributing paddy seed, and production of honey; and (iii) engaged in environmental protection activities, such as social forestry. Some WMGs even developed partnerships with the private sector, as in the case of the Kalmitala WMG.

Success Story No. 1

Increased Agricultural Production through Participatory Irrigation Management

The Kamlapur irrigation pump station, which is located at Kamlapur Village in Auria Union of the Narail Sadar Upazila in Narail District, is managed by the Kamlapur Water Management Group. According to Khandaker Abul Bashar, president of the water management group, the experimental irrigation pump began operation during fiscal year 1998–1999 under the management of the Bangladesh Water Development Board, with a target command area of 442 hectares (ha). The irrigation system eventually became ineffective due to a number of problems—inefficient management, lack of appropriate operation and maintenance, poor maintenance of irrigation channels, insufficient discharge and water flow, inappropriate distribution of water into farmlands, absence of beneficiary participation in the operation and management, negligence of executing agencies to water management, weak collection of water charges, and significant unpaid electricity bills.

The Southwest Area Integrated Water Resources Planning and Management Project (SWAIWRPMP) repaired the irrigation pumps; re-excavated the distribution canals; and constructed check structures, village roads and bridges, and an office

building for the water management groups and the association. The project also supported the organization of water users into water management groups and their federation into a water management association, including developing their institutional capacity.

There are four water management groups under the Kamlapur pump irrigation system—Kamlapur, Nakoshi-Goshpur, Shimla, and Shonali. The executive committee of each group comprises 12 representatives from the general membership. Each water management group has six subcommittees that address issues relating to agriculture, fisheries, the environment, gender and livelihood, operation and maintenance, and internal audit, respectively.

Kamlapur Irrigation Pump
Rice Demonstration Plaot

The Kamlapur Pump Irrigation System Water Management Association comprises 12 members that represent the membership of the four water management groups. The association has a total of 721 members of which 248 (34%) are women. The subcommittees, water management groups, and water management association meet monthly to decide on operation and maintenance issues, and other concerns relating to the operation of the water management groups. These include fixing operation and maintenance fees and planning initiatives that will ensure the collection of annual operation and maintenance fees.

According to Bashar, they themselves prepared participatory action plans for operation and maintenance, indicating the activities to be undertaken and the respective implementation periods. They also made projections for the operation and maintenance expenditures and sources of funding for meeting these expenditures, fees to be collected (whether in kind [paddy at 1 kilogram per decimal] or cash [Tk1,200 {$15} per hectare (ha)]), and allocated responsibilities to members.

The SWAIWRPMP also conducted awareness-raising and motivational programs, and trained farmers in modern crop and fish production technologies at Farmers' Field Schools and Field Schools of Fishery. This training included demonstrations in the use of high-yielding rice and fish varieties. The project also provided formal trainings in problem-solving, project identification, participatory planning, implementation, and monitoring; livelihood improvement; operation and maintenance of irrigation pumps, canals, and related infrastructure; and in banking, accounting, and financial management.

The water management association performs regular maintenance of the canals. This includes removing debris and water hyacinth, and cutting of grass and weeds prior to activation of the irrigation pump station. Periodic maintenance includes re-excavation of canals, preventive maintenance on irrigation pumps, painting of pipes, and clearing of rubbish. Electricity is a major cost item For

example, as of June 2015, the association had paid Tk210,059 ($2,693) in electricity expenses. Since the association collected Tk918,856 ($11,780) from its members, it still has a balance of Tk252,429 ($3,236) in its operation and maintenance fund.

Prior to the SWAIWRPMP, rice yields were low at 1.0–1.5 metric tons per hectare (ha), cropping intensity was 150%, and vast areas of productive agricultural land remained idle. Food shortages were common, and unemployment widespread. As a result, agricultural labor migrated to other areas. Poverty was severe as an estimated 40% of very poor families faced starvation. However, since the project began operation in 2012, both agricultural and fisheries production has increased by 2–3 times as compared with the preproject situation, significant areas of formerly idle land have been brought under cultivation, and ponds and borrow pits have begun to be used for fish culture. Prior to the project, there were drinking water shortages during the dry season. As a result, residents were forced to drink arsenic-contaminated water since the underground water level had fallen below discharge limits, and most of the hand-operated tube wells were either inoperative or had very minimum water flow. After 3 years, none of these problems exist. This demonstrates the project's beneficial impact.

Large tracts of unused land were brought into agricultural production
Rice Demonstration Plaot

Women and other vulnerable members of the community can now easily undertake a variety of economic activities, including duck-raising and poultry rearing activities, and homestead vegetable gardening. All these efforts have increased agricultural and fisheries production, raised incomes, improved social status, increased school attendance, benefited the landless and poorer segments of the community through share-cropping and leasing of agricultural lands, and increased employment opportunities both for men and women.

In conclusion, Bashar said that "this project resolved the shortage of food, unemployment of agricultural labor, poverty, misery, and starvation. Now, there are no longer very poor families as even the extremely poor can have a minimum storage of 2.5–3.0 metric tons of paddy rice." Most importantly, he said that the project has improved equity among water management group members, and has increased social cohesion.

Sahana Begum, a poor woman and member of the Kamlapur Water Management Group, is now happy as a result of her duck farming business Irrigation Pump
Rice Demonstration Plaot

4. Institutional Capacity Development

Over the past 2 decades, the government has implemented a number of polices for addressing water management. This was followed by issuance of the *Guidelines for Participatory Water Management* in 2000 for use at the field level, and the Bangladesh Water Development Board Act of 2000. These activities facilitated the finalization of the National Water Management Plan in 2004. The short- to medium-term programs in the plan created an enabling environment for the participatory management of the water resource, and the development of the institutional capacity for such participatory management.

The development of institutional capacity particularly focused on the BWDB, which underwent the following changes: (i) reformulation of its board to include representatives of stakeholders and experts from the water sector, (ii) long-term assignment of leadership, (iii) significant staff rationalization (by over 50%) through diversification of the staff skill mix, and (iv) formulation of a BWDB vision of transformation from a top-down implementer to a service-oriented agency. The *Guidelines for Participatory Water Management* was also finalized by specifying the procedures to be followed, and the arrangements for implementing interventions that would empower the WMAs.

The SWAIWRPMP developed the institutional capacity of BWDB for supporting the reforms articulated under the National Water Policy. Some of the most important of these reforms were (i) shifting the responsibility for

Farmers Field School to enhance knowledge on modern agriculture

the formation and monitoring of water management organizations from the Department of Cooperatives to BWDB,[5] (ii) formation of water management organizations, and (iii) introduction of participatory water management.

