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Factors Affecting the Formation of FWUCs in Institution Building for PIMD in Cambodia: Two Case Studies

L. R. Perera

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International Water Management Institute

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Acronyms and Abbreviations

ADB	-	Asian Development Bank
DOH	-	Department of Hydrology
FO	-	Farmer Organizer
FWUC	-	Farmer Water User Community
FWUG	-	Farmer Water User Group
IMT	-	Irrigation Management Transfer
ISF	-	Irrigation Service Fee
LB	-	Left Bank
MOWRAM	-	Ministry of Water Resources and Meteorology
O&M	-	Operation and Maintenance
PDOWRAM	-	Provincial Department of Water Resources and Meteorology
PIMD	-	Participatory Irrigation Management and Development
PRA	-	Participatory Rural Appraisal
RB	-	Right Bank
RGC	-	Royal Government of Cambodia

Summary

Cambodia adopted Participatory Irrigation Management and Development (PIMD) as a national policy quite recently in recognition of the need for community participation and ownership of irrigation schemes in order to improve the performance of irrigation systems to achieve operational sustainability and economic development. Under this program, the Royal Government of Cambodia is seeking to devolve responsibility for all aspects of scheme operations to Farmer Water User Communities (FWUCs), which constitute the focal institutional mechanism of PIMD. Implementing PIMD in Cambodia under many existing unfavorable conditions including high levels of poverty, low agricultural productivity and deteriorated irrigation systems with frequently poor design is a very difficult and challenging task. This study carried out towards the end of 2004 in two irrigation schemes of contrasting socioeconomic and physical scenarios analyzes the factors that influence the formation of FWUCs under different physical, socioeconomic, legal and institutional conditions. In this analysis it was found that the favorable socioeconomic conditions, appropriateness of the strategies and the process followed and link with the local institutions were the key attributes for the formation of functional FWUCs in the implementation of PIMD.

Chapter 1

Background

Introduction

The Participatory Irrigation Management and Development (PIMD) program was introduced in Cambodia in recognition of the need for community participation and ownership of irrigation schemes in order to improve the performance of irrigation systems to achieve operational sustainability and economic development. Cambodia has now adopted the PIMD program as a national policy. The Royal Government of Cambodia (RGC), in accordance with its Circular No. 1 on Sustainable Irrigation Policy (1999), is seeking to devolve responsibility for all aspects of scheme operations to Farmer Water User Communities (FWUCs) which constitute the focal institutional mechanism of the PIMD program. The purpose of this program is to enable farmers to take over the management of their irrigation systems and achieve socioeconomic developments, such as increased productivity and profitability, leading to better living conditions through their involvement in irrigated agriculture.

Cambodia is the second poorest country in Asia and is ranked as the 75th poorest country of the 88 developing countries in the world. Poverty is largely a rural phenomenon, with 87 percent of the poor living in rural areas; 43 percent out of the rural poor live below the poverty line. Compared with the neighboring countries, agricultural productivity is extremely low. There are many factors contributing to the prevalence of rural poverty, including inadequate transport and roads, lack of credit, insecure land tenure, lack of farmer education and poor extension support, etc. Owing to poor (in numerous cases, perverse) design and related construction problems of irrigation systems commissioned during the regimes of the Khmer Rouge, many irrigation structures and some entire irrigation schemes are of no value or are positively harmful to effective water management (ADB 2001). The Royal government established after three decades of civil war and instability is strongly centralized, with local authorities directly appointed and supervised by the central government (ADB 2001). Many of these existing conditions are not conducive to the introduction of new innovations such as PIMD.

Farmer institution building is the foremost activity in introducing participatory irrigation management. It is essential to form farmer water user associations in order to secure farmer participation in irrigation system management. There are many factors that have an effect on the formation of farmer water user associations. In the literature on irrigation, these factors are discussed under physical and socioeconomic environments. In fact, the total physical, socioeconomic, institutional and policy environment have a composite effect on people's participation in irrigation management (Joshi 2000; Meinzen-Dick 2000). Similarly, the adequacy and appropriateness of the institution building process that followed in the given physical and socioeconomic environments are also equally important as deciding factors in building effective farmer water user associations. The process is not to be taken in the abstract meaning of a sequence of activities but it should include the methodologies and the strategies followed in implementing these activities. In discussing the factors that affect the formation of effective farmer water user associations, the importance of the underlying process followed has been generally overlooked, particularly in the recent literature.

Objective

The PIMD office is mainly responsible for implementing the PIMD program in Cambodia while many other agencies are also involved in implementing this program under different projects. The PIMD office is involved in implementing the PIMD program in 11 irrigation schemes with different characteristics on a pilot basis. The FWUCs formed in them are functioning at different levels.

Implementing the PIMD program in Cambodia, with many unfavorable conditions (including high levels of poverty, low agricultural productivity and dysfunctional irrigation systems due to inappropriate design) is a difficult and challenging task. The objectives of this study are:

- To assess the progress of PIMD with respect to the development of functional FWUCs of two contrasting cases.
- To analyze the factors influencing the formation of FWUCs under different physical, socioeconomic, legal and institutional conditions.
- To identify the most important factors that affect the formation of the FWUCs.

Research Questions

1. What was the historical development and management of irrigation in Cambodia up to the introduction of the PIMD program?
2. What is the existing legal framework to support the institution building and is it adequate?
3. What is the present level of functioning of the FWUCs?
4. What are the inadequacies, weaknesses and strengths of the present institution-building process?
5. What are the physical, social and economic environments of the irrigation systems?
6. What are the effects and impacts of these physical, social and economic environments on the present efforts in building the FWUCs?
7. What are the most contributory factors in the formation of the FWUCs?

Site Selection

This study was carried out in two sample irrigation schemes of 5 February and Sne with two different scenarios. The 5 February Irrigation Scheme is located in the Chamka Leut district of the Kampong Cham province which is regarded as an economically rich area in Cambodia. It was built during the Polpot period. The reservoir receives water mainly from rainfall runoff.

