MANAGING THROUGH PERSUASION: EXPERIENCES IN A PHILIPPINE COMMUNITY IRRIGATION SYSTEM

ROMANA P. DE LOS REYES
Institute of Philippine Culture
Ateneo de Manila University

Several mechanisms which farmers use in managing a communal irrigation system in the Philippines are discussed in this paper. These mechanisms are either culture-specific (e.g., mobilization of labor and cash resources, imposition of discipline among system members) or those used across cultures (e.g., creation of mini-unit organizational structures and the presence of leadership in all parts of the irrigation system). Since these mechanisms represent the farmers' solutions to socio-organizational challenges specific to community systems, they require careful attention in irrigational development efforts.

The expansion and improvement of irrigation coverage in many parts of the world have taken on high priority as a developmental goal in recent years. The need for irrigation development stems primarily from high rates of population growth in developing countries and the resulting need for increased production of food crops. For instance, the population of most of Asia (excluding China and Japan) is expected to reach 1.67 billion by 1990. To meet the rice requirement of this population (rice being the staple food of most of Asia), rice production must increase to about 300 million tons or 140 million tons over the 1975 production figures (Takase and Wickham 1976). One way of achieving this is to expand the riceland area. However, since expansion of area would involve the cultivation of marginal lands, the expected increase in yield per hectare would necessarily be lower. The other way is to utilize more intensively the existing cultivated land – a strategy which can be achieved through irrigation. Several studies (e.g., Herdt 1980, Takase and Wickham 1976) show that irrigation accounts for a large portion of rice output increases in most Asian countries since the 1960s. Moreover, the yield potential of the new or modern rice varieties has been realized only in areas where adequate irrigation water is available. For these reasons, irrigation has been identified as the most effective means of increasing rice production in Asia (Takase and Wickham 1976; Colombo, Johnson, and Shishido 1978).

As in past irrigation development programs, contemporary efforts aim to install irrigation facilities and improve or rehabilitate existing ones. However, today's irrigation development activities have an added thrust: the development and improvement of human support structures required to manage an irrigation system. This thrust responds to assessments concerning the disappointing performance of many irrigation systems built in the past few decades. As several irrigation observers have noted (e.g., Coward 1980; Bromley, Taylor, and Parker 1980), many existing systems fall short of their expected performance. Observers concur, however, that this problem can be corrected by strengthening organizational structures for managing irrigation. Thus, over the past few years, there has been an increasing effort, particularly in the developing countries, to improve the institutional component of irrigation.[1]

The new thrust of irrigation development efforts underscores the need to understand the organizational aspects of irrigation. One important source of this understanding is the experience of existing systems themselves. Knowing exactly how these systems are operated and maintained can help identify the sources of organizational difficulties. More importantly the experience of existing systems can reveal organizational principles relevant to organizational programs. These considera-

tions are the major reasons for the research discussed in this paper.

Type of Irrigation System Studied

On the basis of its institutional arrangement, an irrigation system may be classified into one of these four types: (1) state- or government-run, (2) company- or hacienda-administered, (3) individually-operated, or (4) community-managed. The irrigation system discussed here belongs to the fourth type.

Community systems, or those managed by local groups of farmers, comprise a significant portion of irrigation coverage particularly in the humid tropics. In the Philippines over 5,000 community systems (locally referred to as communal systems) serve about half of the country's irrigated croplands (Bagadion and Korten 1979); in Indonesia, over 25 percent (Bottrall 1981); while in Malaysia, at least 20 percent (Taylor and Tantigate 1981). Many of these systems, or at least parts of their physical network, date back centuries, indicating that local groups of farmers have devised viable means of managing irrigation water. However, knowledge about how these systems are operated and maintained remains inadequate.[2]

This paper discusses the mechanisms which farmers of one community irrigation system in the Philippines – the HMT system – utilize in managing their system. Since these mechanisms represent the farmers' solutions to socio-organizational challenges specific to community systems, the nature of these challenges is first reviewed.

Socio-Organizational Challenges Faced by Community Irrigation Organizations

For any irrigation system to continue operating, it must have the organizational capacity to: (1) maintain the physical facilities, (2) allocate water among the users, (3) resolve conflict among them, and (4) mobilize the resources required to support system operation and maintenance.[3]

While all irrigation systems need to perform similar functions, the systems managed by the state, a company or an individual differ from those managed by a community in one aspect. In the first three types, the entity operating the system has equal interest in all parts of the system since it reaps benefit from the entire area served. In contrast, a community system is composed of people whose individual interests are not identical. Eliciting a common effort from these individuals poses socio-organizational challenges specific to community systems. These challenges are best seen through an examination of the tasks that need to be accomplished to sustain the operation of the system.

System maintenance

The maintenance of system facilities is the key to the continued existence of an irrigation system. If no maintenance is undertaken, the system will deteriorate and eventually disappear. The rapidity of system deterioration is especially high in the humid tropics owing to the heavy damages which canals and structures sustain during the monsoon season. Because vegetation grows more rapidly in the humid tropics, the need to clean canals and structures regularly is much greater in the humid than in arid areas. Consequently, labor mobilization for maintenance is an especially critical irrigation management task in the humid tropics.

