

# Nabagram Irrigation System

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## 1 Static Analysis - Collective action

The Nabagram village is located in the Comilla District in Bangladesh. The primary resource appropriated is water for irrigation using a tubewell. This irrigation is used to grow three wet rice crops in sequential order, so proper irrigation and timing is essential for ensuring the vitality of the boro crop but also the other two crops that follow (amon and aus). The original case was documented in 1979 and covered an action situation involving 50 families. The governing system combines government bureaucracy and local management with the main governance being done in a decentralized manner, giving village cooperatives flexibility. The Nabagram village is a member of the national Thana Irrigation Program (TIP) but also created local adaptations including creation of the role of water distributor, differential water-use categories, and use of private mechanics for pump repairs.

### 1.1 The Commons Dilemma

- Prior to availability of irrigation, the Nabagram village primarily grew amon rice at the end of monsoon season (September – December) and some farmers would grow aus rice on the higher lands during the summer. When irrigation became available through TIP, farmers were able to grow a third crop, boro, which is planted after the main crop and harvested before the beginning of the rainy season. The operation of the irrigation pump is critical for the boro crop and to ensure that the two subsequent crops can be planted on time.
- Nabagram established their village cooperative society in 1962, before the creation of TIP. In 1969, the village applied for installation of a tubewell and pump which was installed in the same year. After installation, local water users constructed the necessary channels to distribute water and labor was mobilized by the leaders of the cooperative society.
- Over-use of water and free-riding on repairs to public infrastructure are results of the commons dilemma. To avoid these dilemmas, the Nabagram village took advantage of the flexibility built into TIP by implementing three important local adaptations. The first adaptation is the creation of the role of the water distributor (Panichalak), who is chosen by the local management committee from the group of men that received training from the Bangladesh Agricultural Development Cooperation (BADC). The water distributor is responsible for adequately distributing the water between 8 blocks. The second adaptation is the creation of differential water use categories, so the different categories of water users (cooperative members, village members, and

non-village members) are charged different prices for irrigation based on expected participation in maintenance and governing meetings. The third adaptation is the use of private mechanics, not supplied by BADC, which allows for quick and adequate repairs when necessary.

## 1.2 Biophysical Context (IAD)

- The Nabagram village is on a relatively flat plane about 30 ft above sea level with a slight slope from north to south. The **natural infrastructure** includes rainfall and soil. The soil is generally alluvial but more clay in the North and more loam in the South. Average rainfall for the Comilla region is 94 inches, with uneven distributions both year-to-year and across different months. This village has 113 acres of cultivated land along with another 40-50 acres for residential use. This action situation involves 50 families and 291 individuals who own approximately 96.2 acres of land.
- The **public hard human-made infrastructure** includes the tubewell and pump for irrigation. The irrigation area is divided into 8 blocks, each served by a secondary branch of the main canal, and a number of intra-block field channels. Blocks vary in size from 4.1 to 15.2 acres.

## 1.3 Attributes of the Community (IAD)

- The Thana Irrigation Program (TIP) links village cooperative societies with a government agency, Bangladesh Agricultural Development Cooperation (BADC), to distribute, operate, and maintain irrigation pumps used for boro, a winter (dry-season) crop. At the thana level, three formal organizations are involved: Thana Central Cooperative Association (TCCA), Bangladesh Agricultural Development Cooperation (BADC), and Thana Training and Development Center (TTDC). At the village level, the formal unit of organization is the village cooperative society. Within the village cooperative, formal leadership is provided by a six-person elected Committee who then selects three members to serve as chairman, vice chairman, and manager-secretary. 32 families in the village are members of the cooperative society and meet weekly. In addition to this elected Committee, 2 people are chosen to fill the roles of water distributor and pump operator for each irrigation season. The TIP permits local variations and Nabagram has generated three important adaptations: the role of a water distributor, creation of differential water-use categories, and use of private mechanics for pump repair.
- The **soft human-made infrastructure** includes the role of the water distributor which was created in 1971. The water distributor is responsible for allocating water to the 8 irrigation blocks. Water is successively supplied to each block in a pre-arranged rotational pattern. When water is being supplied to one block, all other secondary channels are closed and no water is provided to the other blocks. There is no fixed period for supply of water to a particular block, so the water distributor judges when adequate water has been supplied to all fields within the block. Similar procedures are used to supply water to individual fields within the blocks. The soft human-made infrastructure also includes the use of private mechanics for pump repairs as necessary.

- The **social infrastructure** in this system consists of the differential water-use categories which result in differential rates of irrigation charges. Because all costs are borne to the village cooperative but water is supplied to non-members, increasing rates are charged to non-cooperative and non-village members to cover these costs and maintain the irrigation system.
- There is no mention of **private hard human-made infrastructure** in the text.

## 1.4 Rules in Use (IAD)

### 1. Position Rules:

- At the thana level, three formal organizations are involved: Thana Central Cooperative Association (TCCA), Bangladesh Agricultural Development Cooperation (BADC), and Thana Training and Development Center (TTDC)
- Village cooperative societies choose to participate in TIP and elect a six-person managing committee as the formal leadership. This committee then selects 3 members to serve as chairman, vice chairman, and manager-secretary. The committee also appoints a water distributor and a pump operator to act as full-time staff during the irrigation period.
- Water users include village cooperative society members, village members who are not a part of the cooperative society, and individuals from other villages.

### 2. Boundary Rules:

- The water distributor is selected from the group of men in the village who have previously received formal training from BADC.
- Ties to the village and the cooperative society determine the water-use category of an individual and the amount that they are charged for water provision. Cooperative members are charged approximately US \$10 (Tk150) per acre, village members not in the cooperative are charged US \$20 (Tk300) per acre and water users from other villages are charged US \$25 (Tk375) per acre

### 3. Choice Rules:

- Villagers may choose to become members of the cooperative society which includes 32 families and meets weekly to discuss affairs of the cooperative
- Village cooperative societies may choose to add adaptations to manage irrigation.

### 4. Aggregation Rules:

- Cooperative members are expected to attend weekly meetings.
- When canals need deep cleaning and/or repair, all families in the village with land under irrigation are expected to contribute labor, but water users in other villages are not called upon.

### 5. Payoff Rules:

- The water distributor is appointed for only one irrigation season, so they can be replaced if inadequate.

- The water distributor is an employee of the village cooperative and is paid for by water users instead of a government agency.

#### **6. Scope Rules:**

- The water distributor has the sole right to distribute water to individual fields following a system of rotation that was developed in collaboration with the managing committee and general assembly. There is no fixed period for supply of water to particular blocks or fields, so the water distributor must judge when adequate water has been supplied.
- During the period of land preparation and transplanting, water is supplied according to the sequence of requests received from individual water users. To receive initial water, irrigation fees must be paid in advance.

#### **7. Information Rules:**

- Village cooperative members participate in weekly meetings to discuss the affairs of the cooperative.

### **1.5 Summary**

The Nabagram Village in the Comilla District of Bangladesh represents an irrigation system with limited dependency on an outside agency. Because of the flexibility of the TIP, Nabagram has been able to implement three key adaptations that have led to success in managing this irrigation system: creating the role of the water distributor, creating differential water-use categories, and using private mechanics for pump repairs. The two important outcomes from these arrangements include a limited dependency relationship with an outside agency and the lack of significant agency resources required to manage this system. The organizational pattern in this case allows for dominant local management that has strong incentives to use water efficiently due to a local accountable water distributor and differential water-use charges.

## **2 Case Contributors**

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