The Sne Irrigation Scheme is located in the Pemro district of the Prey Veng province which is regarded as one of the poorest areas in Cambodia. It was built by the French in 1953. The reservoir is fed from flood water. The total reservoir capacity is 6 million m³.

Both irrigation systems are partly rehabilitated under the PIMD program. The total area cultivated under the reservoir in the 5 February Irrigation Scheme is about 800 hectares with about 700 farmers. The total command area of the Sne Irrigation Scheme is 795 hectares with 895 farmers.

Methodology

Data were collected according to the following six methodologies:

1. Interviews

Irrigation scheme	No. of interviews	No. of interviewees
5 February	16	Farmer leaders: 10 Govt. officials: 3 Village group leader: 01 Chief of the village: 1 Chief of the commune: 1
Sne	15	Farmer leaders: 11 Chiefs of the commune: 2 Govt. officials: 2

2. Questionnaire survey

Stratified simple sampling method was followed in selecting the sample from three villages of each irrigation scheme representing the head, middle and tail.

Irrigation scheme	Sample population	Sample	Location		
			Head	Middle	Tail
5 February	345	34	12	12	10
Sne	364	36	12	14	10

3. Group discussions

Irrigation scheme	No. of discussions	No. of farmers
5 February	1	12
Sne	1	11

4. Secondary data on irrigation development and socioeconomics of the scheme areas available with the government departments
5. Field survey of the physical structure and functions
6. Field observations of farmers' irrigation and cultivation behavior

Chapter 2

Overview of Irrigation Development in Cambodia

Irrigation Development in Ancient Times

The history of irrigation development in Cambodia stretches back as far as the third century AD up to the golden era of the Angkorian period between the tenth and thirteenth centuries. The gradual change in land use took place from about the eighth century onwards. Development of agriculture during these centuries dominated by Angkor was a feat of tremendous magnitude with millions of small plots neatly leveled and bunded for water retention and thousands of small devices to manipulate water. Superimposed on this productive, profane world was a theocratic superstructure of colossal canals and moats and the philosophy of God king (Liere 1980).

There are two opposed schools of thought on why the kings built those great reservoirs of *Barays* at Angkor: whether to irrigate rice fields or for some other sacral purposes, providing city water needs and giving the kings an aura of divine and supernatural power (Higham 2001). After many years of studying Angkor, the two French scholars, Bernard-Philippe Groslier and Jacques Dumarçay, concluded that it was an essentially hydraulic city in which the reservoirs were the source of irrigation water for rice fields (quoted from Higham 2001). Others argue that if the *Barays* were for irrigating rice fields why they lacked outlets and canals to take water to rice fields. Also, the *Barays* with their shallow depth were able to provide water to around 7,000 hectares of the total 86,000 hectares of rice fields even if they were in their fullest capacity (Acker quoted from Higham 2001). Liere (1980) rejects the conclusions of Groslier that those large reservoirs in Angkor were for irrigation purposes under the same reasons of lack of distribution systems and their small capacity. He argues that the irrigation superstructure served the purpose of satisfying the year-round water needs of city moats, for security, city water needs, sacral purposes and projecting the heaven on earth more than irrigation. Anyway, rice farming was basically rain-fed during the Angkor period with some small tanks constructed as a source of supplementary water during difficult dry spells (Higham 2001).

Irrigation Development in Recent Times

Irrigation development in recent times in Cambodia can be divided into four periods: a) the French Period from 1930 to 1950, b) Prince Sihanouk Period from 1950 to 1970, c) the Polpot Period from 1975 to 1979, and d) the period from 1980 to date.

Irrigation Development by the French from 1930 to 1950

Irrigation development by the French included mainly the Colmatage system that uses dikes and sluices to provide controlled annual inundation. Intake and drainage are controlled, allowing a fertile layer of silt to settle on the fields. The agricultural lands are extended in and around the Colmatage canals. A few modern irrigation schemes were also introduced at Bovel, Baray, Kampong Sne and Tuk Char. Due to the absence of maintenance these systems later deteriorated although some functioned at a low level of efficiency (ADB 2001).

Irrigation Development during Prince Sihanouk Period from 1950 to 1970

After the country's independence in 1953, the main thrust in irrigation development was the introduction of the philosophy of self-help programs to upgrade traditional water-control structures, which were generally temporary in nature, to more permanent concrete works.

On the initiative of Prince Sihanouk, beneficiary involvement was promoted under the direction of local authorities and monks. The government employed gate operators (dike keepers) for the reservoir schemes. Cambodia was a rice exporting country during these years. A large number of cooperatives involved in agribusiness were established all over the country.

After the establishment of the Mekong Committee in 1957, many projects were identified, including a few large, multipurpose projects for hydropower and irrigation development. But they were not implemented. However, by 1975, when Prince Sihanouk's rule was toppled irrigation facilities were organized only in about 0.7 percent of the total cultivated area. They were generally unsuccessful because of poor conception and limited resources (ADB-MOWRAM 2001).

Irrigation Development during Polpot (Khmer Rouge) Period from 1975 to 1979

During 1975-79, the provision of irrigation was taken to extremes and the entire population was mobilized in forced labor for construction by the Polpot regime. Irrigation management was organized directly by the village chiefs and commune leaders. Thousands of people died in the construction of irrigation systems. A large number of irrigation systems were constructed during this period and much of the rice-growing area of Cambodia was covered by these networks of canals. The inventory and analysis of existing systems describe 841 existing irrigation systems of which 69 percent were built during the Polpot regime.

Although many of the Khmer Rouge irrigation schemes served the purpose of water harvesting they were not only ineffective due to poor planning and design but also often produced negative results on the environment and were, sometimes, harmful for better water management.

Problems in the Polpot Systems

- Flood protection works prevented both natural replenishment of soil fertility and fish migration.
- Canals were laid in simple parallel lines arranged on basically a kilometer grid regardless of actual terrain, accelerating drainage from high areas and flooding low areas.
- Diversion structures are often sited too far downstream and because of inadequate flood-discharge capacity they cause widespread flooding of upstream areas.
- Shallow reservoirs reduced the net area of land in agricultural production.
- Long canals crossed catchment boundaries and there was insufficient water for them to operate, and they also disrupted the natural flow that caused flooding.