The important benefits that farmers gain from irrigation provide them the incentive to devise mechanisms to ensure that maintenance is done. However, the strength of the motivation to accomplish this task is unequally distributed among farmers in the area covered by a community system. If the system begins to deteriorate, farmers farthest from the source of water are the ones who suffer first, while those closer to the source are affected last. This characteristic of irrigation systems generates unequal motivations among farmers to undertake maintenance. Mobilizing both upstream and downstream farmers for

the maintenance work thus presents a serious challenge to a community system. The basic challenge is to ensure that maintenance is undertaken in the upstream area even though the people located there are not the primary ones to benefit from that maintenance.

Water allocation and conflict resolution

Rarely is so much water available in an irrigation system for all users simply to take as much as they want. Normally there is a need to allocate the water. Because farmers recognize the high value of irrigation, they themselves are motivated to try to distribute the available irrigation water and deal with the difficulties that this effort brings.

The socio-organizational problem for a community system lies in that water to be used by farmers farther from water source must first pass the fields of farmers closer to the source. This gives the "upstream" farmers the chance to take a larger share of water. Consequently the challenge to the social organization is to develop mechanisms for keeping farmers who have easy access to water from taking excessive amounts and thus depriving those farther downstream.

Closely associated with the need to allocate water among users of the system is the need to resolve their disputes about who gets what amount of water and when. Conflict among farmers is inevitable in the context of irrigation owing to the nature of the resource itself: its use by some reduces what is available for others. Thus while cooperation among formers is needed for irrigation to exist at all, competition is also ever present, threatening to destroy the cooperation. The social organization must at minimum contain, if not settle, the disputes arising from this competition.

Resource mobilization

The tasks of maintaining the system and allocating water among the users generate the need for an irrigation organization to mobilize resources to support these tasks and meet the necessary costs. In community systems, farmers themselves have the responsibility of providing the needed resources either in cash (fees) or in kind (labor and materials). The failure of any single farmer to contribute is not likely to destroy the system. But a significant number who shirk their responsibility could discourage others from contributing and could result in the demise of the system. Thus a special problem that faces a community irrigation organization is how to ensure that sufficient contributions continue to be given year after year.

These are the socio-organizational challenges faced by community irrigation organizations. Before discussing the ways in which these challenges are solved in the HMT system, the system's key characteristics are described.

The HMT Communal Irrigation System[4]

The HMT system, situated in the province of Camarines Sur, Philippines, serves ricefields in the adjoining municipalities of Tahaw and Sirangan. In the dry season of 1976 (January to May), it irrigated around 513 hectares; in the following wet season (June to December 1976), it irrigated an additional 43 hectares, or about 556 hectares in all. Around 420 farmers cultivated the irrigated rice farms.[5]

On the basis of its major water sources and diversion structures, the HMT system may be divided into three subsystems: Harani, Malinao, and Tugmad (see Figures 1 and 2). Parts of the Malinao and Tugmad subsystems were already in existence in the late 1920s; these were built and maintained by the farmers who used the irrigation water. In the late 1950s and early 1960s, these subsystems' temporary dams were rebuilt with concrete. Funds for the construction came from the provincial government and from the public works appropriations of the now defunct Philippine Congress.