The project was, thus, to a significant extent, responsible for helping BWDB and related government agencies take ownership of the participatory water management principles and practices. As a result, BWDB is now well positioned to fully support water management organizations. Under the SWAIWRPMP, BWDB has enhanced the institutional capacity to make participatory water management sustainable through both formal and on-the-job practical trainings.

Through its day-to-day management of the project's implementation, BWDB has acquired valuable experience in supervising external staff in community mobilization, engineering, and other functions that directly relate to project implementation. BWDB's collective ability to promote participatory water management and the sustainability of O&M facilities that were upgraded by the project have been improved considerably. These were evident in the (i) formation of joint management committees, which is consistent with both the National Water Policy and the BWDB Act of 2000; (ii) establishment of an O&M system that links the joint management committees with WMAs and WMGs, and (iii) capacity development of water management organizations. As part of item (ii) initiative, the project developed a management information system for BWDB that remains in use today.

By working with consultants, professionals from BWDB, especially members of the project management office, have acquired knowledge of sustainable O&M of water facilities—efficiently allocating water, both from a spatial and chronological perspective. In the agriculture sector, they helped project beneficiaries to adopt appropriate crop selection, cropping patterns, and procedures for efficient cultivation. Extension services were also provided through Farmers' Field Schools (FFS) that focused on appropriate crop cultivation practices.

In the fisheries sector, extension services were provided, through the Field Schools for Fishery (FSF), techniques for fishpond site selection, including appropriate types of fish for pond culture, efficient fish culture practices, and initiating group action managed by WMGs. Each WMG has its own arrangements for raising funds and contributing to its O&M requirements. This ensures that the maintenance of water facilities involves all members.

The wide range of activities under the SWAIWRPMP has allowed BWDB to gain experience in introducing, testing, and promoting a strategy for participatory IWRM. These include the formation, registration, and strengthening of water management organizations, and the preparation and implementation of subunit implementation plans.

The project also strengthened linkages between BWDB and the government's service providers, including the Department of Agriculture Extension, the Department of Fisheries, and the Department

[5] Participatory Water Management Rules, enacted February 2014.

of Livestock. The project helped establish linkages between these service providers and the water management organizations in the project areas. The strength of these water management organization networks has already attracted additional assistance from a number of development partners. For example, in collaboration with the Food and Agriculture Organization of the United Nations, the Embassy of the Netherlands has donated agriculture and communication training equipment to 55 water management organizations.

The Inter-Agency Project Evaluation Committee at the district level, the mandate of which is to avoid duplication of effort among agencies, facilitated the development of these linkages by encouraging collaboration among officials at various government agencies. This resulted in a multi-disciplinary and integrated approach to agriculture and fisheries development in the project areas.

Interagency linkages, particularly those between BWDB and the Department of Agriculture Extension and the Department of Fisheries, have facilitated "experiential training" or sharing of experience among community residents through Farmers' Field Days, FFS, Fisheries' Field Schools, and demonstrations of crop and fish production technologies.

Similarly, collaborative training in water management has been jointly provided by BWDB, the Department of Agriculture Extension, and the Department of Fisheries. This includes training in (i) matching available water resources to planned uses, (ii) measuring and controlling salinity intrusion in agricultural plots, (iii) O&M of regulators and irrigation pumps, and (iv) bookkeeping and financial management.

The project also strengthened the institutional capacity of the members of water management organizations in agriculture and fisheries production, income-generating activities, environmental upgrading, gender awareness, improved sanitation and hygiene practices, and in managing participatory labor contracts.

Finally, the project greatly strengthened the WMGs, which are the basic units of participatory water management. On average, about 250 households comprise a WMG, although this number varies based on the extent of the geographic area that an individual WMG serves. Each WMG is governed by a 12-member executive committee and a general committee. At least 30% of the members of these committees are women.

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

Improving Capacity of the Water Management Organizations

In explaining his experience with the project, Masud Karim, chief extension officer of the Southwest Area Integrated Water Resources Planning and Management Project narrated that their previous experience in implementing the flood control, drainage, and irrigation project and/or schemes, they understood that (i) matching of water resources with the different uses and users, (ii) organizing users into functional groups for collective action, and (iii) building the capacity of beneficiaries for effective use of water and quick benefit were the major challenges they faced to achieve success for the project.

The project, Karim said, had undertaken massive awareness and motivational programs to organize the beneficiaries, and to establish functional linkages with other line agencies like the Department of Agricultural Extension, the Department of Fisheries, and the Department of Livestock with a view to building the capacity of the beneficiaries in their respective fields. These programs included sharing of knowledge and experiences through Farmers' Field Days, Farmers' Field Schools, and Field Schools of Fisheries; distribution of high-yielding varieties of paddy and fish fingerlings; and demonstration of modern production technologies. But more importantly, Karim said that these programs provided training to the beneficiary communities in matching water resources to agriculture and fisheries uses, and in income-generating activities for livelihood improvement. All these programs, he noted, were designed to deliver quick benefits to beneficiaries, and helped them to take responsibility for the operation and maintenance of flood control, drainage, and irrigation systems in their area so that these may become sustainable over the long term.

As pointed out by Masud Karim, the chief extension officer of the SWAIWRPMP, the capacity of the water management organizations to expand agricultural and fisheries production was strengthened through awareness-raising and motivational programs. These programs taught them modern agriculture and fish production technologies. To build the capacity of beneficiary communities, the project established 323 FFS, and 234 FSF. With the assistance of the Department of Agricultural Extension, the Department of Fisheries, and other government line agencies, the project conducted 142 classroom training sessions in agriculture and 115 classroom training sessions in fish production techniques. The project also organized 340 agricultural demonstration plots, including 45 demonstration plots that showed the beneficial impacts of using high-yielding varieties of rice, and 176 fisheries demonstration plots.

By the end of the project in June 2015, a total of 600 training sessions for beneficiaries and 70 training sessions for the staff had been conducted. All training activities were practical in nature and emphasized learning by doing.

Multi-disciplinary teams of community facilitators organized beneficiaries into WMGs and WMAs, and assisted them throughout the subunit implementation plan formulation process. These facilitators were guided by professional staff from the project management office, with technical assistance provided by the Institutional Strengthening and Project Management Consultant team.

Thus, with guidance from the project management office staff and consultants, these facilitators assisted the planning committees of WMGs and beneficiaries in assessing their current situations. These assessments included the following:

- **Current status of physical infrastructure.** The infrastructure's ability to distribute and regulate water flow at various levels was assessed, while improvements that could be made to it were looked into. This included the availability of gates, measuring points, and devices for regulating and measuring water flow to the command area of the concerned water management organization.
- **Arrangements for the O&M of physical infrastructure.** Specific questions asked included the following: (i) How should existing arrangements for the maintenance of physical infrastructure be changed to ensure that all demands for water are met (including how the water management organization should take responsibility for the water management)? (ii) How should fish production and crop yields be improved? (iii) What is the appropriate role of beneficiaries in the O&M of water management infrastructure? (iv) What is the appropriate relationship between the beneficiaries and BWDB? (v) Which sources of funding for the O&M of water management infrastructure are available? (vi) How should fee collection from water use be improved? (vii) Are the beneficiaries willing to change the current O&M arrangements in water management infrastructure?

