IDENTIFYING ASSISTANCE NEEDS OF FARMER-MANAGED IRRIGATION SYSTEMS

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INTRODUCTION

The task of increasing food production to sustain the food requirement of a rapidly increasing world population would be made easier through the increased availability of irrigation. Sad to note, however, is the difficulty of developing water resources for irrigation. The cost involved has become prohibitive in most developing countries where more food production is badly needed. Thus, new projects and development of new water sources for irrigation development in most countries have been relegated to lower priority in favor of improving existing systems to maximize their utilization.

Farmer-owned and managed systems, estimated to represent more than half the total irrigated areas in most countries, have become the present focus of attention. In the Philippines, it is estimated that 56 percent of the irrigated area falls under communal and pump development projects. About 580,000 hectares (ha) of land are irrigated by systems that are owned and controlled by farmers (Bagadion and Korten 1980). Government assistance is made available to irrigator associations for the improvement of their systems. Some systems or portions of systems that were once managed by the government are now being turned over to farmer associations to own and manage because of the financial burden to the government and the belief that farmer associations have the potential to manage the systems more efficiently.

In order to harness the potential of farmer-managed systems, adequate support from all sectors, especially from the government, must be given. The kind of support and assistance needed should be properly identified, and the manner of providing assistance must be carefully studied if it is to serve its purpose. There are instances where assistance improperly timed and completed was detrimental to the effectiveness of the system (Coward 1983). Towards this end, the Central Luzon State University (CLSU) has embarked on research activities focusing on systems managed and operated by farmer associations. The purposes are to understand properly the manner in which this type of system is operated and managed and to identify the kind of assistance farmers need and the best way of providing such assistance.

Classification of Farmer-Managed Systems

To identify assistance needs, farmer-managed systems were classified into three categories based on the system's historical background: indigenous systems, modified systems, and government turned over systems.

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Indigenous systems. These are traditional systems that are built, owned, and managed by farmer-users which have not received any form of assistance from the government or from other sources for construction, operation, and management. Canal networks of these systems are usually crude and without permanent controls, measuring structures, or other facilities. The diversion structures are usually made of logs, stones, brush, and tree branches that are easily washed away when the streamflow swells.

Modified systems. These were indigenous systems until the government intervened and provided financial assistance to the farmer-users, particularly for improving the systems' physical facilities. Diversion dams that used to be made of logs, stones, and brush have been made permanent. Turnouts, checks, and other facilities have become more sophisticated.

Government-turned-over systems. These are systems that used to be owned, operated, and managed by the government. The irrigation facilities are mostly permanent and contain some degree of sophistication, as compared to indigenous systems. Systems that are a heavy burden to the irrigation agency in terms of financial viability are turned over to the farmer-users after some degree of physical rehabilitation in the systems' structures and organizing activities takes place. Farmers, not previously involved in the system operation and management nor having experience in such activities, are trained to manage system functions, such as water allocation and distribution, repairs and maintenance, and fee collection.

Research on Farmer-Managed Systems

A multidisciplinary research team composed of engineers, social scientists, and economists was organized at CLSU to examine the operation of different types of farmer-managed irrigation systems. The following discussion presents the observations and findings from a comparison between the indigenous-type systems and government-turned-over systems under study. Research activities on a modified system have barely started and as yet little can be reported.

Research Methodology

The research procedure is common to all systems under study. It consists of three phases. First, the observation phase documents the operation and management of the system. Close observations are made of the water allocation and distribution, system maintenance, financial and conflict management, farming practices, and socio-economic conditions of the people in the community. In this report, however, emphasis will be only on water allocation and distribution and system maintenance activities.

In the second phase, farmers participate in identifying and discussing problems regarding the operation and management of the system; these problems are then analyzed in order to arrive at solutions. Some degree of overlap, however, exists between this and the observation phase.

The third phase implements agreed solutions or actions regarding the identified problems. Implementation is done by the association after detailed discussion with farmers. Close observations and monitoring of farmers' attitudes and responses to these changes follow implementation.

Research assistants are assigned to the study area. Data is gathered using participant-observation methods. The research assistant resides within the locality which enables him to observe all farmer activities relevant to the management of the systems, such as meetings, surveys, sharing sessions, and group works. Unstructured interviews are held with farmers regarding issues and problems encountered in operation and management of irrigation systems.