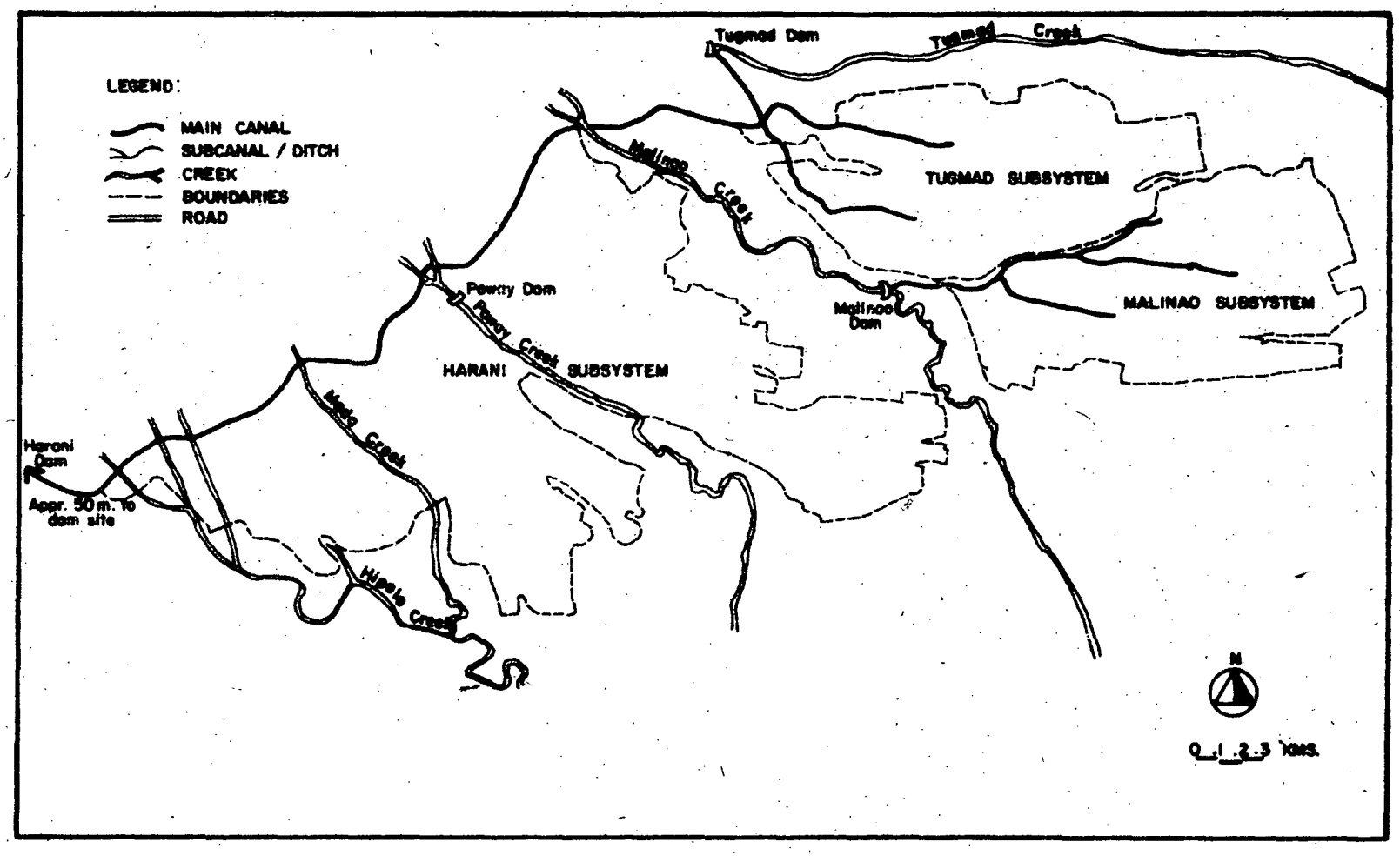

Figure 1. *Subsystems of the HMT communal system*

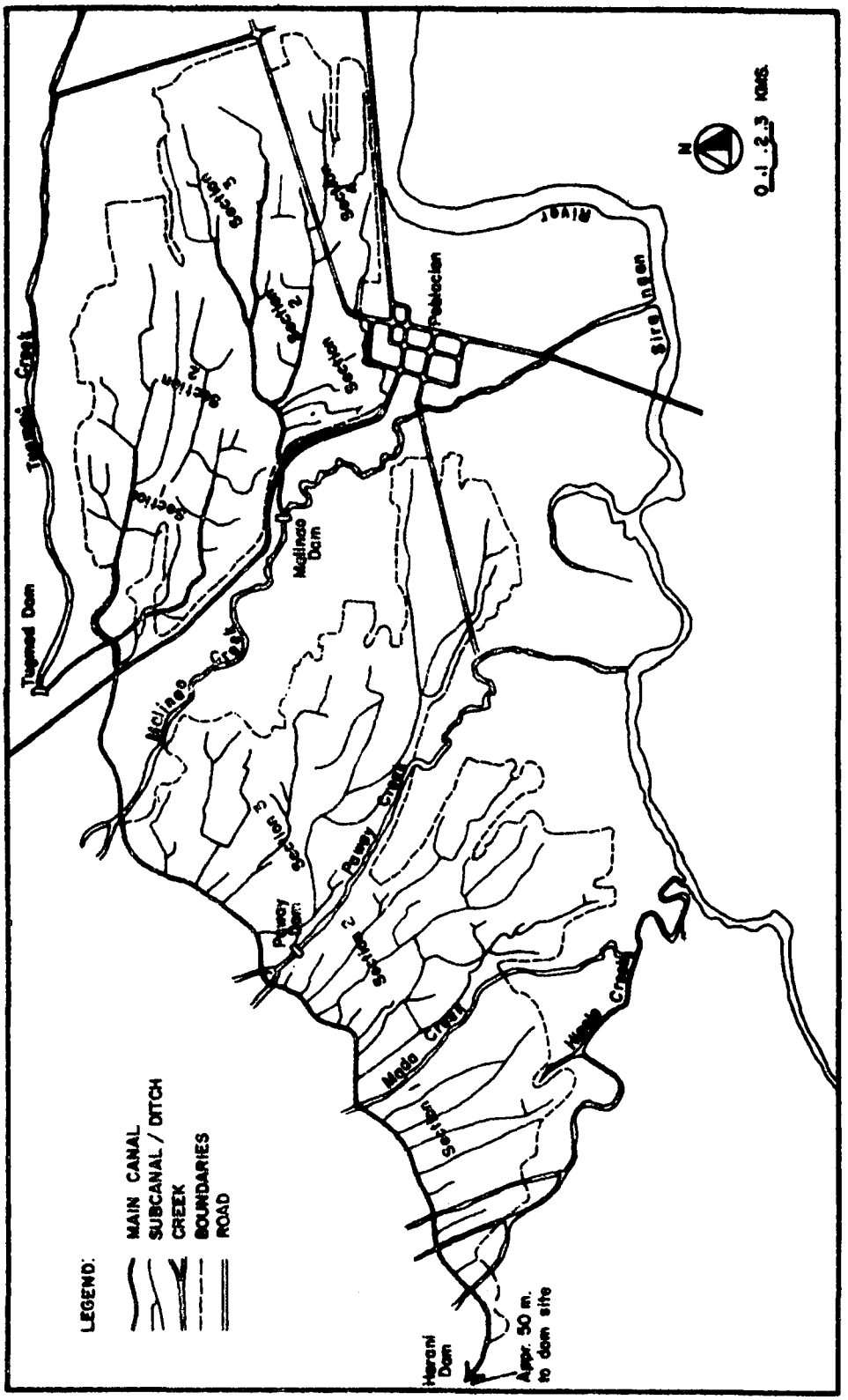

Figure 2. *The HMT communal system*

The Harani dam and canal network, in turn, were constructed through the government's assistance. These structures were built beginning in the late 1950s. However, owing to the staggered releases of congressional appropriations, the Harani subsystem became fully operational and connected to the other two subsystems only in the early 1960s.