These problems arose because anybody, regardless of training or experience, could be held responsible for the construction. People were forced to develop projects of a scale that was far beyond their technical competence, using materials with which they had no experience. Constructions

were done in the traditional trial-and-error method without technical calculations. Schemes were developed without any design whatever and, sometimes, in places where the people knew the scheme could not work.

Consequences of the Khmer Rouge Schemes

- Irrigation infrastructure extended over areas far in excess of those which could be served by available water resources.
- The capacities of canals and structures were incorrect and mismatched.
- Foundations and erosion protection were inadequate causing numerous failures.
- Embankments were built without topsoil strips, with unsuitable material, inadequate compaction, and without protection against erosion and piping.
- Controlling capacity of floods was inadequate causing additional failures in flood years such as 1991 and 2000 (Mekong Secretariat June 1994).

Irrigation Development from 1980 onward

The fall of the Polpot regime was followed by chaos and uncertainty, and people's movements and return to their original places were the result of forced population shifts. Consequently, most irrigation systems were left unattended and neglected. From 1980 to 1985, farmers were generally organized into *krom samaki* (solidarity groups) to manage the irrigation systems. The *krom samaki* provided labor for the operation and maintenance (O&M) of the schemes and the land was collectively owned by these groups.

After 1985, the government encouraged people's participation by providing the farmers with diesel, oil and construction materials. Completed projects were handed over to the Provincial Offices of the Department of Hydrology (DOH under the Ministry of Agriculture, Forestry and Fisheries) as it was called then. Responsibility for O&M of medium and small irrigation schemes was handed over to the water users, with the assistance of the District Agricultural Office staff. Resources were very limited and in most of the systems there was no maintenance.

From the early 1990s, international NGOs assisted the DOH under the Ministry of Agriculture with the establishment of the draft water law, O&M of schemes and capacity building at central and provincial levels. Pilot projects were started to involve the farmers in the O&M of their irrigation schemes. Since 1994, the Cambodian government has embarked on a program of transferring the responsibility for O&M of irrigation schemes from the government to Farmer Water User Communities (FWUCs).

In 1999, the Ministry of Water Resources and Meteorology (MOWRAM) was established. Under the new structure of the MOWRAM, the Department of Irrigation and Drainage (DID) was formed with a mandate to develop policy-related activities in the irrigation sector (ADB 2001).

The responsibility for the implementation of PIMD policy is basically with the PIMD office located within the Department of Irrigated Agriculture. Including the PIMD office there are altogether around 20 NGOs involved in the implementation of PIMD programs in about 100 schemes.

At the local level, before PIMD was introduced the responsibility for implementing irrigation-related activities rested with the respective village and commune chiefs who are of the lower rank in the administrative structure of Cambodia. This administrative structure introduced by the French in 1908 has four levels: Province, District, Commune and Village. Each level is headed by a respective chief. The village is divided into groups headed by group leaders. This administrative system continued after the French and was reintroduced after the Polpot regime. When it was reintroduced after the fall of the Polpot regime, the village and commune chiefs had been appointed among the supporters of the ruling party which had the political power continually in the country. The group leaders had been selected by the chief of the village from among his close associates. These groups are not functioning now.

The involvement of the village chiefs and commune chiefs had been mainly in some urgent maintenance work. Some of those works had been implemented through group works organized by the village chiefs, mostly under the direction of the commune chiefs.

Chapter 3

Legal Framework for the Formation of the FWUCs

Formulation of the Legal Framework

Implementation of participatory irrigation management development (PIMD) in Cambodia commenced with the necessary policy support and legal framework. The PIMD program was initiated when MOWRAM issued Pracas (declaration) 306 in June 2000. This gave the overall framework for the formation of FWUCs and irrigation management transfer (IMT) to the FWUCs. Pracas 306 includes several important documents relating to policy and guidelines for implementation of the PIMD:

- Circular No 1 on the Implementation Policy for Sustainable Irrigation Systems.
- Policy for Sustainability of O&M of Irrigation Systems.
- The statute of the farmer water user communities.
- Steps in the formation of a Farmer Water Users' Community.

Pracas 306 accepts the FWUC as essential in irrigation development and management as a formal mechanism legally chartered by the government and provides the required Statute for the FWUCs and eight steps necessary in its formation process. The Policy for Sustainability of O&M of Irrigation System is based on the basic principles of:

- Legal Statutes of FWUC.
- Involvement of FWUC in system development.
- Obligation of farmers in paying O&M cost.
- Permanent maintenance and improvement of the existing systems.
- Arrangement of the water delivery in equality and effect.
- Receiving support and assistance from MOWRAM.

The policy states that the FWUC is the mechanism established by farmers, and it has duties to manage and utilize water in any irrigation system by obtaining due recognition from the Royal Government of Cambodia (MOWRAM 2000).

Functions of FWUC

According to the given statute of FWUCs in Pracas 306 the basic functions of the FWUC are as follows:

- FWUCs are established to manage irrigation schemes.
- Collect Irrigation Service Fee (ISF) to cover the cost of service delivery and O&M.
- Bring together farmers who have farming land in an irrigated area and form a group for facilitating the supply of irrigation water to them.

- Supply adequate water for irrigation to the members.
- Acquire a knowledge of management, O&M of the irrigation system and financial affairs.
- Increase the yields and seasonal cropping.
- Facilitate support from the government.

FWUCs have the following responsibilities:

- Collect the ISF as determined by the FWUC.
- Prepare a work plan for the FWUC.
- Formulate statutes (constitution), contracts and internal regulations of the community.
- Maintain the irrigation system in good condition to enable the provision of irrigation for the whole season.
- Manage and distribute water to all members.
- Strengthen the use, management and improvement of the irrigation system in an efficient manner.
- Resolve problems occurring within the community.