INDIGENOUS SYSTEMS

Description of the System

A system with a service area of about 337 ha with 150 farmer-users was selected as the study site. The system is a run-of-the-river type and is operated and managed by an association of farmer-users which is headed by a president. The other officers of the association are the vice-president, secretary, treasurer, and three auditors. These officers are selected by an elected Board of Directors from Board members. In addition, a water master is selected from outside the Board and assists the president in water distribution and allocation activities. He is the only paid officer of the association and receives 12.5 kilograms (kg) of rough rice per year by every farmer who uses the system's irrigation water. When water is scarce and the water master cannot cope with work, water inspectors are hired and also given remuneration. The organizational set-up is shown in Figure 1.

The water is diverted from a stream with the aid of a brush dam placed across the stream. The streamflow at the location of the dam is shared with another irrigation system on the opposite side of the stream (Figure 2). The sharing arrangement is that the other system gets one-third of the flow during the wet season and gets one-day flow per week during the dry season.

Rice is planted during the wet season. Dry season crops include onion, garlic, peanut, corn, and vegetables such as tomato, eggplant, and various kinds of bean.

The whole service area of the system is divided into four divisions for water distribution (Figure 3). Water diverted from the stream is distributed to the system's service area through the four kilometer (km) long main canal. The main canal branches to a lateral canal about 0.75 km from the dam which serves a portion of Divisions I, II, and III.

Figure 1. Organizational structure of indigenous system.

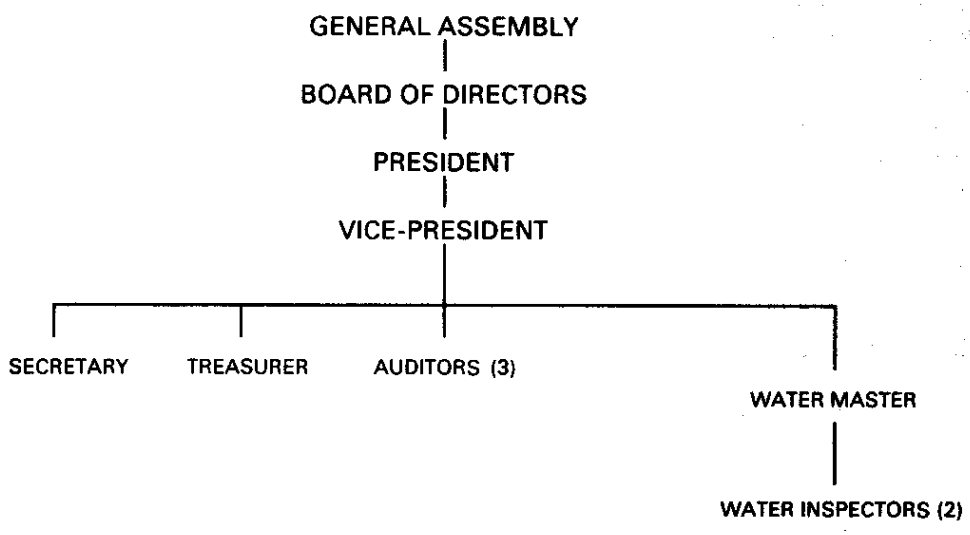


Figure 2. Brush dam method of sharing water with other systems.