Results of the measurements of the water supply (irrigation and rainfall) and the water requirements of the HMT ricefields (evaporation, seepage and percolation) during Crop Year 1976-77 (June 1976 to May 1977) indicated that the HMT system had an abundant water supply. The water supply of each of the three subsystems was almost double the amount that each needed.[6]

Like all communal systems in the Philippines, the HMT system is owned, operated and maintained by the farmers who draw water from it. These farmers have been organized into a duly registered irrigators' association since 1967. The leadership of the association is formally vested in the board of directors whom the membership elects in a general meeting. The board in turn elects from among themselves those who stand as association officers; it also hires the employees who assist in system management. In 1976, the association officers consisted of the president, vice-president, secretary-treasurer, and auditor. The association employees in turn included a watertender and a gatekeeper.

Persons of higher status and with greater wealth dominate the leadership of the association. For instance, of the 57 persons who occupied the board positions between 1963 and 1976, about one-third had held elective positions either in the municipal or *barangay* (village) council – three as vice mayor, two as municipal councilor, four as barangay captain, and nine as members of the barangay council.[7] Many association officials are also economically better-off than the general membership. About half of them have landholdings (the major economic resource in Tahaw and Sirangan) and a majority of these own more than 10 hectares. Moreover, while some economically poorer individuals had occupied the board positions, the key offices were held by upper class persons. One out of two upper class individuals who sat on the association board between 1963 and 1976 had been selected to the officers' post; only one out of 10 lower class members had been so honored.[8]

Management Mechanisms in the HMT System

Although farmers in the HMT system have differing interests, the system is operated and maintained through their cooperative effort. Farmer cooperation in managing the system is elicited through four types of mechanisms, each of which is discussed below.

Mini-unit organization

In 1976, HMT farmers employed a mini-unit organizational structure by dividing the system's service area into five smaller units or sectors. The size of the sectors ranged from 48 to 153 hectares, or a membership ranging from 42 to 133 farmers.

As Coward (1977) has noted earlier, the mini-unit structure is an organizational device adopted in many community systems in a variety of diverse cultures. One consequence of this organizational set-up is the development of an intensive leadership structure. In the HMT system, each sector had one or two association officials designated as sector leaders, thus giving 12 individuals sectoral leadership responsibility. This appears to be a lower intensity of leadership than observed in other community systems, but the actual intensity may be higher than it appears from the number of formally designated leaders.[9] Other community leaders, particularly the barangay officials who were also HMT farmers, were often involved in the mobilization of farmers for system maintenance and in mediating irrigation use disputes among farmers. Interestingly, the association itself tried to develop its own more intensive leadership. The association officials initiated the organization of farmers at the sectoral level; they

specifically urged farmers of each sector to elect their own set of leaders in preparation for the association board's plan to devolve operation and maintenance responsibilities within a sector to the sector's farmers.

Leadership in all parts of the system

An examination of the location of the farms of HMT association officials between 1963 and 1976 reveals that a majority were downstream farmers. The dominance of downstream farmers in the HMT leadership conforms to a pattern predictable from economic motivation. Downstream farmers have a greater stake in operation and maintenance activities. It is in their interest that farmers closer to the source are restrained from taking too much water and that channels are well-maintained so that water can flow to the lower end of the system. Thus it is to be expected that the greatest interest in irrigation leadership would come from the downstream area.[10]

However, not all leaders were from the downstream area. Experience in the HMT system reveals that if a system is to be managed effectively the leadership should be dispersed throughout the geographical area of the system. Maintenance, water allocation, conflict resolution, and fee collection need to be done in all parts of the system. Even though upstream farmers may be less motivated for these activities, they are a key part of the system and leadership in their area is needed. In the HMT system, most leaders came from the downstream area, but it also had a strong upstream leader. This leader motivated a majority of farmers in his sector to participate in maintenance and to pay their fees. More importantly, he took action to decrease the amount of water diverted by upstream farmers.

What forces created this upstream leadership? Considering that upstream farmers already have easy access to water, they have little economic motivation to become leaders. The upstream leadership in the HMT system was in fact created through social mechanisms. The upstream leader (Malang) was identified by the association president (who was a downstream leader) and it was through the president's persistence that Malang consented to vie for a position in the association board to which he was elected. Malang's positive response to the president's request for assistance in system management can be traced to their personal relationship, an important aspect of which was that Malang had obtained a loan from the president. In consideration of this personal favor that he had received from the president, Malang agreed to help in irrigation management. The upstream leadership was thus created through personalistic ties.

Mobilization through personalistic, vertical ties

In 1976, between 50 and 60 percent of the HMT farmers worked in system maintenance and paid their irrigation fees. This level of farmer participation raises the question of why these particular farmers shouldered the burden of operating and maintaining the system. Why did they involve themselves despite the nonparticipation of a large percentage of other farmers? Since it appears that the participation rate in previous years had been at 50 percent or lower, why did the participating farmers not follow the example of the shirking, nonparticipating ones? The explanation lies in the personalistic nature of the HMT social organization – an organization which is derived from the social structure of the broader community.