The Steps in the Formation Process of FWUCs

Pracas 306 includes the following eight steps for the formation of the FWUCs:

1. Initial discussion with farmers.
2. Setting up of levels (farmer water user groups) as per the different levels of irrigation systems.
3. Formation of the FWUC board representing the whole irrigation scheme.
4. Selection of Farmer Organizers.
5. Discussion on the Draft FWUC statute.
6. Formation of system-wide water users' committees.
7. Final ratification of the FWUC statute.
8. Registration of the statute and committee of the FWUC.

Supplementary to Pracas 306 the MOWRAM has prepared seven extensive training manuals for the implementation of PIMD program under the following subjects:

1. Introduction to the PIMD program.
2. PIMD program: Policy, legal and institutional framework.
3. Planning and implementing the PIMD program at the national level.
4. Implementing the PIMD program at provincial and irrigation system levels.
5. Establishing and developing the farmer water user community.

6. Monitoring and evaluation system for the PIMD program.
7. Technical Guide for irrigation water management.

These training manuals are meant for the government officials involved in planning and implementing the PIMD program, from the level of senior planners to field operation officials at the provincial and district levels.

According to training manuals, the formation of the FWUCs should be implemented as a learning process involving continual adjustments and improvements. The implementation process is to be started with a Participatory Rural Appraisal (PRA). Particularly, the Training Manual 5 on Establishing and Developing the Farmer Water User Communities gives comprehensive guidelines under 10 steps for organizing FWUCs (MOWRAM 2003).

Ten Steps Given in Training Manuals for Establishing FWUCs

Step 1. Hold initial meetings at system or subsystem level: This includes mainly holding initial discussions with farmers through PRAs, making them aware of the PIMD policy and program, and plan with local leaders the next steps to organize the FWUC.

Step 2. Identify the irrigation service area and potential members of the FWUC and conduct a PRA.

Step 3. Farmers agree to form the FWUC and plan organizing activities. This includes mainly taking the decision whether to form the FWUC, election of a committee for drafting the FWUC statute, selection of a FWUC assistant by the FWUC drafting committee.

Step 4. Farmers prepare and adopt the FWUC statute and bylaws. This includes providing training for the draft committee, completing the draft statute and bylaws, and discussing it with prospective members, getting their approval for it and registration of members.

Step 5. Farmers establish the FWUC and select leaders. This includes the election of group leaders and the FWUC board of members and registration of the FWUC.

Step 6. Build the capacity of the FWUC to prepare an irrigation service plan. This includes providing training on O&M, preparation of the irrigation service plan and financial management.

Step 7. The FWUC adopts and implements the initial irrigation service plan. This includes the final preparation of the irrigation service plan and budget by the FWUC board, calculation of the ISF, getting approval of the general assembly, opening of a bank account, collection of the ISF and implementation of the first irrigation service plan.

Step 8. Prepare and adopt the management transfer agreement. This includes the preparation of the draft of the management transfer agreement and approved by the general assembly, its trial implementation and its official signing among MOWRAM, the FWUC management committee and the provincial authorities after one year of its successful implementation.

Step 9. Repair and improvement of irrigation infrastructure.

Step 10. Continue capacity building and provision of support services. This includes mainly training of farmers on communication by leaders, planning, conducting meetings, decision making and conflict resolution, record keeping, preparation of seasonal O&M plans and resource mobilization, financial management, development of new marketing channels and agribusiness.

As per the training manuals a support team comprises the provincial-level officials who are responsible for implementation of the PIMD program by establishing FWUCs (MOWRAM 2003). This support team should comprise government staff from the District MOWRAM office and one or two staff each from the provincial office of the Ministry of Agriculture, Forestry, and Fisheries and the Ministry of Rural Development. The staff of the District office and a farmer organizer (FO) selected among the farmers are responsible for the field-level implementation activities (annex 1).

Organizational Structure of the FWUCs

As per the legal framework under Pracas 306, the FWUC is formed for the total irrigated area of the scheme representing all farmers. Farmer water user groups (FWUGs) are formed as the base level of the FWUC comprising farmers who use water in an identified irrigated area at the secondary level. The FWUC is led by an apex body of a committee comprising the chairman in charge of general supervision, first vice-chairman in charge of system maintenance and repairs, second vice-chairman in charge of water supply and record keeping, and third vice-chairman in charge of financial management and of all the group leaders of FWUGs. The structure of the FWUC that is being introduced in most of the irrigation schemes implemented by the PIMD office is given in annex 2. Subgroups have been introduced to the model as, sometimes, the number of total membership of the groups formed on identifiable hydrological bases is too large (annex 2).

Chapter 4

Physical and Socioeconomic Environment of the Two Irrigation Schemes

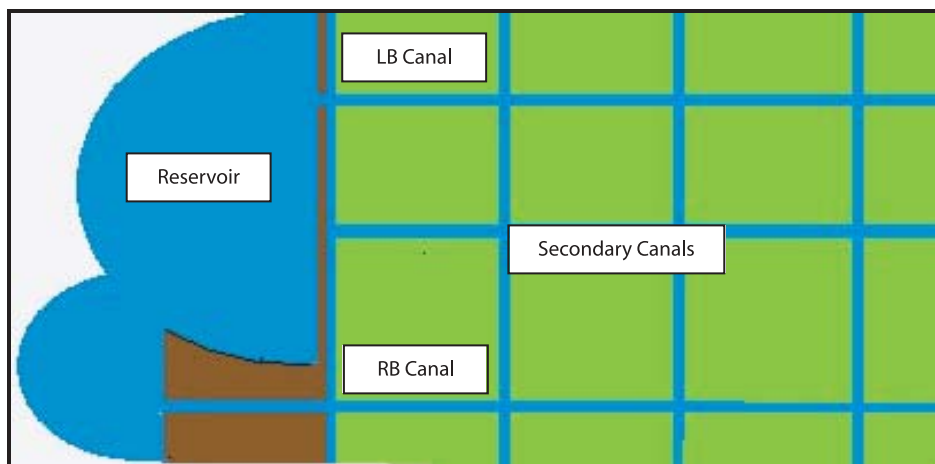
Physical Environment and Irrigation Behavior of Farmers

Physical Environment of the 5 February Irrigation Scheme

The 5 February Irrigation Scheme comprises the reservoir and dam, two main gates of the Right Bank (RB) and the Left Bank (LB) and a grid of secondary (field) canals typical of Polpot irrigation systems. The reservoir receives water mainly from rainfall runoff and from a small tributary that activates during rains. The reservoir has two sections: one feeds the RB and the other the LB (figure 1). The main canals serve the four purposes of water storage, irrigation, drainage and fishery. Information on the total reservoir capacity is not available but it is said that the water available is adequate to complete the cultivation.