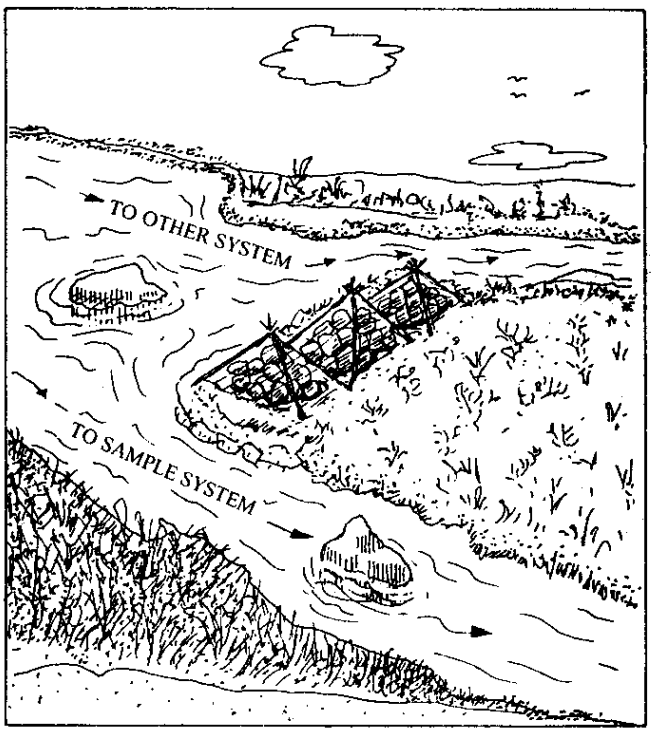
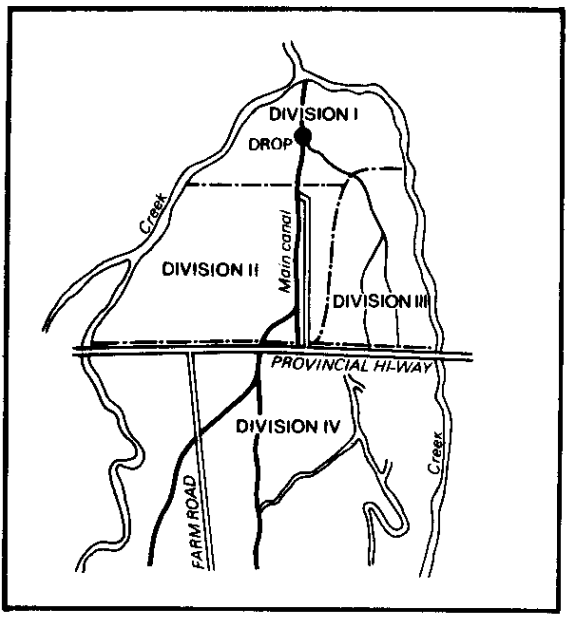


Figure 3. System layout showing location of divisions I-IV.



The limited amount of water during certain times of the dry season would hardly reach the far end of the system if allowed to flow through the main canal as it is quite wide, causing slow movement of water and more conveyance losses. To remedy the situation, the farmers constructed a small temporary canal parallel to the main canal to convey the small quantity of water to the far end of the system.

Irrigation Practices

Except for isolated cases, flooding is the general method of irrigation in the area. Irrigation enters into paddy fields directly from the canal by cutting the embankment. For farms far from the canal, during the dry season the farmers use temporary farm ditches to convey irrigation water to their fields. During the wet season, however, water is conveyed from paddy to paddy. The amount of irrigation needed depends on the individual farmers' judgement. No measuring device is employed. For rice crops, most farmers wait until water almost overflowed their paddy dikes before releasing the flow to the next farmer. In the case of upland crops, irrigation is stopped when all the fields up to the farthest end become wet.

Water distribution and allocation

The water sharing arrangement in the area is basically rotational. Rotation at different levels of organization is used for the wet and dry seasons. Although there are no measuring

devices nor permanent control structures employed, the institutional arrangements evolved by the farmers for water allocation have enabled the association to cope with the situation and distribute water to the fields.

Even before the research project started, the association had its own water distribution and allocation scheme which the farmers followed for many years. The association had adopted distinct rotation schedules for the wet and dry seasons and these were in use during the study observations. These are described below.

Wet season. During the wet season, the following irrigation schemes were implemented at different times depending on the amount of available water.

Continuous flow irrigation. This is practiced while there is still frequent rainfall and ample discharge from the source. Water flows continuously into the main canal and farmers use it anytime they want to. There are cases, however, where upstream farmers totally check the flow to downstream fields. If farmers downstream need water, they inform the upstream farmers and usually the problem is settled. In cases of disagreement, the intercession of the watermaster or the president is sought.

Rotation by division. This is used when continuous flow irrigation no longer works due to a decrease in the amount of water entering the system. Each of the system's four divisions receives water for a certain time period within a 13-day cycle (Figure 4). Distribution within the division is the farmers' concern and rotation usually goes from upstream to downstream. In some cases, all farmers in the division are not able to irrigate their fields during the division's scheduled time; these are given the first priority during the division's next turn. The cycle is repeated after the last farmer in the division has irrigated his fields.

Before irrigation by rotation is implemented, the four divisions are ranked according to urgency of their needs for irrigation water, based on the predominant condition of the standing crops in the area. This is done to determine who gets water first, which is decided by the president of the association upon the recommendation of the watermaster who is expected to know the condition in each division.

As can be seen in the schedule, there is inequality among divisions in area planted and irrigation time allotted. This is tolerated in the case of Division I because farmers in this division were the original users of the system when it was first built and have prior right to the use of water. In the case of Divisions II and IV, farmers can get water from another source to supplement their needs.