These assessments allowed the water management organizations to develop the skills they needed to achieve an integrated water resource planning and management. With their newly developed skills, these organizations were able to manage conflicts over water use at the community level, thereby achieving effective use of scarce water resources. In addition to increasing the degree to which management of the water resource was participatory, their successful resolution of water-use conflicts positively impacted community development overall.

After these assessments, the registration of water management organizations followed. This is required before the transfer of management of water resource facilities to the beneficiaries could take place. Unfortunately, the registration of WMAs was delayed due to some regulatory provisions of the Department of Cooperatives.[6] As an interim solution, these associations signed a memorandum of understanding with BWDB that stipulated an O&M agreement relating to water facilities. By July 2014, all 14 WMAs had signed such a memorandum of understanding.

As of this writing, the registration of WMGs with the Department of Cooperatives has been largely completed. Of the 105 WMGs, 102 have already registered. These registrations cover all subunits, for a total of 25,426 beneficiaries, of which 10,120 (40%) are women.

[6] To register with the Department of Cooperatives, a WMA had to fulfill the following conditions: it should have more than 10 lower-tier WMGs, and it should have a minimum of Tk100,000 in share and savings funds. Since the boundaries of WMAs and WMGs are delineated by hydrological boundaries of water management structures, some associations covered less than 10 WMGs. This restricted the registration of WMAs.

Success Story No. 2

Cooperative Fish Culture in Borrow Pits[1]

The Surjamukhi Water Management Group was formed in May 2010 with 246 members. Women accounted for 74, representing 30% of the group's total membership. This water management group covers 175 hectares (ha) and is located at Mohiskhoal village in KaliaUpazila of Narail District. A key water management facility in this area is the Pateshwari Regulator under the Chenchuri Beel flood control, drainage, and irrigation system.

Each water management group is headed by an executive committee comprising 12 members drawn from the group's general membership. Six subcommittees—one each for agriculture, fisheries, environment, gender and livelihood, operation and maintenance, and internal audit—report to the executive committee on respective issues that each addresses.

According to Badsha Mollah, president of the Surjamukhi Water Management Group, the Chenchuri Beel flood control, drainage, and irrigation system had nearly become nonfunctional due to (i) defective regulator gates, (ii) sedimentation of canals that resulted in poor drainage, (iii) salinity intrusion, (iv) lack of beneficiary participation, and (v) neglect of water management requirements by executing agencies. Due to the ineffectiveness of the flood control, drainage, and irrigation system, flooding and drought had damaged both agricultural and fisheries production, ultimately causing formerly productive agricultural lands and borrow pits to remain unused, or at best, underutilized.

In light of the above, the technical assistance project[2] supported the (i) repair of the regulator; (ii) re-excavation of canals; (iii) construction of check structures, culverts, and footbridges; (iv) construction of inlet and outlet structures; (v) protection of riverbanks; and (vi) construction of an office building for the water management groups and the association. The technical assistance project also organized water users into water management groups.

Fish harvest from the fish culture borrow pit

[1] A borrow pitis an area where **soil**, sand, **gravel** or other terrestrial material has been removed for use at another location, thus, leaving a shallow depression in which water from rain or runoff collects.

[2] This is the Southwest Area Integrated Water Resources Planning and Management Project, a partnership between the Asian Development Bank and the Bangladesh Water Development Board.

The technical assistance project staff also conducted awareness-raising and motivational programs. They also distributed high-yielding varieties of rice and marketable fish species to beneficiaries, and provided demonstrations on these through training programs called Farmer's Field Schools and/or Field Schools of Fishery. Formal training was also provided in problem analysis, identification of required interventions, planning, implementation, livelihood improvement, banking, accounting, and financial management.

The fish culture training and demonstration programs resulted in beneficiaries initiating fish culture in borrow pits on previously unused land. This ensured nutrition and food security, created employment, and improved the economic status of beneficiaries.

During field visits, the project staff discussed a wide range of issues with beneficiaries. These included the (i) preparation of the subunit's implementation plan, (ii) maintenance of borrow pits, (iii) lack of use of common-property water bodies for fish culture, (iv) community's lack of knowledge concerning fish culture technology, (v) lack of availability of quality fish fingerlings, and (vi) inadequate financial support of the water management group.

In response to these issues, the Surjamukhi Water Management Group concluded a lease agreement with the Bangladesh Water Development Board for fish culture in four borrow pits, which together comprised 17 hectares (ha). During the first cycle when these four borrow pits were used, Tk43,000 ($551) was invested in fish fingerlings, feed, and repair of the pits. This generated a net profit of TK120,000 ($1,538) that was equally distributed to all members of the group.

During the following production cycle, the water management group diversified its fish production mix by releasing both domestic carp species (catla, rohita, mrigal) and exotic species (silver, grass, and mono-sex tilapia) into the borrow pits. The amount invested for fish fingerlings, feed, repair of the pits, and other costs increased to Tk350,000 ($4,487) during this cycle. As of this writing, fingerling growth appears to be progressing well, despite problems with irregular feeding and fertilization. The projected profit is Tk250,000–Tk300,000 ($3,205-$3,846) for the current production cycle.

Also according to Mollah, these water bodies are actually a habitat for various natural species of freshwater fishes having high commercial value. Hence, he said, exploiting this opportunity and properly utilizing this water resource could extensively enhance the livelihood, increase employment opportunities, and increase the income of his group.

Mollahalso pointed out that "borrow pit fish culture has played a significant role in improving the economic status of our water management group members, while providing our community people with a supply of protein at a very low cost." He noted that borrow pit fish culture has been slowly spreading to village ponds, even to the small ditches of nearby houses, and has become an activity that is leading to small entrepreneurship among the villagers. "The success achieved by the Surjamukhi Water Management Group has already been conveyed to the neighboring villages," he said.

The key factors in the successful formation and registration of water management organizations were the integrated multi-disciplinary strategy used, the participatory approach employed, the strength of the facilitation process, and the financial soundness of the water management organizations, as detailed in the table below.