The total cultivated area under the reservoir is about 800 hectares. In addition, some small irrigation schemes located below the reservoir benefit both from drainage and direct canal runoff from the reservoir. A command area of 350 hectares has been demarcated recently out of the total area of cultivation along the boundary of the commune in which the reservoir is located. There are 345 farmer families within this command area in the 3 villages of Thnal Bek Keut, Thnal Bek Lech and Bram Mat Dey.

Figure 1. Outline of the 5 February Irrigation Scheme.



According to farmers, the reservoir was damaged by Vietnam troops who fought against the Khmer Rouge. Farmers said that the Vietnam troops had one of their camps close to the reservoir and they broke the bund and gates to empty the reservoir to catch fish. The system was in a dilapidated condition and farmers cultivated using some temporary controlling gates until it was rehabilitated in 2003 under the PIMD program funded by the ADB.

Cultivation in the 5 February Irrigation Scheme is limited to one season. Farmers cultivate a long-duration variety of traditional rice of 8 months.

The 5 February Irrigation Scheme is located near the district town that, in turn, is located within one of the three villages of the irrigation scheme. The other two villages of the scheme are located adjacent to the district town.

There was some migration into the villages in the 5 February Irrigation Scheme associated with the collapse of the Khmer Rouge. In the sample, 9 families (26%) had come to the village from outside the 5 February Irrigation Scheme after the Polpot period.

Irrigation Behavior of Farmers in the 5 February Irrigation Scheme

The 5 February Irrigation Scheme was constructed during the Polpot period when people were forced to develop projects of a scale that was far beyond their technical competence, using materials they had no experience with (ADB 2001). This irrigation scheme also has some of the consequent problems inherent to those irrigation schemes such as lack of a proper structural system. This situation has been further aggravated with the dilapidation of the physical system. This has resulted in a high level of inequality and difficulties in sharing water.

During the study, it was observed that the rehabilitation of the headwork and part of the RB main canal was completed. But the LB and secondary canals were dilapidated and needed rehabilitation. Some of the tertiary canals, particularly in the tail end, were totally silted up and they could not be identified as canals due to heavy growth of weeds. There were no controlling gates at the field level in main or tertiary canals.

Access to water from the rehabilitated RB canal was easy at both the head and tail ends. But the middle section was having severe irrigation problems as the lands were at a higher elevation and access to water was difficult both from the main canal and the tertiary canals. It was observed that these farmers had not taken any steps to pump water, which was the prevalent method of irrigation in Cambodia and some fields along the main canal had been abandoned and left for cattle feeding although they were in the booting stage.

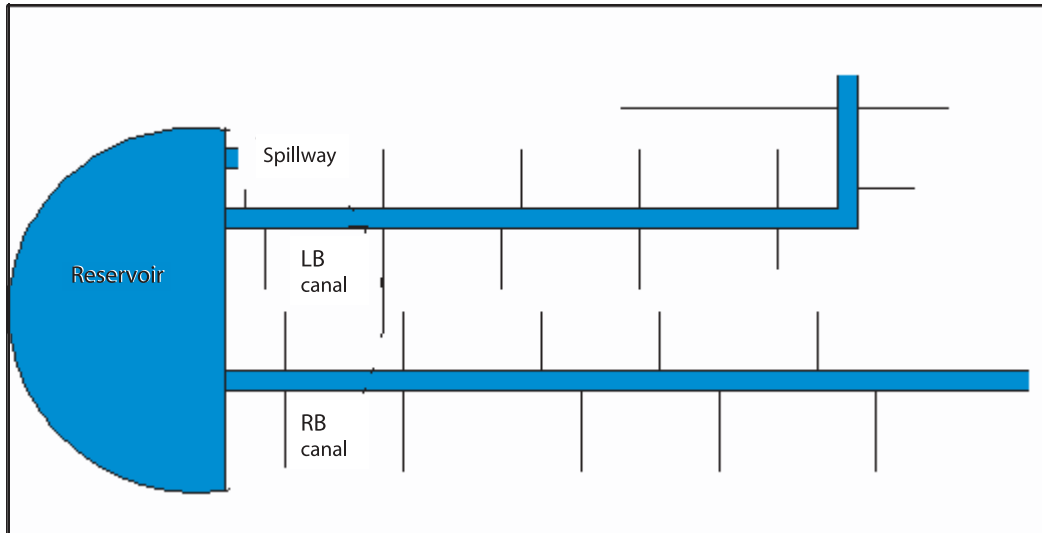
In the LB area, the practice was to empty the subsection of the reservoir into the LB canal and to the fields. Water was stored in the canal to its full capacity, paddy fields were ponded and the water level in some fields was as high as 32 centimeters. Farmers were practicing flood irrigation that they were used to during rains. Some farmers said that this level of standing water was maintained even during the harvesting period. However, this practice could be followed only at the head end and at the middle section. The tail end was having severe irrigation problems due to the absence of proper irrigation structures. Water was draining off from the head end and the middle of the scheme to some downstream off-scheme paddy fields and irrigation systems by passing the tail end. Several tail-end farmers were seen waiting till nightfall to bring water to their lands by removing some temporary weirs built by head-end farmers. Some paddy plants at the tail end were dying for want of water while there was lush greenery at the head. Anyway, it was observed that much attention had not been paid by some tail-end farmers to save their paddy plants and had abandoned them to nature. No attempt was taken to pump water. Very few farmers were present in their paddy fields. Overall, there was no concerted effort among farmers to share water. Irrigation was an individual activity.