Rotation on a time basis within the division. Whenever water becomes insufficient such that a majority of the farmers in a division are unable to irrigate their farms during the prescribed schedule for the division, water is allocated to each farmer in the division on a time basis.

Figure 4. Rotational irrigation by division during the wet season.

Div	Area (ha)	1 M	2 T	3 W	4 Th	5 F	6 S	7 Su	8 M	9 T	10 W	11 Th	12 F	13 S	1 Su	2 M	3 T	4 W	5 Th	6 F	7 S
I	73.50	▬	▬	▬	▬										▬	▬	▬	▬			
II	88.00					▬	▬	▬											▬	▬	▬
III	39.00								▬	▬	▬										
IV	136.50											▬	▬	▬							
Other systems		Given 1/3 of the streamflow as continuous flow to its diversion canal.																			

It is worthwhile to mention that in the previously discussed rotation by division, water is diverted simultaneously into the fields of two or three farmers, depending on the volume of flow, and released only when their water needs are satisfied. This practice places the tail end farmers at the mercy of those upstream in their division. This situation usually becomes a source of conflict among farmers whenever there is water scarcity. To remedy this situation and to give equal chance to every farmer, the time allocation for each farmer is adopted.

In the rotation on a time basis, the total time allotted for the division is divided by the total number of hectares farmed in the division to get the time allocation per hectare. It becomes the farmer's responsibility to apportion the amount of water he is to receive within his time schedule. Regardless of whether he finishes irrigating his field or not, as soon as his time is up, the next farmer gets the water. The time allocation per hectare in each of the divisions is shown in Table 1.

Table 1. Time of irrigation per hectare for each division.

Division	Area planted (ha)	Time allotment (days)	Time per hectare (minutes)
I	71.5	4	80.6
II	85.0	3	50.8
III	35.4	3	122.0
IV	111.5	3	38.7

Dry season. In the dry season (December-May), a different water allocation scheme is used. The water flow into the system during this period is quite low due to decreased rainfall. Only about 40 percent of the total area is planted (mostly areas close to the canal and the upstream portion of the system). The following schemes for water allocation were used in the study site during the period of observation.

Rotation by division. Continuous flow was not practiced during the dry season. The first level of water allocation was rotation by division (Figure 5). During the first months of the season, water shortage was not yet critical. The crops were still small and only a few farmers planted their crops so that the amount of water entering the system was still sufficient.

Figure 5. Rotational irrigation by division during the dry season.

Div	Area (ha)	Mon			Tue		Wed		Thu		Fri		Sat		Sun	
		6am to 12n	12n to 6pm	6pm to 6am	6am to 6pm	6pm to 6am	6am to 6pm	6pm to 6am	6am to 6pm	6pm to 6am	6am to 6pm	6pm to 6am	6am to 6pm	6pm to 6am	6am to 6pm	6pm to 6am
I	73.5		▬		▬		▬		▬		▬					
II	88.0			▬				▬				▬				
III	39.0					▬				▬						
IV	136.5												▬	▬		
Other systems		▬													▬	▬

During the dry season, Division I irrigated on Monday from noon to 6pm and on Tuesdays and Fridays from 6am to 6pm, a total of 54 hours per week. Division II irrigated on Monday, Wednesday, and Friday from 6pm to 6am, and Division III irrigated on Tuesday and Thursday from 6pm to 6am. Division IV used water from 6am Saturday to 6am Sunday. The remaining hours of the week (6am Sunday until noon Monday) were given to the system on the other side of the stream. The whole irrigation flow was diverted to the division scheduled to use the water.

Although the wet season irrigation cycle is 13 days, the dry season cycle is only seven days. Farmers gave two reasons for the difference: a) Because the area planted to crops during the wet season was larger than the area planted during the dry (only about 40 percent of total area), a short irrigation period was not enough to irrigate one division. On the other hand, in the dry season a three day irrigation period for one division was found by farmers to be quite long, especially during the first few months of the season when the inflow is still large. b) Because the streamflow during the dry season decreases with time, shorter intervals during this period will give every division their turn when the flow is still large.

Rotation by subdivision. During January and February, the available irrigation water decreased tremendously and that, in combination with a maximum water requirement for the standing crops led to a water shortage in the system. Some farmers in one division were unable to get water during the division schedule; in some cases, even after two irrigation cycles. This was particularly true for farmers in the downstream end of the division. As a remedy, the division was subdivided and each subdivision given a definite schedule within the division schedule (Figure 6).