As in many Philippine rural lowland communities (Fox 1956, Lynch 1959, Hollnsteiner 1963, Arce 1973), the communities where the HMT system is situated have a two-class system with definable status levels within each class. The two social classes are differentiated by several perceivable characteristics, the most basic of which is that the upper class *(dakulang tao)* owns land or has a steady income from other sources while

the lower class *(sadit na tao)* does not. This economic difference forms the basis of the patron-client patterning of social relations along vertical class lines.

The patron-client ties between members of the upper and lower classes characterize the structure of the community social organization. In its most reduced form, the local social organization may be described as one where members of the lower class are linked with one or more upper class persons. However, while at any point in time, a *sadit na tao* has ties with more than one *dakulang tao*, such ties have unequal instrumental value to him. Each tie does not provide the same degree of economic security. Mainly on the basis of his assessment of the relative value of one vertical relationship over another, a *sadit na tao* becomes more strongly tied with one *dakulang tao* than with another. The strength of this relationship is manifested on occasions when the *dakulang tao* needs the support of the *sadit na tao* – support which is crucial particularly in the factional disputes of the *dakulang tao* with one another.

The coalitions that emerge once the upper class becomes engaged in factional disputes result in a pattern of social organization in which, at any given point in time, members of the upper class have their respective sets of lower class allies. However, because there are in fact status differences within each class, the system of community social organization becomes one made up of a series of vertical chains of individuals, with the person of a higher status providing economic goods in exchange for which the individual of a lower status gives him social and political support.[11] Analysts of Philippine rural society agree that in this social system, the most significant relationships of any particular individual are his vertical ties. Horizontal relationships have less significance; in fact, solidarity among persons of equal status is not a characteristic of Philippine rural lowland communities.

The patterning of social relations in the broader community manifests itself in the social organization of the HMT system. As in other facets of community life, in irrigation the *dakulang tao* forms the leadership while the *sadit na tao* provides the labor and support. More importantly, the means of managing the system are based on the personal ties of the *dakulang tao* (leader) with the *sadit na tao*. Thus *sadit na tao* farmers who had strong ties with the *dakulang tao* leaders were the ones who were obliged to participate in system maintenance and also to pay their fees. These farmers were the allies – often referred to in the HMT area as *cabohan* – of the active association officials.[12] The management of the HMT system is therefore a collective endeavor of the *dakulang tao* leaders and their allies.

.The HMT farmers themselves talk of their participation in terms of the association leadership. For instance, farmer-informants who did not join the maintenance activities in 1976 would recall the days when the association had a different leadership at which time they worked in maintenance because they were tied to those leaders. From the ordinary farmers' perspective, their time to be actively involved in system management comes when the association leadership is in the hands of their own *dakulang tao*. This explains why the participation of HMT farmers is at 50 percent; it perhaps also accounts for the 50 percent irrigation fee payment rate in other Philippine communal systems (de los Reyes 1980).[13]

Managing through social pressure

The fourth mechanism employed in the management of the HMT system consists of a set of culturally-prescribed means of handling special interaction. This includes the light enforcement of formal rules,[14] avoidance of head-on confrontation or open conflict, and the use of social pressure rather than formal sanctions as a means of imposing discipline. These mechanisms are most evident in the context of water allocation in conflict management.

Observations of the association officials' activities in 1976 revealed a variety of ways

in which they exercised their authority to enforce the formal rules. For example, the association leaders closed the turnouts[15] of farmers who failed to pay their irrigation fees or the registration fees for their structures, as well as the turnouts which farmers installed without the board's approval; they also investigated the illegal checks[16] and admonished the farmers concerned. Moreover, the officials decreased the size of the openings of 20 of the 47 turnouts in the Harani subsystem (in order that a greater amount of the irrigation water from the Harani River would reach the Malinao and Tugmad subsystems). The openings of a majority of the 20 turnouts were reduced to half their original sizes.

Most farmers who were affected by the board's implementation of the formal rules recognized the board's authority in taking these steps. For instance, the farmers whose turnouts were made smaller grumbled a lot but they accepted the board's decision. In the case of farmers whose turnouts were closed, a few simply reopened their turnouts but most waited after they either had appeared at a board meeting or conferred with an association official. In a number of cases, the farmers concerned even got a letter from the association official designated as irrigation superintendent and showed this to the watertender before they resumed diverting irrigation water to their fields.

While there were many instances in which the association officials implemented the formal rules and the farmers accepted their decisions, on the whole the officials exercised a light hand in the enforcement of the rules. Thus while the association leaders closed the turnouts of farmers who failed to comply with their obligations, they approved the reopening of these turnouts once the farmers had expressed the willingness to meet their obligations. Also while they reprimanded farmers who installed illegal checks, the officials did not ask the farmers to remove these checks.

A major reason why the association officials were not firm in enforcing the formal rules was the folk view of water. The association leaders shared the general view that every farmer has a right to irrigation – because of his inherent right to farm or earn a living. Thus, as long as a farmer had access to irrigation, the officials believed they could not deny him the use of water. They articulated this view particularly when they were deliberating or deciding the cases of lower class farmers. The following case shows an irrigation-use concession that the board granted to a small farmer.