Physical Environment of the Sne Irrigation Scheme

This irrigation scheme is located in the Mekong flood plain. The reservoir is fed from flood water. The irrigation scheme had been built under some technical specifications and comprises the reservoir and dam, two RB and LB main canals, secondary and tertiary canals and a spillway (figure 2).

The total command area is 790 hectares. The total reservoir capacity is 6 million m³. There is an adequate supply of water in the reservoir.

Figure 2. Outline of the Sne Irrigation Scheme.



The total number of farmer families under the irrigation scheme is 895 from the 7 villages of Chan, Prey Kampong, Prey Angkong, Daung, Ba Boung, Chok Cheiy and Panley. These villages come under two communes.

The Sne Irrigation Scheme has been rehabilitated twice, first in 1993, and then in 2003. Only the main canals were rehabilitated in 2003 with both earthwork and concrete work under the PIMD program. Both the secondary and tertiary canals have to be rehabilitated. The quality of the rehabilitated main canals is better than that of 5 February, with some concrete structures and a few controlling gates.

The main canals of the Sne Irrigation Scheme serve 6 functions:

1. Feeder canals of the reservoir during floods.
2. Floodwater drainage canals.
3. Source of water storage after flood.
4. Irrigation canals (from the reservoir).
5. Irrigation drainage canals.
6. Fishery.

Since the scheme is located in a heavy flood area the irrigation system is continually damaged by annual floods needing repairs every year. During the study period it was observed that three places in the LB canal bund and two places in the RB canal had been washed away by floods. Some new concrete work was also affected in some places due to erosion of the earthwork. It was also observed that the access road to the irrigation scheme had also been washed away and was not roadworthy.

Many of those who live around the reservoir cultivate the lands outside the command area even in the reservoir catchment by pumping water from the reservoir. Also, outside the command area there is a canal built during the Polpot period which provides irrigation direct from the reservoir to around 60 hectares. The total area cultivated under the reservoir is said to be around 2,000 hectares.

Recession cultivation is practiced by farmers and they depend on irrigation water during the whole crop growth period. Farmers cultivate some hybrid 3-month variety introduced to them by an NGO. Cultivation is limited to one season.

No one has migrated into the villages from other areas in the Sne Irrigation Scheme after the Polpot period. Eight farmer families who migrated to this area during the Polpot period from nearby places have remained in the same villages even after the Polpot period.

Irrigation Behavior of Farmers in the Sne Irrigation Scheme

The existing physical system of the Sne Irrigation Scheme in spite of part rehabilitation is not in a proper operational level due to the lack of an adequate controlling system. Maintaining the irrigation system in good condition is a problem in this scheme due to heavy annual flood damages.

The Sne Irrigation Scheme is said to be water-abundant and, according to farmers, water is available even after cultivation. Farmers start cultivation with the receding of the flood and depend on irrigated water afterwards. Flood water recedes totally within about a month and all the farmers in the sample survey mentioned that they depended on irrigation as the main source of water. It was observed that soon after the flood receded farmers had requested for irrigated water. Pumping is the prominent method of irrigation apart from direct canal irrigation. Given below are the responses of the sample farmers on how they received irrigated water.

From the main canal	:	2 (6%)
From secondary canals	:	2 (6%)
Main canal and pumping	:	14 (39%)
Secondary canal and pumping	:	18 (50%)

Accordingly, 89 percent of the sample farmers used pump irrigation in addition to other sources. This was substantiated at the group discussions with farmers.

As mentioned earlier, the responsibility for the gate operation in the Sne Irrigation Scheme rested with a gate operator appointed by the DOWRAM. The gate operations were said to be made on farmer requests; however, the operator decided the quantity and the time period of water issues.

A total of 92 percent of the sample farmers said that they were having irrigation problems. A total of 47 percent of these sample farmers said that their irrigation problems were due to the actions of the head-end farmers. The solution available to farmers was pumping.

Socioeconomic Environment of the Two Irrigation Schemes

Livelihood Activities of Farmers

The 5 February Irrigation Scheme is located in the Kampong Cham province, which is a dominant highland cultivation area in Cambodia (annex 3). This province takes the lead in producing some highland crops such as sesame, soybean and mung bean (table 1). Highland cultivation is the main livelihood activity of the Chmaka Leaut district where the 5 February Irrigation Scheme is located. According to the data available at the district office, highland crops are cultivated in 32,318 hectares (80%) out of the total cultivated area of 42,259 hectares in the district. Highland cultivation is dominant in this area due to the red alluvial soil and it is regarded as a relatively rich area of Cambodia but background data to substantiate it are not readily available.

Table 1. Production of crops in the Kampong Cham and Prey Veng provinces.

Crops	Total country production. (tons)	(Province- 5 February)		(Province- Sne)	
		Kampong (tons)	Cham %	Prey Veng (tons)	%
Paddy	4,710,957	484,551	10	639,452	14
Maize	314,601	7,540	2	1,842	1
Cassava	330,649	13,098	4	119	0
Vegetable	139,626	6,036	4	804	1
Mung bean	23,746	8,997	38	469	2
Peanut	18,483	4,513	24	728	4
Soybean	62,918	28,898	46	0	0
Sesame	21,487	16,979	79	3,760	17

Most of the areas in the Prey Veng province where the Sne Irrigation Scheme is located are inundated during seasonal floods. Paddy is the dominant cultivation in this province (table.1). According to the information available with the district office, 80 percent of the total number of farmers in the district are involved in paddy cultivation as their livelihood activity. This district as per the available reports is regarded as one of the poorest in the country. Animal husbandry, fishing and making rice wine are the other income-generation activities of the people of this district.

The main income-generation activity of 62 percent of the sample farmers of the 5 February Irrigation Scheme is highland cultivation (table 2). Paddy cultivation is the main income-generation activity of only 12 percent of the farmers. Sale of labor, and driving motorcycle taxis are the other main income-generation activities of some sample farmers while some others earn their income by doing small businesses, and engaging in government employment, etc.