Figure 6. Rotational irrigation by subdivision during the dry season.

Sub-div.	Area (ha)	Mon			Tue		Wed		Thu		Fri		Sat		Sun	
		6am to 12n	12n to 6pm	6pm to 6am	6am to 6pm	6pm to 6am	6am to 6pm	6pm to 6am	6am to 6pm	6pm to 6am	6am to 6pm	6pm to 6am	6am to 6pm	6pm to 6am	6am to 6pm	6pm to 6am
IA	19.40		—													
IB	11.60				—											
IC	26.00						—									
ID	16.50								—							
IIA	31.75			—								—				
IIB	56.25							—								
IIIA	13.90					—										
IIIB	25.10									—						
IVA	94.75												—			
IVB	41.75													—		
Other systems		—													—	—

Rotation on a time basis in the subdivision. Another arrangement was adopted by the association during severe water shortages to give each farmer a chance to use water during the subdivision schedule. The total number of hours allotted for the subdivision was divided by the number of farmers to determine the time that each farmer could use water during their subdivision's turn. This is quite different from what was done during the wet season. The main justification given by the farmers for the difference was the need to give every farmer equal opportunity during the dry season considering that not all the area could be planted. This also discouraged farmers with plenty of resources from monopolizing available water by planting more land. It is interesting to note that during the dry season, the variation in area cultivated among farmers in the system was quite minimal.

During the period of observation, only one subdivision in the entire system implemented the time allocation schedule. Other subdivisions allocated water only according to rotation by division and subdivision. With the rotation on a time basis, farmers prioritize the use of water during their schedule: they first irrigate the portion of their field that badly needs water.

System Maintenance

To maintain the irrigation system's physical structures, the association from time to time organized group works. Work consisted primarily of repairs and reconstruction of the damaged portions of the canal network and the diversion dam, or cleaning and desilting the irrigation canals. When repairs and maintenance of major irrigation structures and brush dams were required, the association called for group work to do the job. Jobs which required less effort, like cleaning, weeding, or desilting of irrigation canals, were left to the individual farmers concerned. Specifically, if a certain length of the canal passes through or beside a farmer's fields, that farmer is responsible for cleaning and maintaining that portion of canal.

Group works are usually called by the association president upon recommendation of officers or members. Information regarding group works is disseminated to farmers by the watermaster who goes around the *barrio* (town or village subdivision) informing the farmers. He also requests farmers to pass on the information to others they meet.

During the first year's observation, four group works for system maintenance were performed by the association. The first consisted of deepening and narrowing a shallow but wide canal starting from the system's earth dam and going downstream. Only 40 percent of the 138 farmer members attended the activity. Some farmers who were not able to attend the group work said they were too busy at that time while others claimed they were not informed of the project.

The second group work was to repair the system's washed-out brush dam. Although this type of work required the participation of all farmer members, only about 70 percent participated. Some farmers brought with them bamboo poles for strengthening the dam foundation, while others brought jute sacks which were used as containers for sand and other filler materials. Brush and tree branches were also used. A month later, the newly repaired brush dam was again washed out. A second repair was performed by 43 farmers.

Another group work involved only farmers in Division III. It consisted of repairing an earthen dam used to divert water from the main canal to the lateral canal that services this division, and cleaning the lateral canal. The group work was arranged by the farmers in Division III with help from the watermaster and the barrio captain, who has a farm in the division. It was also observed that some downstream farmers, especially those suffering from reduced canal flow to their farms, followed the canal upstream to check for and remove obstructions in the canal.

Problems and Needs

Based on observations of the system, it could be safely said that its operation and management is quite satisfactory. The association has water allocation and distribution schedules to cope with different situations that occur. It has also demonstrated its capability, to a certain extent, to mobilize labor for system maintenance activities, to

resolve conflicts among its members regarding water use, and to collect fees for use by the association. It is believed, however, that the operation and management of the system could be further improved if identified problems could be solved and needs provided for. These are discussed below.