Achievements of Water Management Organizations

No.	Indicator		Achievement
1	No. of registered WMGs (Target: 105)	:	102 (97.1%)
2	No. of WMAs formed (Target: 14)	:	14 (100%)
3	No. of JMCs formed (Target: 2)	:	2 (100%)
4	Total capital (share + savings + others)	:	Tk32,866,894
5	Total O&M fund in bank (as of 30 June 2015)	:	Tk2,797,312
6	Total O&M expenditure	:	Tk631,797
7	Total capital invested in CAPs	:	Tk6,528,960
8	Total no. of CAP activities	:	404
9	Total WMG members involved in CAPs (Target: 30,223)	:	23,921 (79.15%)
10	Total female members involved	:	9,755 (40.78%)
11	Per head investment in CAPs	:	Tk272.94
12	Total profit	:	Tk1,463,471
13	Per head profit from CAPs	:	Tk61.18

CAP = collective action plan, JMC = joint management committee, O&M = operation and maintenance, Tk = taka (currency of Bangladesh), WMA = water management association, WMG = water management group.

Source: Project management office, 2015.

Success Story No. 3

A Multifunctional Self-Sustaining Water Management Group

The Kalmitala Water Management Group at Dopakhola village under Sadar Upazila of Narail District has become a self-sustaining business entity. Its profit-making activities include agriculture and fishery support services; pump irrigationservices; large-scale production of seed; and the production of honey, "wormy compost," and urea. Formed in September 2009, this water management group has 119 members, 41 (35%) of which are women. This water management group's command area comprises 367 hectares (ha), all of which are under the jurisdiction of the 4.5-kilometer Barendar Khal (Canal), and includes two pumps and shallow tubewells.

Seed Production Land

According to Khandaker Shahed Ali, president of the Kalmilata Water Management Group, the project established a sustainable water management system for the area by involving beneficiaries in identifying the water management problems they faced, and matching the opportunities available to them to resolve their water requirement problems. This process ultimately resulted in a detailed implementation plan for each hydrological subunit, and in organizing the beneficiaries into water management groups. The water management infrastructure in the subproject areas was then rehabilitated, and where necessary, reconstructed.

The SWAIWPMP provided trainings in agriculture and fishery production techniques, and in other productive activities that could ensure a sustainable livelihood for the beneficiaries. The project also encouraged all registered members of the water management group to engage in income-generating activities on a collective basis. The trainings included techniques for cultivating high-yielding rice varieties and other crops; pond fish culture; duck-raising and poultry-rearing activities; beef fattening; production of seed, compost, and guti urea fertilizer; and operation and maintenance of irrigation facilities.

This training significantly expanded the group's fish and agricultural production, and as a consequence, brought a substantial area of formerly unproductive land under cultivation. Similarly, plots of land that were previously on single cropping were able to undertake double and even triple croppings, which in turn increased the demand for high-yielding seed varieties. Initially, few high-yielding variety seeds were available in the area. As a result, farmers had to travel significant distances to collect such seeds. The relatively high cost of these seeds led the water management group to begin producing such seed.

Net Profit from Major Productive Activities of the Kalmitala Water Management Group, 2014–2015			
Activity	**Investment (Tk)**	**Net Profit (Tk)**	**Remarks**
Provision of pump irrigation services	180,000	160,000	Annual total profit: Tk322,210
Pond fish culture	112,000	73,058	
Guti urea production	124,745	38,430	
Honey production	64,000	15,882	
Sale of seed produced	20,000	34,840	
Garment stitching (primarily performed by indigent women)	155,299	00 (Service)	Training provided for indigent women
Information Technology Training Centre (various donors)	700,000		Training-cum-business
Major assets: Paddy/wheat harvester (Tk175,000) ($ 2,243.59) Large-scale electric pump (TK275,000) ($3,525.64)			

Shahed Ali, president of the Kalmitala Water Management Group, related that he "attended different classes on seed production, grading, preservation, and quality seed production procedures conducted by the technical assistance project, and later, transferred these ideas to members of the group". Ali said that they started seed production in 2010, using varieties like BR28 and BR29 supplied by the Bangladesh Agricultural Development Corporation. He reported that their group's investment was Tk55,500 ($711.54), which earned a total income of Tk63,500 ($814.10) for a net profit of Tk8,000 ($102.56).

Ali also mentioned that in November 2011, the group concluded an agreement with Rahim Afroz, a multisectoral company, which the group would supply with their produced seeds.

This enabled the group to expand its farmland to a total area of 240 hectares (ha). Since the group's farmland has adequate irrigation and proper drainage, it is well-suited to seed production. As a result, 850 farmers are now producing seeds. By the end of the previous growing season, these farmers had produced 680 metric tons of seeds. The seed produced is of high quality and genetic purity as the group adheres to strict production standards. For example, the seed contains no contaminants or non-seed materials; it is free of disease, weeds, soil particles, sand, and stones; and none of the seed is broken. Due to the high quality of the seed that the group produces, demand for these seeds has increased substantially.

Ali also revealed that his water management group has also inked agreements with other multisector business companies—Singenta Bangladesh, ACI Ltd., Rahim Afroz CIC Agro Ltd., and Nafco Private Ltd.—to act as an agent for collecting and supplying high-yielding variety seeds to these companies. "We expect to not only increase but also to diversify seed production to include wheat and vegetable seeds," Ali said. According to him, his group has already increased the seed production area to 400 hectares (ha) and the number of seed-producing farmers to 1,200, with the aim of producing 1,500 metric tons of seed in the next season. As the agent of the multisector companies, he said that they "expect to reach a profit of Tk2,500 ($32.05) per metric ton of seed." At the moment, however, they have no drying and cleaning facilities, and lacked preservation capability. He was optimistic that if they could acquire such facilities, their income from this business would be doubled.

Ali also added that the Kalmilata Water Management Group is also involved in other collective income-generating activities, including pond fish culture. Another venture—urea ball production using the urea brick machine procured with support from the International Fertilizer Development Center—has generated a total income of Tk73,058 ($936.64). The group's two other ventures—honey production and pump irrigation services—have generated revenues of Tk15,882 ($203.62) and Tk160,000, ($2,051.28) respectively.

Sacks of seed produce under the Kalmitala Water Management Group

The net profits from all activities undertaken by the group are distributed equally to all members, including women. The group has also established a sewing centerthat both generates income and provides employment for a number of poor women. In the near future, the group plans to begin mushroom production, and toestablish a seed-testing laboratory and an agriculture information and service center. Finally, Ali pointed out that the group envisions "to build a poverty-free, prosperous, and flourishing society" within their communities.

5. Community Involvement in Planning and Implementation

Active community participation during planning and implementation of the project

All stakeholders—including the beneficiary communities—participated in preparing the integrated water management plans for subprojects and implementation plans for subunits. The support of the SWAIWRPMP included organizing WMAs and WMGs, improving the ability of these organizations to identify the problems they faced in meeting their water use needs, and finding solutions to these problems. The project also supported the preparation of the WMG proposals for discussion at the meetings of WMGs and WMAs, and in finalizing these proposals taking into account the requirements of the individual subunit implementation plans, which articulate the needs of the WMGs for infrastructure support, capacity building and training, and livelihood support.