Table 2. The main income sources of the sample farmers of the 5 February and the Sne Irrigation Schemes.

Main income activity	5 February		Sne	
	No. of farmers	%	No. of farmers	%
Highland cultivation	21	62		
Paddy cultivation	4	12	26	72
Labor work	3	9	5	14
Driving motorcycle taxis	2	6		
Doing small businesses	1	3		
Government employment	1	3	1	3
Renting out the highland	1	3		
Fishery	1	3		
Money sent by children working in Phnom Penh			2	6
Barbering			1	3
No income			1	3
Total	34		36	

According to the sample survey, the main income-generation activity of 72 percent of farmers in the Sne Irrigation Scheme was paddy cultivation (table 2). Altogether, the main income source of 14 percent of farmers was labor work. Some of them worked in Phnom Penh. The main income source of some others was the money sent by their children who worked in Phnom Penh. Also, one family of the sample (3%) did not have any identifiable income. The chief of the household earned the family living by supporting religious activities in the village pagoda.

Altogether 13 sample farmers (36%) of the 5 February Irrigation Scheme were having other income sources such as highland cultivation, paddy cultivation, driving motorcycle taxis, small businesses and labor work (table 3). Altogether 71 percent of the sample farmers in this scheme were involved in highland cultivation. Paddy cultivation was an income-generation activity as a main or secondary income source only of 7 sample farmers (21%). Twenty-one percent of the farmers were involved in some income-generation activities in the district town such as driving motorcycle taxis and doing small businesses. The income of a few farmers (9%) was the money sent by their children who worked in Phnom Penh mainly in garment factories.

Table 3. Other income sources of sample farmers of the 5 February and the Sne Irrigation Schemes.

Other income activity	5 February		Sne	
	No. of farmers	%	No. of farmers	%
Highland cultivation	3	9*		
Paddy cultivation	3	9	8	22*
Driving motorcycle taxis	2	6		
Labor work	2	6	4	11
Small businesses/paddy cultivation	1	3		
Small businesses	1	3		
Money sent by children working in Phnom Penh	1	3	2	6
Animal husbandry			5	14
Vegetable cultivation			1	3
Masonry			1	3

*Out of the total sample

A total of 56 percent farmers of the sample in the Sne Irrigation Scheme had other income sources (table 3). Altogether 97 percent of the sample farmers were involved in paddy cultivation (all the sample farmers except one). Animal husbandry was the income source of 18 percent of the sample farmers but all the farmers in the Sne Irrigation Scheme were engaged in rearing animals such as draught cattle, pigs and chicken as a household activity. Altogether 17 percent of farmers undertook labor work in addition to paddy cultivation. A total of 12 percent of families were getting some income from their children who worked in the Phnom Penh city.

Cultivation Practices of Farmers

The farmers of the 5 February Irrigation Scheme cultivate a traditional paddy variety of 8 months' duration. According to them, this paddy variety is somewhat tolerant to drought, pest and crop diseases. Cultivation starts in April with some rainfall during this period and is completed in December.

Most of the farmers use self-grown seeds. During the last season, 80 percent of the sample farmers (out of the 25, as 9 had rented out the lands) had used their own seeds. Twelve percent said they had purchased the seeds while 8 percent had exchanged them for paddy with others.

The paddy cultivated in the Sne Irrigation Scheme is a 3-month high hybrid variety introduced by an NGO about 10 years ago (in 1993, according to farmers). Most of the farmers (80%) were continually using their own reproduced seed paddy. This paddy variety had been cultivated outside the scheme as well by these farmers.

Of the sample farmers in the Sne Irrigation Scheme, 92 percent start cultivation in November while the rest start in December. The cultivation period extends from October to February. All the sample farmers said that they depended on irrigated water after the initial transplanting. All of them said that they needed water for the whole period of 3 months.

Altogether 84 percent of the sample farmers (out of the 25) in 5 February were using hired labor for their cultivation (table 4). Only 16 percent of the sample farmers (out of the 25) were applying fertilizer for their cultivation. None in the sample had applied agro-chemicals. All the sample farmers used hired machines for threshing. The average cost of cultivation for these inputs (excluding own farmer labor) was about US\$45/ha.

Agricultural credit was not obtained by any of the farmers. They said they did not need any credit.

Table 4. Use of inputs in the 5 February and the Sne Irrigation Schemes.

Details	5 February		Sne	
	No. of farmers	%	No. of farmers	%
Seed paddy (purchased)	03	8*	07	20*
Hired labor	21	80	18	51
Fertilizer	4	16	35	100
Agro-chemical	0	0	31	81
Use of pumps	0	0	32	89
Use of threshing machines	25	100	35	100
Obtain credit	0	0	19	54

*Out of the total number of farmers who are involved in paddy cultivation in their lands (in the 5 February, 25 farmers and in the Sne, 35 farmers).

Of the sample farmers in the Sne Irrigation Scheme, 20 percent had purchased seed paddy from a seed paddy center during the previous season (table 4). All the farmers of the sample (except the one who had rented out his land) said that they applied fertilizer; 83 percent of the sample farmers said that the problem was the high cost in applying fertilizer. Altogether, 89 percent of the sample said they applied agro-chemicals. The remaining farmers said that they did not apply agro-chemicals because of financial problems. All the farmers who applied agro-chemicals said that the high cost of agro-chemical was a big problem for them. The option available for most of these farmers was to apply less fertilizer and agro-chemicals than needed.

Forty-nine percent of the sample farmers in the Sne Irrigation Scheme said that they used their own labor in their cultivation. Fifty percent of the sample said that they had to hire labor apart from using their own labor. A total of 89 percent of the sample said that they had to bear the cost of pumping. Also, all the sample farmers said they hired threshing machines. The paddy cultivation cost to farmers in the Sne Irrigation Scheme includes costs of labor, fertilizer, agro-chemicals, pumping and the use of the threshing machine. The average cost of these inputs excluding their own labor was US\$118/ha.

Fifty-four percent of the sample farmers in the Sne Irrigation Scheme said that they obtained agricultural credits. Forty-six percent of them got credit in kind from local fertilizer and agro-chemical dealers to be paid in paddy after the harvest. The rest of the farmers (8%) got formal credit introduced by an NGO.