Limited water supply during the dry season. The nature of the system as a run-of-the-river type suggests that the most obvious problem is the scarcity of water during the dry season. The solution is to provide a water impounding reservoir to store water during the wet season for use during the dry. Improvement of the system's diversion structure by making it permanent would have minimal effect in solving the problem. Although the present diversion dam is crude and could be easily washed away during heavy rains, it is capable of diverting the entire streamflow during the dry season if necessary. With a large and more permanent diversion structure, the service area of the system would be increased but this is not the concern of the association. Apart from the financial burden, if a permanent diversion dam was constructed, maintenance of the dam when silted would be a potential problem for the association.

The construction of a storage reservoir for the system is definitely not within the financial capability of the farmers. Only the government could provide this kind of assistance. However, considering the financial situation of the government, it may be limited as well. A water impounding project was initiated in the system last year only to be halted for lack of funds after a change in administration.

Complacent attitude of the farmers. The tendency most people have to maintain their traditional ways is not conducive to improving the operation of a system. The farmers have become accustomed to the water allocation and distribution methods passed to them by their ancestors, and few would care to change them, even for the better.

There should be a program aimed to activate irrigator associations and to motivate them to improve their systems. In the system under discussion, the presence of the research team in the area rekindled the interest of the farmers in their system and the association became more active without direct motivation by the team. The government could do a lot in this direction.

Lack of exposure to new ideas on system management and modern agriculture. One factor that contributes to the complacent attitude of some farmers is their lack of exposure to alternative procedures and techniques. Farmers should be introduced to new ideas and techniques of system management. Training programs, seminars, and workshops should be conducted where irrigators' association officers and members could participate.

In the system under discussion, workshops on system management were facilitated by the research team using training modules prepared by representatives from different government and private agencies involved in communal irrigation in the Philippines. In the workshops, the irrigators' associations were able to examine thoroughly their operational procedures in managing their system, which led to a revision of their water allocation schemes, system maintenance plans, and administrative regulations.

In the case of the water allocation schemes, for example, the inequity in favor of the upstream division caused a revision in both upstream and downstream allocation schemes. Figure 7 shows the revised allocation scheme for the wet season. Previously, the upstream division usually irrigated for four days while the downstream divisions were allotted only three days each. All the divisions now are given three days. The argument of prior right to justify the inequity was not accepted because land ownerships have changed in the area and most of the original farmers or their descendants are no longer in the upstream division. Furthermore, the upstream farmers already have an advantage with easy access to water.

Figure 7. Rotational irrigation by division during the dry season.

Division	Area (ha)	1 M	2 T	3 W	4 Th	5 F	6 S	7 Su	8 M	9 T	10 W	11 Th	12 F	1 S	2 Su	3 M	4 T	5 W	6 Th	7 F	8 S
I	73.50																				
II	88.00																				
III	39.00																				
IV	136.50																				
Other systems	Given 1/3 of the streamflow as continuous flow to its diversion canal.																				

After implementation of the revised schedule, there was a general feeling of satisfaction among the farmers. Even upstream farmers who resisted the change felt that the decrease in the time allotment for their division had not affected their farming activities. On-farm water management should also be considered in a training program or seminar for farmers. Proper understanding by farmers of this aspect should lead to the improvement of the management of the system.

GOVERNMENT-TURNED-OVER SYSTEMS

A system turned over by the government irrigation agency to a farmer organization for operation and management is one type of system that the CLSU Irrigation Management Research Team is currently studying. The specific objectives are as follows:

1. To obtain comprehensive knowledge about the experiences of irrigators' associations taking over the management of an irrigation system.

2. To identify the kind of assistance needed by users in the operation and maintenance of an irrigation system.

3. To formulate and implement action programs to assist the farmer associations in managing their system.

Research activities in this system have been underway for over a year now and are still in the observation and problem identification stage.

System Description

This is a pump irrigation system which receives its water supply from the main canal of a large gravity-type system. Two 8-inch (20.3 centimeters) pumps are being used to lift water for irrigation. The pumps are driven by two 150-kilowatt electric motors and are operated alternately. The system was constructed by the National Irrigation Administration (NIA) and became operational in the early 1970s under NIA management. The high operational cost and low irrigation fee collection rate prompted the NIA to turn over the management of the system to the association.