The staff of SWAIWRPMP thus worked with beneficiaries during preparation of each subunit implementation plan by assisting them in the overall planning exercise and in data collection. This significantly increased the sense of beneficiary ownership of the subunit implementation plans.

Following a beneficiary analysis of the preproject situation, with the assistance of project staff, interventions were proposed. Although these interventions were first suggested by project consultants and staff from the project management office, the beneficiaries were encouraged to augment or modify them until both the beneficiaries and project staff reached a consensus on these proposals. Thus, the

resulting subunit implementation plans were a mix of indigenous knowledge and international best practice.

By blending the beneficiaries' accumulated practical experience with expert knowledge, the final subunit implementation plans represented a considerable improvement over preproject practices. Since these final plans have been assessed and accepted by the beneficiaries themselves, they were fully implementable at the operational level. This was achieved because (i) the beneficiaries articulated the responsibilities of the concerned parties in a transparent manner, (ii) the plans contained timed implementation schedules and detailed resource requirements, and (iii) the plans stated the sources and providers of the resources required, the procedures to be used for making full use of project inputs, and the inputs of external agencies.

This planning process took place simultaneously at the WMG and WMA levels. The beneficiaries used the broader integrated water management plan previously prepared for each subproject as the starting point for their subunit implementation plans. Simultaneous preparation of these plans at these two levels was an important feature of this process, and to enable the various types of water management infrastructure be designed in a complementary and integrated manner.

Interaction between the WMGs and WMAs provided feedback on the problems identified by the beneficiaries and on the initial version of their subunit implementation plans. This interaction took place at meetings of the WMA planning committee, which comprised representatives from the WMGs.

Deliberations by the planning committees ensured that the needs of the beneficiaries would be considered in finalizing the respective subunit implementation plans. This also ensured that plans at the level of WMGs were appropriately aggregated as this allowed the planners and beneficiaries to ultimately agree on the specific objectives of the activities. This feature of the planning process was important in avoiding conflicts among the various WMGs. Special efforts were also made to include in these deliberations representatives from women and other vulnerable groups. The result of this participatory planning process was a greater sense of ownership by the beneficiaries of their subunit implementation plans.

Empowering Women in the Project Area

Shamima Islam used to be poor and powerless before the project was implemented in her area. Today, she is a member of the executive committee of the Surjomukhi Water Management Group under the Pateshwari Regulator. She has also transformed her life into a more productive one. After her livelihood training, she started her duck-raising activity (which now number 300 heads) in a nearby borrow pit and in low-lying areas. She currently harvests about 30 eggs per day, which nets her an average monthly income of Tk3,600 ($46.2). She expects that in about 1 month, her monthly income will rise to Tk24,000 ($308) as a result of her enhanced ability to sell duck eggs. She reports that she is "happy and living nicely" through her livelihood project. She is also grateful for the training she received from the project.

6. Community Involvement in the Operation and Maintenance, and in Ensuring the Sustainability of Water Management Infrastructure

At all levels, the boundaries delineating the WMG, WMAs, and federations were based on hydrological rather than political or administrative boundaries. This feature greatly facilitated the efficient O&M of the water management infrastructure. As of this writing, the project has organized 102 WMGs federated at the overall flood control, drainage, and irrigation infrastructure level. Due to the common interest of organization members, and the feeling of beneficiary ownership over the subunit implementation plans, the beneficiaries are motivated to raise needed funding and perform O&M on the facilities.

In general, O&M involves preventive maintenance work on canals. This includes removing floating debris, water hyacinth, grass, and weeds prior to the onset of the monsoon season. In addition, periodic maintenance of the canals is also necessary. This includes re-excavating canals and performing preventive maintenance on water structures, the latter to include greasing, removing debris, and painting. With the training in such maintenance provided by the project, members of the water maintenance organizations were able to maintain the facilities, which they were responsible for, in an efficient manner.

To date, 14 WMAs and 102 WMGs have been formed. These organizations now raise their own funding for O&M, which they maintain in separate bank accounts.

Women of Mirapara Village in Bhadravila Union collecting Arsenic-free water from the tube well installed by the Project

This ensures their ability to perform necessary O&M functions themselves, and at the appropriate time.[7]

Members of water management organizations are fully aware of the economic benefits of collective action, particularly as these relate to O&M, using inputs efficiently, and engaging in income-generating activities. Almost all of these organizations have complied with their principal obligations. Appropriate procedures for joint beneficiary-government monitoring and planning for improvement of water management systems have also been put into place and are now fully functional. The sense of ownership of beneficiaries over the water management facilities they use, which resulted from the transfer of O&M responsibilities to the WMAs and WMGs, has further strengthened the commitment of the beneficiaries to meeting these responsibilities.

Success Story No. 4

Successful Operation and Maintenance of the Regulator and Increased Agricultural Production

The Pateshwari Regulator, a major water management structure in the Narailflood control, drainage, and irrigation system, is located at Nayagram village in the Durulia Union under Kalia Upazila of Narail District. It is managed by the Novoganga Water Management Association. According to its president, Munshi Hafizur Rahman, prior to the project, the Pateshwari Regulator had stopped functioning because of defective hoists (valves), drainage congestion, sedimentation, salinity intrusion, absence of beneficiary participation, and management negligence of the executing agencies. Due to the ineffectiveness of this regulator, the area regularly experienced severe flooding and drought that damaged agricultural and fisheries production. This caused productive agricultural lands to remain either unused or underutilized.

The implementation of the Southwest Area Integrated Water Resources Planning and Management Project turned the situation around. The project supported a number of repairs to the flood control, drainage, and irrigation system. These included (i) refurbishment of the regulator; (ii) resectioning of embankments; (iii) re-excavation of canals; (iv) construction of check structures, culverts, and footbridges; (v) construction of inlet and outlet structures; (vi) protection of river banks; and (vii) construction of

Pateshwari Regulator, A FDC/I system.

[7] The capacity of water management organizations to perform O&M of water management infrastructure has been significantly improved through the preparation of O&M maintenance manuals, and by the learning-by-doing training in O&M provided under the project.

an office building for water management groups and the association. The project also organized water users into water management groups, and federation of the latter into a water management association. Through the collective efforts of the water management groups, the technical assistance project performed operation and maintenance (O&M) on the regulator.

The Pateshwari Regulator covers three subunits managed by three water management associations, with the command area comprising 14,217 hectares (ha) of agricultural land. One of these three is the Navoganga Water Management Association, which is governed by a 12-member executive committee coming from the water management groups. There are 34 water management groups in Navoganga. These groups serve cultivable lands totaling 6,126 hectares (ha).

