

Status of Farmer Managed Irrigation Systems in Bangladesh

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INTRODUCTION

About 30% of cultivated land has access to some forms of irrigation in Bangladesh. According to the government projections 90% of the irrigated area would be covered entirely under farmer managed irrigation systems by the end of the fourth five year plan, 1994-95. Minor irrigation systems cover and would continue to cover about 90% of the country's irrigated area mostly managed by farmers. In the near future, even large scale gravity irrigation systems would be partially managed by farmers. On-farm distribution and management of irrigation water would be done by the farmers and public agency intervention would be in planning, implementation and operation and maintenance of the main system. However, farmers would have to bear at least part of the operation and maintenance cost. To make farmer participation effective their involvement should be ensured from the conceptual stage of a project to its operation. Water charges could be collected from farmers in an amount at least to cover annual O&M costs. Farmers should be organized to take over operation and maintenance of the completed projects. For larger flood control, drainage and irrigation (FCDI) projects and those requiring higher levels of skill, government institutions should provide technical and logistic supports.

Presently, pure farmer managed and farmer cum government managed irrigation systems are in operation in Bangladesh. However, under the present management system, irrigation facilities are operating at about half their potential capacities. In this paper, an attempt is made to inventory farmer managed irrigation systems and their management status. Experiences of some case studies are used in suggesting improvement alternatives.

Water availability during the year in Bangladesh is highly skewed since the country is subject to alternating annual periods of extreme excesses and deficits in rainfall, recurring floods and cyclonic storms (Ghani and Rana, 1992). Both surface and groundwater are used as a source of irrigation in Bangladesh. But the country does not have much control over surface water since most of the flow comes during June to September from catchment areas outside Bangladesh. Most of the streams remain dry or nearly dry during November to May and cannot be used as a dependable source of irrigation unless conservation and augmentation facilities are created. A more dependable source of irrigation is groundwater extraction.

In the past, development of both surface and deep tubewell groundwater resources for irrigation has been entirely done by government agencies. Recently, most of groundwater irrigation systems like Deep Tubewells (DTWs), Shallow Tubewells (STWs) and other Manually Operated Pumps for Irrigation (MOSTIs) have been privatized. Low Lift Pumps (LLPs) which pump surface water are also operated and managed by farmers. Installation, operation and

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maintenance of the large surface irrigation systems are carried out by government agencies. Presently, irrigation systems are managed by either farmers or farmer-cum-agencies. However, it is expected that by the end of the Fourth Five Year Plan (1994-95) of Bangladesh, about 90% of the irrigated area would be covered by farmer managed irrigation system (Table 1).

Table 1. *Irrigation Achievements and Target of Irrigation Coverage Under Different Systems in Bangladesh*

PROGRAM 1/	1989-90 Achievement		1994-95 Target	
	Number (^{'000})	Area (^{'000} Ha)	Number (^{'000})	Area (^{'000} Ha)
Gravity	-	210.00 (7)	-	500.00 (10)
LLP	60.00	780.00 (25)	75.00	1090.00 (23)
Trad	-	300.00 (10)	-	200.00 (4)
DTW	30.00	500.00 (16)	35.00	700.00 (15)
STW	200.00	1250.00 (40)	500.00	2250.00 (47)
HTW	450.00	50.00 (2)	450.00	50.00 (1)
TOTAL		3090.00		4790.00

Adapted from the Fourth Five Year Plan (draft)

Figures in the parenthesis indicate percent of total irrigated area.

- 1/ LLP Low Lift Pump
 Trad Traditional
 DTW Deep Tubewell
 STW Shallow Tubewell
 HTW Hand Tubewell

MANAGEMENT STATUS

Irrigation systems in Bangladesh are generally managed by agencies, farmers or by both sharing responsibilities. Within each category of managements there are different arrangements. Different management systems are briefly described as:

Gravity Irrigation

Most gravity irrigation systems are identified, planned, implemented, operated and maintained by government agencies. Bangladesh Water Development Board (BWDB) is the lead agency in the field of surface water development. BWDB delivers water up to the tertiary head gates and assumes that farmers should take responsibility of on-farm development and water distribution at the tertiary and farm levels. There is a large gap between expectations of BWDB and actions by farmers. Therefore, BWDB-managed irrigation systems have not achieved more than 50% of irrigation targets in most of the irrigation systems. Recently, BWDB is actively considering involvement of its farmers in project identification, project preparation, implementation, and operation and maintenance stages in order to achieve long term sustainability of water development programs. The water development program of BWDB involves Flood Control, Drainage and Irrigation (FCDI). In addition to these, BWDB also deals with river bank protection and river training. BWDB has implemented 465 projects in Bangladesh which cover 0.43 million hectare under irrigation. This is only 6% of the total FCDI area in the country (BWDB 1991). In BWDB irrigation projects, farmers are required to pay a very small irrigation fee for dry and wet seasons. The irrigation fee collection rate is only about 10%.