> To ensure that the Harani water would reach the Malinao and Tugmad subsystems, the board instituted a policy in February 1976 that no new turnout application in the Harani subsystem would be accepted. Soon after the board made this policy decision, a young lower class farmer, Julio Cano, asked the association officials who were inspecting the irrigation flows in the upstream section of the Harani subsystem that he be allowed to install a new turnout in the Harani main canal. He wanted to use the water for his newly-converted one-half hectare riceland. The officials reminded him about the association policy, but they also acceded to his request. In a subsequent board meeting, the majority of the officials concurred that Cano's request should be granted because he badly needed the new riceland to augment his income. Perhaps, the officials mused, Cano could repair his much dilapidated one-room nipa hut.

The culturally-prescribed means of handling social interaction are further manifested in the management of conflict in the HMT system; these are best seen in the context of the disputes between the association board and farmer-members. In 1976, many association board and farmer conflicts in the HMT system could be viewed as unresolved considering that the officials did not strictly implement the formal rules or the sanctions. However, for many disputes, the farmers and the association leaders seemed to perceive the conflict as over soon after they had discussed and agreed on how to resolve the issue on hand. In fact, inquiries

about irrigation conflict found that unlike the anthropologist who wanted to find out the final outcome of a dispute, neither the involved farmers nor the association leaders were particularly keen in clarifying the end result of a conflict. This tolerance for ambiguity appears to emanate from the cultural propensity to maintain smooth face-to-face relations, or to avoid open conflict – a cultural norm that other analysts of Philippine society have noted (Lynch 1970 and Coward 1978). Indeed, unless a real confrontation occurs, those involved in a dispute can continue to be in good terms.

One strategy adopted by the association officials for resolving irrigation disputes was to seek assistance from various persons in authority, particularly those holding positions in the municipal government, the local law enforcement agencies, and the local courts. The government representatives whom the association officials approached had successfully mediated in the settlement of many dispute cases, hence the officials hoped that these authorities would make categorical decisions on the problem. Contrary to their expectations, the association officials were advised to bring the cases to the courts. However, the officials wanted to avoid the litigation expenses and they realized that court cases are time-consuming. Besides they were not sure whether the court would uphold the association's case. Consequently, the association officials resorted to other means to influence the farmers. For example, the association president who was the biggest moneylender in the town of Sirangan, reminded farmers who borrowed from him about their irrigation fee payments. In late 1976, he also told the other officials that they should not worry about the case of the group of farmers who refused to pay their fees for he planned to talk with one of the group's leader. This farmer-leader had approached the president for a sizeable loan, with the title of his one and one-half hectare riceland as collateral.

The association officials thus tried to contain conflict in the HMT system not through the strict enforcement of association rules but through the application of varying degrees of pressure. This pressure was applied through multiple channels, specifically through the authority of the association, local government, police and judicial authorities, and through the economic power of the association leaders.

The nonlegalistic means of management in the HMT system derive from the broader society's cultural prescriptions relative to social interaction and are observed in a variety of social situations. For example, the officials' reluctance to enforce the formal rules in consideration of a farmer's right to earn a living is not specific to irrigation. The basic concept of a person's right to live has been observed to be an important social consideration in nonagricultural endeavors in Philippine rural lowland communities, e.g., in marketing (D. Szanton 1981, M.C.B. Szanton 1972).

The avoidance of open conflict and the use of social pressure to regulate behavior have likewise been observed to be the modes of interpersonal dealings among rural lowland Filipinos in a variety of other contexts (Lynch 1970). The salient evidence of these cultural mechanisms is the frequent use of intermediaries in a variety of interaction both between individuals of unequal status and those of equal status (Hollnsteiner 1963, Anderson 1966 ms.)

Summary and Discussion

The mechanisms which HMT farmers employ to carry out system operation and maintenance may be grouped further into two: those which are culture-specific and those utilized across cultures. The culture-specific mechanisms pertain to those employed in mobilizing labor and cash resources, imposing discipline, and managing disputes. The mechanisms which are also observed in other cultures, in turn, include the mini-unit organizational structure and the presence of leadership in all parts of the irrigation system.

The culture-specific management mechanisms in the HMT system manifest the influence of the existing broader sociocultural system on the irrigation social organization. Thus, in the HMT system, the existing social stratification serves as the means for the mobilization of resources for system operation and maintenance, while the existing cultural prescriptions for handling social interaction constitute the basis for the nonlegalistic means of system management.

Although the sociocultural milieu in the HMT case sharply shapes the irrigation social organization, the mechanisms which farmers adopt also include devices responding to the special requirements of irrigation. The mini-unit organization, for instance, is an organizational device used in many community-managed systems in diverse cultures (Coward 1977). Its widespread use appears to be dictated partly by the physical nature and the scattered setting of an irrigation system. Many systems are characterized by geographically dispersed members. In developing countries where often there are few vehicles and no telephones, communicating to and coordinating among such a dispersed membership becomes difficult. Functions need to be delegated into geographically small areas where people can easily meet, talk and work together.

As in other community-managed systems similar to the HMT system, the mini-unit results in irrigation leadership being dispersed throughout the geographical coverage of the system. But a more important lesson which the HMT experience reveals is the need for a strong leadership in the upstream as well as the downstream section of the system. This need is worth stressing considering that upstream farmers have less motivation than downstream cultivators in assuming leadership responsibilities. In the HMT system, the majority of leaders in fact come from the downstream area. In 1976, the downstream leaders' efforts to improve system operation were enhanced because of the support of a strong upstream leader.