The project conducted awareness-raising and motivational programs, and trained farmers in modern agricultural production and fish-culture technologies. The project staff also distributed high-yielding varieties of rice and fish at Farmer's Field School and Field School of Fishery, organized agricultural and fish production demonstrations, and supplemented these with trainings in livelihood improvement. Formal training in problemsolving, participatory planning, implementation and monitoring of subprojects, operation and maintenance of the regulator, banking, accounting, and financial management were also provided.

According to Rahman, the water management association performs regular maintenance on canals. This includes removal of floating debris and water hyacinth, and cutting of grass and weeds prior to the onset of the monsoon season. Maintenance on canals includes re-excavation of the canals and preventive maintenance of structures. The latter includes greasing, clearing of debris, painting of gauges, and estimating the cost and area to be painted.

Rahman said that the association meets monthly. At these meetings, association members decide on operation and maintenance activities to undertake, and discuss other issues of the groups, such as setting O&M fees, and ensuring the collection of annual operation and maintenance fees, both of which are necessary for sustaining the flood control, drainage, and irrigation system. The association also prepares the participatory action plan to operate and maintain the water management structures in the area. This plan includes the activities to be undertaken, the duration of the respective implementation periods, the responsibilities of members, estimates of O&M costs, and sources of funds.

Compared with the preproject situation, the technical assistance project has increased agricultural and fisheries production by two to three times by bringing large tracts of uncultivated and unused land under cultivation and many small water bodies, ponds, and borrow pits under fish culture. Also as a result of the project, women and the more vulnerable members of the community can now easily undertake a wide range of livelihood activities. Examples include duck-raising and poultry-rearing activities, homestead vegetable gardening, beef fattening, and fish culture on pond land leased from the Bangladesh Water Development Board.

The project transferred the O&M of the regulator to the beneficiaries through their water management association. Beneficiaries are now able to control flooding, regulate water flow, control salinity intrusion, and match the supply of water to specific uses and users. The association formulates the O&M budget for the regulator, and collects Tk60 ($0.76) per

hectare (ha) from water management group members to cover the O&M cost. Prior to the project, no funds were available for O&M. In contrast, the current balance of the O&M fund is about Tk700,000 ($8,974).

All these efforts have expanded agricultural and fisheries production, increased income, improved social status, increased school attendance, benefited the landless and poorer segments of society through sharecropping and landleasing, improved livelihoods, and increased employment both for men and women. Residents now take decisions collectively, work together, provide support to one another, and include women in community decisionmaking.

In sum, Rahman proudly stated: "We have registered our organization and got the necessary legal standing. We have already established a financing mechanism for O&M through resource mobilization from the water management groups and collective action, we have ensured the collection of annual O&M fees from beneficiaries, and have put up a mechanism for a sustainable O&M. We are now working to strengthen the water management groups and water management association for a better future."

7. Beneficial Impact of the Project on Socioeconomic Development

In a global sense, the project's overall objective was formulation of an operational blueprint for achieving water management by beneficiaries. According to the project's final evaluation report prepared by the government's Implementation, Monitoring, and Evaluation Division in May 2015,[8] waterlogging of soil is no longer an issue—due to the rehabilitation and reconstruction of the water management infrastructure in the project area. This has also allowed lands, previously unfit for cultivation due to waterlogging, to be cultivated once again. Similarly, it has allowed lands previously single-cropped to be double- or even triple-cropped, thus, doubling or tripling annual agricultural outputs.

As a result of the project, the total area planted to rice in the Narail and Chenchuri Beel subproject areas increased by 4,318 ha (from 34,248 ha to 38,566 ha), which is equivalent to a 12.6% increase in cultivable land area. Rice yields in the subproject areas have also risen to 3.60 metric ton/ha, representing a total annual yield of 138,665 metric tons of rice—a 92.3% increase from the preproject total annual yield of 72,103 metric tons. Likewise, cropping intensity has increased by 20 percentage-points to its current level of 210%.

A farmer ready with seedlings for transplant in the nearby field under the Kalmitala Water Management Group

[8] Final Evaluation Report, Implementation, Monitoring, and Evaluation Division (IMED), May 2015; IMED, Reference No. 21.121.006.00.00.24.2015-15, dated 17 June 2015.

Areas under fish production have also increased from 2,527 ha to 2,988 ha, with average annual production increasing by 4,897 metric tons, representing a doubling of total production—from 4,896 metric tons to 9,773 metric tons per year. Such dramatic increases in crop and fisheries production levels are results of a combination of employing modern technologies, planting higher-yielding varieties of crops, training, and improved management of the water resources.

Finally, as a result of project support, the O&M of water management infrastructure has been made sustainable through (i) formation of O&M subcommittees in all WMGs and WMAs, (ii) generation of self-sustaining funding for O&M by all WMGs, (iii) preparation of O&M manuals for water management infrastructure, (iv) provision of training in O&M, and (v) formal transfer of the responsibility for the O&M of the water management infrastructure to the respective water management organizations through the signing of memorandums of understanding.

The principle of beneficiaries contributing to the annual O&M cost of the water management infrastructure (Tk60 per hectare (ha) per year) has been well accepted by the beneficiaries. The project has also resulted in having appropriate procedures for joint beneficiary-government planning to improve water management systems in the project area.

Based on the postproject household survey conducted in December 2014, the project provided livelihood training to 4,015 landless and indigent women; and distributed goats, ducks, and sewing machines to women in the project area. This has enabled these beneficiaries to engage in income-generating activities. As a result, monthly average household income in the project area increased from Tk1,187 ($15.2) to Tk4,294 ($55.0). While this resulted in a decline in the number of the poor—including the landless and indigents in the project area—by 1,200, the poor still represent 23% of the project area's total population.

The project also formed 140 labor-contracting societies, with the purpose of providing the requisite labor to complete small-scale earthworks done under the project. This led WMG members to gain a significant experience in managing contracts between these labor-contracting societies and BWDB, where project-related works were undertaken. These labor-contracting societies also provided project area residents with opportunities for earning income from constructing small-scale water management facilities.

The project also raised awareness on gender-related issues and the need for empowering women. This was part of the project's focus on women's participation in

all decision-making processes undertaken by WMGs and WMAs. Under the project, women were given access to both training (in agriculture, livestock raising, postharvest processing, fisheries production, water management, and other income-earning activities) and employment opportunities (construction of project-funded infrastructure and O&M of water management infrastructure). The degree to which women now participate in income-generating activities is testament to the institutionalization of such changes in the role of women in the project area.

The positive gender-related changes were further solidified by institutionalizing the empowerment of women through a gender action plan developed under the project. This significantly increased the degree to which women were involved in decision making, particularly in their increased representation in executive committees and in taking leadership positions in executive committees.