Minor Irrigation

Minor irrigation in Bangladesh includes irrigation using low-lift pumps, deep and shallow tubewells, hand tubewells and doon and swing baskets (MPO 1991). This type of irrigation has been the driving force behind agriculture in the past and is expected to stay so in the near future. Therefore, management is very important for capacity utilization of minor irrigation systems. Management types and their impact on agricultural development are discussed in the sections below.

Deep Tubewells. Deep Tubewells (DTWs) in the past have been installed, operated and maintained by government agencies. Farmers were utilizing the facilities for increasing production. DTWs during early days were almost free for the farmers since they were only paying a nominal annual rent and fuel-oil. Additional production was a main policy goal for the country. Annual rent was increased several times and finally the government decided to sell all deep tubewells to the farmers at a subsidized rate. Many farmers have been reluctant to buy the tubewells though these are highly subsidized. However, with continued persuasion by donors and government agencies, a large number of deep tubewells were sold to the farmers or groups of farmers. However, many are still owned by the government. Therefore, a mixture of deep tubewell management systems exists in the country. In Bangladesh until the recent past all deep tubewells were government supplied. Ownership patterns changed only due to the policy decisions mentioned above. Therefore, present deep tubewell irrigation systems are of the following types:

- i) Agency ownership (rented to the farmers) and privately managed;
- ii) Agency supplied but private ownership and management;
- iii) Agency supplied, NGO ownership and private management; and
- iv) Private supply, ownership and management

Within these management systems there are various types of rents (farmers pay rent plus fuel-oil, pay only rent and everything is beared by the agency etc.) and management modes (managed by a farmer and others pay rent per unit of service area in cash or crop share, managed by group of farmers and they share operation and maintenance cost). Mode of payment for some of the management alternatives are: 25% crop share cash (managers' fuel), cash (farmers' fuel), 33% crop share (Mandal and Miah 1992).

Shallow Tubewells. Shallow Tubewells (STWs) during the early seventies were supplied to the farmers by government agencies on credit. It was the responsibility of farmers to operate and maintain them. During 1973-74, shallow tubewells were supplied, installed, operated and maintained by the Bangladesh Agricultural Development Corporation (BADC) and were rented to the farmers. Later on cash sale, sale on bank credit or sale by private parties were allowed. The private sector rapidly captured the market and subsidies provided by the agencies were withdrawn. Currently, private and public sectors are competing and most of the shallow tubewells are installed through private sector initiatives. A shallow tubewell is generally owned by a farmer or a family for irrigating primarily their own farm and sells or supplies water to the adjacent farmers after meeting their own demand. Therefore, the management mode for shallow tubewells is private management from the beginning. Irrigation fees or water charges are either in cash per unit of service area or crop share at mutually decided rates.

Low Lift Pumps. Irrigation in this part of the world started with power pumps in the mid-fifties. The government agency used to supply free pumping units, operators and fuel-oil during the early days. Then rental systems for the pumps and operators were introduced and farmers had to provide fuel and oil for operating the pumps. Farmers shared the seasonal operating cost. From the mid eighties, the government decided to sell all Low Lift Pumps (LLPs) to the farmers or group of farmers. Therefore, presently all LLPs are owned by individual farmers or group of farmers. Management of LLPs is done by farmers depending on ownership (individual farmers or groups of farmers - either formal or informal). Irrigation fee collection is again in cash per unit of service area or crop share mutually decided by the LLP owner and users.

In certain areas of the country, LLPs are used where irrigation inlets or pump stations were developed by government but operation and maintenance of the irrigation system and water distribution are managed by groups of farmers. Such systems are reportedly performing well. Some examples are the following.