A final point to be noted concerns the impact of the sociocultural system on irrigation social organization. Given the functional and interrelated nature of societies and cultures, it is to be expected that the sociocultural milieu in which the HMT system exists would affect the HMT social organization. However, that this is the case is worth emphasizing. The analysis of how the broader sociocultural system influences the functioning of an irrigation system has yet to become an integral aspect of social science research on irrigation. The perspective of much of earlier work follows Wittfogel's (1957) inquiry which focuses on the residential or politically-defined community and emphasizes the influence of irrigation on these units. The analysis in this paper reverses that perspective, showing how the existing sociocultural system influences the organization of the way irrigation management is carried out.

An investigation of the dominant aspects of existing social structure and culture which become the basis of irrigation management strategies has important potential contributions to irrigation development efforts. Particularly in the past, the organizational structures prescribed for, and adopted in, newly-built or rehabilitated systems in developing countries are generally of foreign origin. The limited effectiveness of these institutions, however, has resulted in an increasing interest in indigenous forms of organization. The likelihood that more appropriate forms of irrigation social structures can be devised is enhanced once planners and implementors have knowledge of how the social and cultural preconditions shape the organization of irrigation activities.

Notes

An earlier version of this paper was prepared for the Joint International Conference of the Canadian Council for Southeast Asian Studies and the Institute of Southeast Asian Studies, International Development Centre, Singapore, 21-24 June 1982.

[1]Examples of this effort include the participatory irrigation development program of the National Irrigation Administration in the Philippines (Bagadion and Korten 1980, Korten 1981), the Gal Oya rehabilitation program in Sri Lanka where the participatory approach is being utilized (Wickramasinghe and Vander Velde 1981) and the Sederhana participatory pilot project in Indonesia.

[2]The reasons for this can be traced to the focus of earlier irrigation research. Particularly in anthropology, much of earlier work has taken on the perspective of Wittfogel (1957) of examining how irrigation influences social structure. This perspective has precluded intensive analysis of how the irrigation system functions and how the irrigation tasks are accomplished (see de los Reyes 1982:4-14).

[3]Hunt and Hunt (1976) and Coward (1980) have developed a similar typology of the basic functions of an irrigation system. The typology of Hunt and Hunt includes the task of organizing ritual activities.

[4]Names of people and places have been disguised.

[5]The fieldwork for the research was carried out for a period of 13 months, in late September 1975 to October 1976. A full report of the study was prepared as a doctoral thesis (de los Reyes 1982).

[6]The hydrological data were gathered with the assistance of the Irrigation Water Management Department of the International Rice Research Institute. I am grateful to Tom Wickham, former head of the department, and Domingo Tabbal and Abel Sumayao, members of the research staff of the same department, for their invaluable assistance.

[7]While the irrigators' association was formally registered as a nonprofit organization only in 1967, the HMT farmers have organized themselves into an association since 1959.

[8]The social class membership of individuals who had occupied positions in the association was determined on the basis of the results of a social status study. This study dealt with a 50 percent sample of the heads of dwelling units in four barangays comprising Sirangan poblacion and all 1963 to 1976 association officials who were Sirangan residents (see de los Reyes 1982:67-72). The methodology used in the social status inquiry follows that which Lynch (1959) employed in his study of the social class system in Canaman, a municipality of Camarines Sur.

[9]Siy (1981), for example, reports that in the irrigation associations *(zangjeras)* of Ilocos Norte, a province in northern Philippines, "The ratio of *zangjera* officials to 'rank and file' members can be as high as 2:5."

[10]It must be noted, however, that not all of the HMT downstream leaders were economically motivated. Some in fact used the positions as irrigation officials to enhance their general community status and power. A full discussion of the power struggle among the community upper class persons and their fight over the irrigation association seats is presented in de los Reyes (1982:72-85).

[11]The "patron-client" social organization of Philippine lowland rural communities is fully discussed in Anderson (1966 ms.), Hollnsteiner (1963), and D. Szanton (1981).

[12]*Cabohan* literally means the men of a *cabo* or head.

[13]While it appears that the HMT approach to system management is employed in many other Philippine communal systems, there are irrigation communities in the country where there seem to be less reliance on the personalistic, vertical ties as a means of mobilizing farmers. Instead, these communities carry out system management through a serious enforcement of the rules which farmers themselves have evolved. These rule-oriented irrigation communities are represented by the irrigation associations *(zangjeras)* in northern Philippines, specifically those found in the province of Ilocos Norte. Studies done of these associations (Christie 1914, Lewis 1971, and Siy 1981) reveal that they observe a strict implementation of the rules particularly with regard to labor and material obligations of members for system maintenance. To emphasize the seriousness of rule enforcement, at the end of each year, many *zangjeras* hold a "reconciliation day" during which a summation of the labor and material contributions of each member is done and fines are computed for each member who falls short of his obligations. This activity is held in the presence of all members, hence it becomes public knowledge whether or not a member has fulfilled his obligations.

[14]These rules pertain to those found in the association by-laws as well as additional rules passed during the association board meetings and general assemblies. They include the rules on who have rights to use the HMT irrigation water, the water allotment system and water distribution schedule, and the rate of irrigation fee.