At this writing, a total of 9,853 women are now involved in WMGs and WMAs, which is roughly equivalent to 40% of the total membership. This is also reflected in the representation of women in WMG executive committees, which now averages 33%. The experiences that women have gained from the project, particularly in project planning, implementation, management, and monitoring have significantly contributed to their empowerment in the project area.

Success Story No. 5

An Indigent Woman Achieves Self-Sufficiency through Guti Urea Fertilizer Production

I am Kripa Moyee Bish was, 45 years old, living at Dopakhala village in Narail Pourashava, Narail District, and a member of the Kalmilata Water Management Group. My husband passed away in 2009, leaving six family members, including two children. I am landless and, thus, my family had to survive by my work as a laborer paid on a daily basis. When I lost my husband, I fell into a very miserable and depressed condition. My family could not manage to eat even just two times a day, and my children had to drop out of school.

Together with my neighbors, the project facilitator of Southwest Area Integrated Water Resources Planning and Management Project motivated us to become members of the water management group. The project's objectives and activities were very well explained to us, including the importance of women participating in development initiatives. Convinced, I decided to become a member of the group. I then received livelihood trainings in homestead vegetable gardening, mushroom production, fish cultivation, guti urea production and its applications in paddy production, poultry-raising and duck-rearing methods, and farming.

Kripa Moyee Bishwas setting guti urea in a paddy field with her follower

During these trainings, I became interested in guti urea production and learned that it increases paddy production. When guti urea was first introduced to us, no one was even interested in using it as a fertilizer, much less in its production. However, over time, the demand for guti urea by farmers steadily increased. To meet this demand, our water management group purchased a guti urea production machine, and together with other members, I became involved in producing guti urea, and began using it in paddy production.

To date, I now produce 50 bags of guti urea each day, and apply this to about 1 hectare (ha) of paddy fields. This earns me about Tk60,000–Tk70,000 ($769–$897) annually from guti urea production alone, and an additional Tk10,000–Tk15,000 ($128–$192) from applying it to paddy fields. As these activities are seasonal, I have also established a tea stall by the roadside near my house, which I operated during the off-season. This tea stall brings me an income of about Tk2,000–Tk2,500 ($25-$32) per month. I feel that I am now better-off than I was before I went into these activities. In return, I started to also train other poor women in the type of work that I do. During this season, six women are working with me as part of their hands-on training.

Due to all these changes, my social status has completely changed. My sons now go to school and my neighbors invite me to social festivals and events. I have transformed my life from that of an indigent into a person who is now self-sufficient. In short, I have become socially dignified as a woman and, with some pride and gratefulness, I can also say that I do quite well in my profession.

Kripa Moyee Bishwas working on Guti Urea production

Finally, I would like to express my gratitude and happiness for the establishment of our Sewing Centre, which has helped many destitute women avail of livelihood opportunities by getting them involved in sewing. This has increased their incomes, and has greatly improved their way of living.

The project has installed 122 arsenic-free tube wells. These now provide safe drinking water to project area residents. These wells are, in fact, managed by the Women, Environment, and Livelihood or WEL, a group comprising 15 female members of WMGs. These tube wells were installed in consultation with WMGs, their female members in particular, in consideration of the perception of the role of women, social norms, and social values. The project also introduced health care and hygiene services that specifically focus on women, mothers, and children, and these services are being provided by female doctors on a rotational basis.

Water management organizations have initiated collective support to members and groups of members engaged in income-generating activity in agriculture, fisheries production, and other economic areas. They have also established group-owned businesses, such as fishpond culture, production and distribution of paddy seed, production of guti urea, honey production, environmental protection, and environment-related social activities like social forestry—depending on the specific needs of each organization. Some of these businesses were established in partnership with private sector entities. The income generated by these group-owned businesses is shared by all members of the group.

Finally, the water management organizations and BWDB have established a partnership under which the management of O&M associated with water management infrastructure are shared. This outcome would not have been possible if the project failed to demonstrate that residents can acquire the capacity for IWRM and participatory O&M. Both outcomes have improved the transparency and accountability with which water resources are currently managed and governed.

Success Story No. 6

Women in Arsenic-Free Drinking Water Management

I am Mili Botacharjee, 42 years old, living at Mirapara village in Bhadravila Union, Narail District. I am a member of the Mirapara Aterhat Water Management Group and the convener of the Women, Environment, and Livelihood (WEL) Group.

Together with my neighbors, the project facilitator of the motivated us to become members of the water management group. The facilitator explained well the project's objectives and activities, highlighting to us the importance of women participating in development initiatives. When I became a member of this water management group, I received livelihood training in homestead vegetable gardening, mushroom production, farming, and in poultry-raising and duck-rearing activities.

In addition to being the convener of the WEL Group, I am involved in the operation and maintenance of our arsenic-free tube wells.

Prior to the project, we had to use water from an arsenic-contaminated shallow tubewell for drinking and other household purposes. We also used unsafe water from ponds and rivers. Unfortunately, the ground water in our area was severely affected by arsenic contamination. As a result, 300 of the 1,500 households in our area faced some degree of arsenic poisoning. In fact, at that time, the number of patients with arsenicosis was increasing day by day. These patients included pregnant women and

children and many of these people were unable to work. This was particularly damaging for the men and women who worked as agricultural day laborers as losing their daily income multiplied the hardship faced by their families and dependents.

The aim of one of the project activities was to mitigate the damage caused by arsenic poisoning of our drinking water, and to improve the quality of life of arsenic-affected patients and their families. To address arsenic contamination, the project tested 20,622 tube wells for the presence of arsenic, and subsequently marked each either as safe or unsafe. The project also installed 122 arsenic-free deep tube wells to supply safe drinking water to the villagers. To manage these wells, the project organized WEL groups to represent the water management group—each WEL group comprising 15 women. The project also trained members of the group on safe drinking water practices; health and hygiene; and in the repair, operation, and maintenance of tubewells. Health campaigns were conducted and medical support was provided for the villagers, particularly for arsenicosis patients, especially the poor.

Our own arsenic-free tubewell was installed in 2011. As convener of the WEL Group, I lead its operation and maintenance. This includes cleaning the platform and replacing the spare parts, as required. Our group's executive members have generated Tk5.00 ($0.06) per month in contributions for the operation and maintenance of the tube well. These contributions are documented by providing official receipts, and depositing them into the WEL group's bank account. Only the president, secretary, and cashier have signing powers over this account.

The WEL group meets monthly to discuss the operation and maintenance of the tube well, and other concerns and activities. Committee members also conduct awareness-raising programs for water management group members and their households, focusing on water, sanitation, and hygiene. These programs particularly target women.

As a result of the project, the number of residents in our area with arsenicosis has fallen, and the health of moderately affected patients is improving.