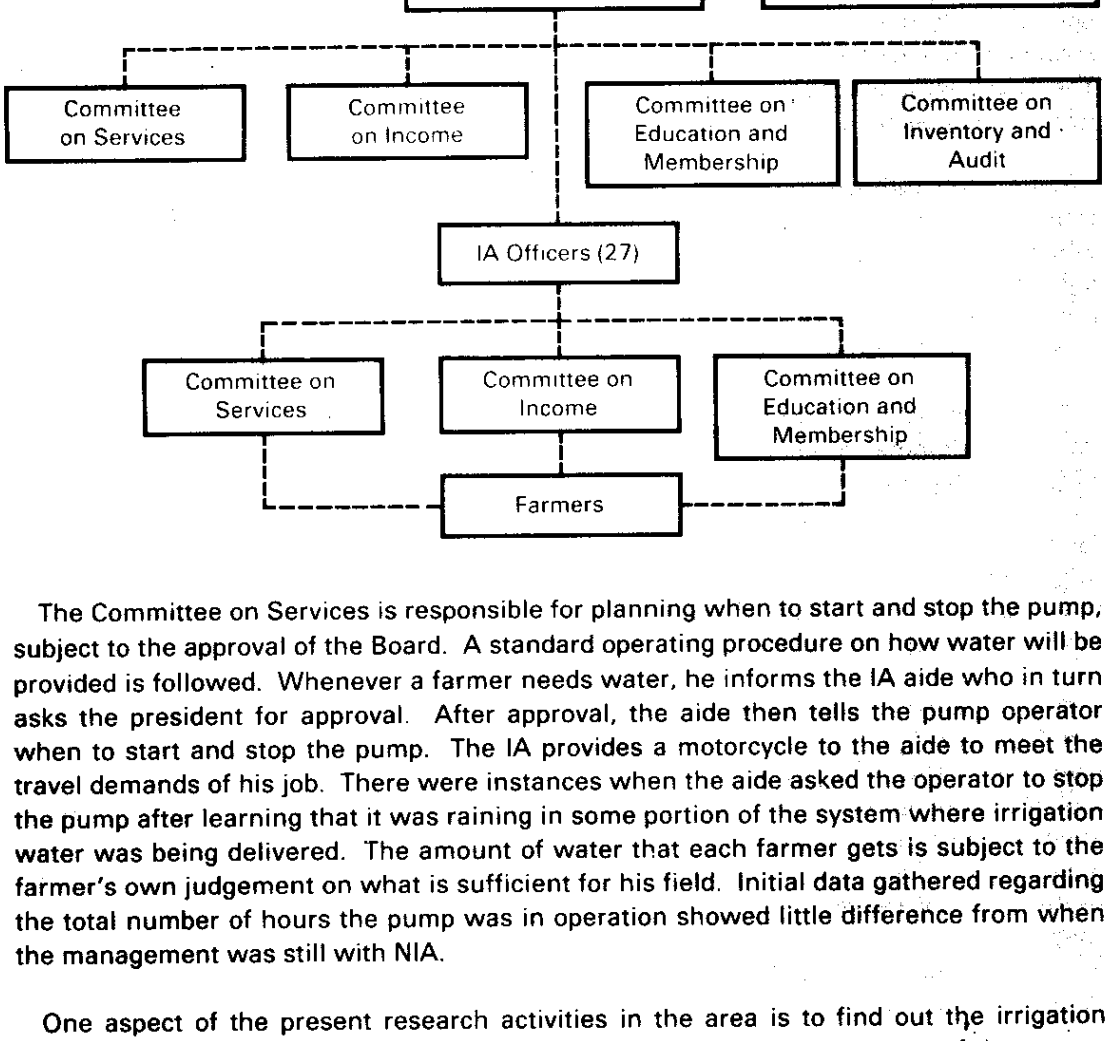
Before the turnover, however, NIA did general rehabilitation work on the system. Damaged irrigation structures and farm roads were repaired. The NIA provided materials while some of the labor requirements were contributed by the irrigators' association. The agreement is that the association will pay the NIA one-half *cavan* (25 kg) of rough rice per hectare per year for 25 years. Also prior to turnover, organizing activities were done. The system was fully turned over to the association at the start of the 1984 wet season.

The system is divided into 28 divisions based on the number of turnouts. Each one has its own irrigators' association which is locally known as the *Bukete ng Samahang Magpapatubig* (irrigators' association, BSM) headed by a chairman. The BSM chairmen form the Board of Directors. The Board then elect among themselves a set of officers for the irrigators' association (IA) for the entire system. The system's service area was originally 688 ha but, because of the suspension of one BSM for not paying their dues to the system IA, the remaining area is 653.72 ha for 27 BSMs. The IA's organizational structure is shown in Figure 8.