[15]A turnout is an opening in a canal or ditch bank through which water passes into a ditch or field. In the Philippines, a turnout is technically defined as being made of a concrete pipe buried in a canal or ditch bank; it may be gated or ungated. In this study, a turnout is used to refer to the concrete pipe and a permanent hole or cut in a canal/ditch bank. The concrete pipe-turnouts in the HMT

system are mostly located in the Harani subsystem -- about 95 percent of the turnouts in this subsystem are of this type. In both the Malinao and Tugmad subsystems, only a few of the turnouts are made of concrete pipes and these are found in the upstream areas; the majority are either holes or cuts in a canal or ditch.

[16] A check is a structure which raises the elevation of water in a canal.

References

Anderson, James N.
1966 Interpersonal bridges across social chasms: Personal intermediation in the Philippines. Unpublished manuscript.

Bagadion, Benjamin U. and Frances F. Korten
1979 Government assistance to communal irrigation in the Philippines: Facts, history, and current issues. *Philippine Agricultural Engineering Journal* 10(2):5-9.
1980 Developing viable irrigators' associations: Lessons from small scale irrigation development in the Philippines. *Agricultural Administration* 7:273-87.

Bottrall, Anthony
1981 Issues in main system management. Paper prepared for the A/D/C Workshop on investment decisions to further develop and make use of Southeast Asia's irrigation resources, Kasetsart University, Thailand.

Bromley, Daniel W., D.C. Taylor, and D. E. Parker
1980 Water reform and economic development: Institutional aspects of water management in developing countries. *Economic Development and Cultural Change* 28:365-87.

Christie, Emerson B.
1914 "Notes on irrigation and cooperative irrigation societies in Ilocos Norte." *Philippine Journal of Science* 9:99-113.

Colombo, Umberto, D. Gale Johnson, and Toshio Shishido
1978 *Reducing malnutrition in developing countries: Increasing rice production in South and Southeast Asia.* New York: The Trilateral Commission.

Coward, E. Walter Jr., ed.
1977 Irrigation Management Alternatives: Themes from indigenous irrigation systems. *Agricultural Administration* 4:223-37.
1978 Values, behavior, and irrigation: Smooth interpersonal relations in the Philippines. *Philippine Sociological Review* 26(1):41-47.

Coward, E. Walter Jr., ed.
1980 *Irrigation and agricultural development in Asia: Perspectives from the social sciences.* Ithaca, N.Y.: Cornell University Press.

de los Reyes, Romana P.
1980 *Managing communal gravity systems: Farmers' approaches and implications for program planning.* Quezon City: Institute of Philippine Culture, Ateneo de Manila University.
1982 *Sociocultural patterns and irrigation organization: The management of a Philippine community irrigation system.* Berkeley: University of California at Berkeley, Ph.D. dissertation.

Fox, Robert B.
1956 Social class. In *Area handbook on the Philippines,* Vol. I. Chicago: University of Chicago for the Human Relations Area Files, pp. 413-70.

Herdt, Robert U.
1980 Studies in water management economics at IRRI. In *Report of a planning workshop on irrigation water management.* Los Baños: International Rice Research Institute, pp. 115-38.

Hollnsteiner, Mary R.
1963 *The dynamics of power in a Philippine municipality.* Quezon City: Community Development Research Council, University of the Philippines.

Hunt, Robert C. and Eva Hunt
1976 Canal irrigation and local social organization. *Current Anthropology* 17(3):398-411.

Korten, Frances F.
1981 Building national capacity to develop water users' associations: Experience from the Philippines. Paper prepared for the World Bank Sociological Workshop, Washington, D.C.

Lewis, Henry
1971 *Ilocano rice farmers: A comparative study of two Philippine barrios.* Honolulu: University of Hawaii Press.

Lynch, Frank
1959 *Social class in a Bicol town.* Research Series, No. 1. Chicago: Philippine Studies Program, Department of Anthropology, University of Chicago.
1970 Social acceptance reconsidered. In *Four readings in Philippine values.* IPC Papers No. 2. Third edition, revised and enlarged. Frank Lynch and Alfonso de Guzman

II, eds. Quezon City: Ateneo de Manila University Press. pp. 1-63.

Siy, Robert Y. Jr.
1981 *Rural organizations for community resource management: Indigenous irrigation systems in the northern Philippines.* Ithaca, N.Y.: Cornell University. Ph.D. dissertation.

Szanton, David
1981 *Estancia in transition: Economic growth in a rural Philippine community.* Revised and expanded. Quezon City: Ateneo de Manila University Press.

Szanton, Maria Cristina Blanc
1972 *A right to survive: Subsistence marketing in a lowland Philippine town.* University Park, Penn.: The Pennsylvania State University Press.

Takase, Kunio and Thomas Wickham
1976 Irrigation management as a pivot of agricultural development in Asia: A report by the associate experts in irrigation for the Asian agricultural survey II. Manila: Asian Development Bank.

Taylor, Donald C. and Kanaengnid Tantigate
1981 Costs and performance of different sizes, types, and locations of irrigation schemes in Malaysia. Paper prepared for the A/D/C Workshop on investment decisions to further develop and make use of Southeast Asia's irrigation resources, Kasetsart University, Thailand.

Wickramasinghe, L. and Edward J. Vander Velde
1981 Action research into farmer participation in irrigation system management: A Sri Lanka experiment. Colombo, Sri Lanka: Agrarian Research and Training Institute. Mimeographed.

Wittfogel, Karl
1957 *Oriental despotism.* New Haven: Yale University Press.