Residents of our area are now drinking safe water and are using it for cooking. The incomes of persons affected by arsenicosis are gradually rising, as women in their households are now able to engage in income-generating activities. This empowers households and improves the living condition of the families.

I am happy that I have been given the opportunity to support my neighbors, the women in particular. At the same time, I am gaining much more social acceptance in our community.

Women from the neighboring village in the Arsenic Free water Collection Area

In sum, the project (i) improved water management, (ii) increased both agricultural and fisheries production, (iii) multiplied employment opportunities for both men and women, (iv) augmented the income of beneficiaries, (v) enhanced the livelihood condition of the community overall, and (vi) strengthened the capacity for collective action by beneficiaries.

Project activities (i) increased agricultural and fisheries productions by 2–3 times as compared with the preproject situation, (ii) brought huge tracts of uncultivated and unused land under production, and (iii) facilitated the use of many small bodies of water, such as ponds and borrow pits, for fish culture.

Women and the more vulnerable sectors of the community can now easily undertake a wide variety of income-generating activities, including duck- and poultry-raising, homestead vegetable gardening, beef fattening, and fish pond culture on land leased from BWDB. These efforts have increased income, enhanced social status, improved school attendance, benefited the landless and poorer segments of the project area's population through sharecropping and leasing, and generated employment opportunities both for men and women. These changes also empowered residents in the project area—particularly the women—to participate in the decision-making process, and have facilitated more equitable distribution of resources.

The Chenchuri Water Management Group

SM Ahasan Habib, president of the Chenchuri Water Management Group under the Gandarbokhali Irrigation Pump, reports that "for a long time, we have been living in the gloomy vast area of unproductive agricultural land, with little knowledge of new methods of cultivation." When the project started in his area, it introduced high-value crops of jute, mustard, corn, and most importantly, saline-tolerant, waterlogging-tolerant, and short-duration paddy varieties. It also introduced high-yielding varieties of fish, for which Habib said the project provided training and field demonstrations on how these fish are to be cultured. Habib pointed out that all these initiatives of the project helped to transform huge unproductive lands into productive farms, and enabled single-cropped areas into double- and triple-cropped areas, which enhanced cropping intensity, crop production, and increased fish culture in borrow pit areas. Habib concluded that "increased employment opportunities have improved social cohesion and the livelihood condition of the poor in our area, particularly the indigents and the landless, while land value increased by about 600%. I would say that these changes were not thought possible, even unbelievable, and I would say, these were enormous," he concluded.

8. Conclusions and Lessons Learned

The project is clearly successful as the outputs and outcomes envisioned when the project was formulated have been achieved. The project had been facilitating inclusive growth in Bangladesh by improving productivity in the agriculture and fisheries sectors in the project areas through increased community participation, and has greatly increased the capacity for operating and maintaining flood control, drainage, and irrigation infrastructure in a sustainable way.

The project's major development lessons include the following:

- The real challenge was motivating the beneficiaries to organize themselves for engaging in quick-yielding, income-generating activities that would result in immediate benefits, thereby motivating them to contribute to the O&M of the water management infrastructure in the project area. To this end, the project used participatory water management in a way that allowed the community to engage in decision making, planning, implementation, financing, cost sharing, and in selecting productive activities in the agriculture and fisheries sectors. Participatory water management was thus used as a vehicle for forming water management organizations. In turn, through capacity development and participatory water management, beneficiaries came to understand

Farmers ready with seedlings for transplant in the nearby field under the Kalmitala Water Management Group

that collective action leads to empowerment of all members of the community. This then spilled over into successful overall economic development for the communities in the project area.

- The factors that ensured participation of all community residents in decision making and ultimately led to a sustainable O&M of water management infrastructure in the project area were (i) creating awareness of the benefits of adopting an integrated approach to solving problems, (ii) mobilizing community members into units capable of collective action, (iii) preparing subunit implementation plans in a way that encouraged the participation of all community members, (iv) introducing income-generating activities, and (v) control of lower-level infrastructure by WMGs.
- Water management organizations have proven to be suitable mechanisms for mobilizing collective action, primarily as a result of their organizational strength, their inherent scale economies, and their legal recognition and bargaining power. This has important implications not only for the O&M of water management infrastructure, but perhaps more importantly for income generation, as collective action is simply more effective in this regard than just an individual action. This is particularly relevant to Bangladesh's southwest region, as it is for the most part populated by small-scale farmers and fisherfolk that operate on tiny landholdings.
- Water management organizations have proven themselves capable of initiating their own income-generating activities and even establishing their own business enterprises. For example, water management organizations are capable of not only managing fish ponds, but also undertaking value-added activities unrelated to water management, such as honey production, when they have become more organizationally mature. Such activities not only improve the financial position of the water management organizations but also improve their respective capacities for performing the O&M of water management infrastructure.
- Apart from the positive impacts on beneficiaries that a successful project generates, projects such as the SWAIWRPMP motivates government agencies to adopt CDD as their primary pro-poor development strategy. Establishment of organizations that can efficiently operate and maintain water management infrastructure as a result of a single project has a powerful demonstration effect on government agencies; it emboldens them to replicate such success under similar initiatives. The establishment of successful water management organizations under a single project likewise attracts support from a a wide range of development agencies, which in turn contributes to further strengthening of water management organizations, thus, generating a self-sustaining cycle of development.
- Water management organizations are capable of organizing subgroups that include in their membership women and the poorer segments of the community, and these subgroups in turn undertake income-generating activities that directly increase household incomes in a

sustainable way. For example, groups that focus on attracting women and the landless to their membership are capable of managing fishponds on land leased from BWDB. In the case of the SWAIWRPMP, the water management organizations supported these groups by marketing the outputs and value-added services that these groups produced.

- Networks of water management organizations are capable of performing key roles in mobilizing the participatory planning of subprojects, operating and maintaining water management infrastructure, collectively procuring inputs for agriculture and fisheries production, and marketing the outputs of value-added agriculture and fisheries production. Water management organizations are, thus, uniquely positioned as vehicles for disseminating technology provided through agriculture and fisheries extension services, such as the FFS and FSF.

Southwest Area Integrated Water Resources Planning and Management Project in Bangladesh
Sharing Knowledge on Community-Driven Development

The Southwest Area Integrated Water Resources Planning and Management Project in Bangladesh became the first initiative to successfully incorporate beneficiary participation into all aspects of managing large-scale irrigation systems. This booklet describes how applying community-driven development principles to managing the water resource can both expand livelihood opportunities available to beneficiaries at no additional cost to the project, and can bridge what historically has been a gap between project beneficiaries and project implementation agencies. As a result of directly involving project beneficiaries, the project achieved significant gains in the efficiency and sustainability of flood control, drainage, and irrigation infrastructure development initiatives.

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