Gohalbari Small Scale Irrigation Project. This LLP small irrigation scheme was developed during 1978-79 with the help of BADC in the Nawabganj area. Three pumps, each with 56 litres/sec (1/s) capacity are pumping water from the river Mohananda. Operation, maintenance and water distribution are managed through a 12-member management committee. The society has 300 members who share water. The service area is about 60 hectares (ha). The water distribution system has a 100 meter lined canal and 240 meter unlined canal. The managing committee collects an irrigation fee of Taka 2600/ha (US\$ 65/ha) for dry season rice and Tk. 1300/ha (US\$ 33/ha) for wet season rice and wheat cultivation. Staff manage water distribution in the service area. Farmers pay Tk. 225/ha (US\$ 6/ha) for the water distributors. From the irrigation fee, the managing committee operates and maintains the irrigation system and saves for future emergency maintenance and replacement of pumps.

Palsa Low Lift Pump Scheme. This was a BWDB-managed irrigation scheme in Nawabganj where BWDB used to operate and maintain the system and farmers were to pay irrigation fee per unit of service area. The scheme has four pumps and a service area of 26 ha. Farmers were not satisfied with service from BWDB and irrigation fee collection was poor. Pumps (4 units) were sold to the farmer group in 1989. At present it is purely farmer managed, managed by five member management committee. Farmers are paying Tk. 3700/ha (US\$ 93/ha) for dry season rice crop which covers operation and maintenance cost and saving for emergency maintenance. For other seasons, farmers share the fuel and oil cost only. In addition to the fixed irrigation cost, farmers pay Tk. 270 (US\$ 7/ha) for a water management staff who takes care of water distribution in the service area. Farmers are happy with the present system though they are paying a much higher irrigation fee as compared to BWDB irrigation rate. Moreover, with a feeling of being owners they feel more responsibility for the system.

Buri River (2 vent inlet) Irrigation System. This small scheme is located in Companiganj, Comilla. This is part of a flood control and drainage (FCD) project operated by BWDB. Farmers requested BWDB for an irrigation inlet which was completed in 1991. Farmers were growing only one non-irrigated rice crop in that area prior to flood protection facilities being developed by BWDB. A farmer organization was formed which manages a 56 1/s low lift pump which pumps water from the irrigation inlet. A 30 ha. area is irrigated and three crops are grown annually in the area. Eighty farmers are getting benefits from the system. The organization collects an irrigation fee of Tk. 3000/ha (US\$ 75/ha) for dry season rice in three installments. On an average, farmers get about 11.0 t/ha of paddy from two rice crops, in addition to a non-rice crop annually.

The above case studies indicate that farmer managed irrigation systems are operating effectively. However, these systems were initiated by the government agency and were handed over to the farmers for operation, maintenance and management.

Other Pumps. Hand tubewells and other manually operated pumps such as twin treadle are used for irrigating mostly vegetables, tobacco and other non-rice cash crops. Local skilled laborers are used for installing these pumps. Banks and other non-Government Organizations (NGOs) are providing credit and other support services in promoting these simple irrigation equipment. Operation, maintenance and water distribution are managed by the farmers and mostly by family laborers. This simple and less expensive technology is gaining popularity.

INVENTORY OF MANAGEMENT STATUS

Most of the farmer managed irrigation systems are presently developed with minimal support from the government agencies. But by the end of the Fourth Five Year Plan (1994-95) all the minor irrigation systems which will cover 90% of the country's irrigation would be privatized and will be purely managed by the farmers. Farmers in such cases will have to collect irrigation equipment from the sources of their choice and government agencies like BWDB and BADC will not have much of a role in the distribution of irrigation equipment. NGOs and private sector will play a major role in the distribution of irrigation equipment. However, Bangladesh Rural Development Board (BRDB) and the Directorate of Agricultural Extension (DAE), as extension

organizations, will continue to work closely with farmers and farmer organizations. Therefore, inventories of irrigation scheme management and technology needs could be pursued through these agencies. After full privatization has occurred farmers will be in need of new support services for technology acquisition and replacement, agricultural inputs and marketing, and management and conflict resolution support. Management inventories would fill a useful role in ensuring formation of a client-responsive support system in the future. Institutes involved in irrigation research could be lined up to help in this area. Interested professionals could develop questionnaires and work through DAE and BRDB in updating irrigation management status.

CONCLUSION

The majority of irrigation systems in Bangladesh are managed by farmers. Public sector investments through government agencies were involved in infrastructural development but these are declining and will be completely withdrawn in the near future. However, government would continue to support relatively large gravity irrigation systems and FCD projects and beneficiaries will progressively bear the full O&M cost. The farming community should be educated to participate in the FCD/FCDI systems to ensure sustainability. Farmers management modes should be reviewed, monitored and updated through extension and research organizations for further improvement.

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