The president acts as the head of the system IA. The vice-president is the chairman of the Committee on Services. The second vice-president serves as co-chairman of this committee. The secretary is automatically the chairman of the Committee on Education and Membership, the treasurer is the chairman of the Committee on Income, and the auditor serves as the chairman of the Committee on Audits and Inventory. Other Board members not elected as IA officers join the different committees as members. Members of the Board were given ₱ 30 (US$1.50) for every meeting attended, whether regular or special meetings. Absentees were fined ₱ 30. The IA at present has three employees: an aide, an accountant (who doubled as billing clerk), and a pump operator. Each employee receives a salary of ₱ 940 (US$47) a month.

Water distribution. The function of the IA aide is to regulate the flow of water entering every turnout. A water delivery schedule formulated by the NIA was adopted by the association. The schedule is supposed to be followed strictly by the IA both during the dry and wet seasons. However, the IA has no specific sanctions imposed on violators of water distribution rules.

Figure 8. Organizational structure of a government turned over system.



The Committee on Services is responsible for planning when to start and stop the pump, subject to the approval of the Board. A standard operating procedure on how water will be provided is followed. Whenever a farmer needs water, he informs the IA aide who in turn asks the president for approval. After approval, the aide then tells the pump operator when to start and stop the pump. The IA provides a motorcycle to the aide to meet the travel demands of his job. There were instances when the aide asked the operator to stop the pump after learning that it was raining in some portion of the system where irrigation water was being delivered. The amount of water that each farmer gets is subject to the farmer's own judgement on what is sufficient for his field. Initial data gathered regarding the total number of hours the pump was in operation showed little difference from when the management was still with NIA.

One aspect of the present research activities in the area is to find out the irrigation efficiency and to identify possible improvements to reduce operation hours of the pump. Initial reports from the research team indicated that farmers have a tendency to fill their paddies with water, thus eliminating the value of any rainfall. This is one area that should be explored to minimize pumping costs.

Maintenance activities. The maintenance of the main canal was divided among the 27 BSMs. Each turnout association was given a 500 meter portion of the main canal to clean and maintain. Canal cleaning is done by the IA twice per cropping season, once at the start and once mid-season. In general, all BSMs should clean their assigned canal sections simultaneously. However, there are some groups that did not comply. Maintenance activities were supervised by the chairman of the Committee on Services and assisted by the members. Some BSMs checked the attendance of their members but others did not. Each BSM was given ₱ 750 (US$38) per cropping season for their expenses during maintenance activities. All BSMs did not charge the same fine from absent members during maintenance. Some charged ₱ 50 (US$2.50), others ₱ 30, while others charged in-kind fines. The maintenance of lateral canals is the responsibility of the BSM where a particular lateral is located.

Financial management. The IA collects the following fees from each member: a) a one-time enrollment fee of ₱ 10 (US$0.50), b) annual dues of ₱ 5 (US$0.25), and c) irrigation fees of 5 cavans/ha (250 kg/ha) during the dry season. The Committee on Income prepares the plan for fee collection, and the treasurer collects the fees. Five percent of the total collection is given to any BSM that attains 100 percent collection.

In the 1984 wet season, the irrigation fee collection rate was 84 percent. This increased to 96 percent in the 1984-85 dry season but dropped to 81 percent during the 1985 wet season, which was attributed to crop damage by a typhoon. However, the collection rate attained by the association is far better than what the NIA attained: an average of a little over 50 per-cent. This is either an indication of the effectiveness of the IA's collection mechanism or an indication that farmers are more willing to pay their obligations to their organization than to the government. The farmers might feel that any investment of the government should be given free to the people.

CONCLUSION

Farmer-managed irrigation systems are an important resource that must be harnessed to maximum advantage. The documentation activities on two communal systems showed the capability of the irrigators' association to allocate irrigation water under a variety of conditions and to mobilize labor for the maintenance of the system. The ability to collect irrigation fees was well demonstrated by one system where fee collection reached a record of 96 percent. Under government management, the rate of fee collection in that system was a little over 50 percent on the average.

The capability of the farmers to manage an irrigation system must be reinforced with adequate support from government and other sectors, whether financial or technical, in order to derive the maximum benefits. Properly identifying the irrigators' association's needs for efficient operation and management of their system, and providing appropriate assistance will translate into better living conditions for the rural people in particular and the country in general. For indigenous systems, assistance needs are both financial and technical; for turned over systems, the need is more technical.

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