None of the farmers in the samples of the two irrigation schemes had received any technical advice and extension services on paddy cultivation. Farmers in the Sne Irrigation Scheme consult the agro-chemical dealers whenever their crops are affected with crop diseases.

The paddy yield in the 5 February Irrigation Scheme varies from 1.5 tons to 2.5 tons. The average paddy yield of the sample farmers in this scheme during the last season was 2.08 tons/ha. Only 21 percent of the sample farmers said that they sold part of their yield. The average selling price of paddy per kilo was 500 riels (US\$0.12c). They were selling them at their homes in small quantities to retailers to buy household needs. Two of the farmers (6%) sometimes sold their produce at the nearby market.

Of the sample in this scheme, 79 percent of the farmers cultivated paddy for their own consumption. Paddy cultivation was not an income-generating activity for them.

Since paddy is not the main income-generation activity of most of the farmers in the 5 February Irrigation Scheme they neglect their cultivations after the initial stages of crop growth to engage in other activities such as upland cultivation. To some extent, they can follow this practice as the traditional paddy variety they cultivate is somewhat tolerant to water scarcity and pest and crop diseases.

The yield of the sample farmers in the Sne Irrigation Scheme varied from 1.8 tons/ha to 4 tons/ha. The average yield was 2.7 tons/ha. A total of 94 percent of the sample farmers sold part of their yield. They sold their yield to retailers in small quantities to buy home needs. Those who had taken informal credit were compelled to repay their credit by selling their paddy to the dealers who provided them inputs on credit. The yield sold by six farmers (18%) was adequate only to cover the credit they had taken from input dealers.

The price of paddy per kilo in this area was 400 riels (US\$0.10). However, those who obtained inputs on credit from the dealers had to sell their produce to them at a lower price of between 350 and 380 riels. The average paddy price in the Sne Irrigation Scheme was 385 riels (US\$0.0950c)/kg.

Most of the farmers in the Sne Irrigation Scheme are in a poverty trap according to their production system. Due to the informal credit arrangement with the dealers they are compelled to buy probably low-quality inputs at higher prices and also in amounts less than needed due to high prices. They are compelled to sell the produce to these dealers at a low price. Any remaining produce with them is sold in small quantities to maintain their subsistence level.

Land Tenure

After the fall of the Polpot regime, when allocating the lands in the 5 February Irrigation Scheme the village chiefs and their close associates of group leaders had obtained the lands in the head end close to the reservoir. The village chiefs were responsible for allocating the lands. The sizes of the lands allocated were decided on family size.

Altogether 97 percent of the sample farmers in the 5 February Irrigation Scheme had their own lowlands. Only 71 percent of the sample farmers cultivated their lands by themselves. Nine farmers (26%) had rented out their lands while one farmer (9%) cultivated a rented land. Altogether 50 percent of the sample farmers had more than one landholding each. Twenty nine percent of the farmers had their own lands while others cultivated rented lands apart from cultivating their own lands. Altogether 24 percent cultivated rented lands. Thus land tenure in the 5 February Irrigation Scheme is somewhat complicated. Many farmers had rented out their lands as they were engaged in upland cultivation.

All the sample farmers of the Sne Irrigation Scheme had their own lowlands. Except for the one particular farmer, all the others in the sample (97%) cultivated their lowlands by themselves. The farmer who assisted in temple activities to earn his family living had rented out his land. Therefore, there were no land-tenure-related problems in the Sne Irrigation Scheme.

Such a practice as sharing the lands in the head ends among the village chiefs and group leaders could not be observed in the Sne Irrigation Scheme. The greater moisture and sediment retention after floods at the tail-end lands might have probably narrowed down the head-tail difference in this irrigation scheme. The land allocation in the scheme had been based on villages: land for five villages from the LB canal and land for two villages from the RB canal. The size of the land had been decided by the village chiefs based on the size of the family.

Income Level and Living Standard of the Farmers

According to farmer responses, the average total gross annual income of the sample farmers in the 5 February Irrigation Scheme was US\$601. They derived this income mainly from their highland cultivation. However, the actual income from highland cultivation may be higher than they stated. According to the income figures given by sample farmers, a total of 56 percent had an annual income higher than US\$500 (table 5).

Table 5. Average total gross annual income of sample farmers of the 5 February and Sne Irrigation Schemes.

Income category	5 February		Sne	
	No. of farmers	%	No. of farmers	%
Below US\$250	-		16	44
US\$250 – US\$500	15	44	20	56
US\$500 – US\$750	10	29		
US\$750 – US\$1,000	8	24		
US\$2000	1	3		
Total	34		36	

The average annual gross total income of the sample farmers in the Sne Irrigation Scheme was US\$285 (table 5). The annual gross total income of the total sample farmers was below US\$500 and the annual gross income of 44 percent of the total sample farmers was below US\$250. Two families do not have any calculable annual income.

The net income of most of the farmers of the Sne Irrigation Scheme was very low as their cultivation cost was high. The net annual income from paddy cultivation of 19 farmers (56%) was less than US\$150.

The house types of farmers were included in the sample survey to get some understanding on the living standards of farmers. Five types of houses could be found in Cambodia (table 6.). House types 1 and 2 are considered as poor, type 3 is considered as medium and types 4 and 5 are considered as rich. In the analysis, each house type was evaluated on five categories of very poor, poor, medium, good and very good.

The house types of 56 percent of the sample farmers in the 5 February Irrigation Scheme were within the category of “good” and “very good” (table 6). Only 21 percent of the houses of the sample farmers belonged to types 1 and 2. Out of them, only 2 houses (6%) could be categorized as “poor.” Only one house (3%) in this scheme was in the category of “very poor.”

Table 6. House type of sample farmers of the 5 February Irrigation Scheme.

House Type	Very poor	Poor	Medium	Good	Very good	Total	%
1-House built of leaf	1	1	2			4	12
2-House with metal roof			3			3	9
3-House with tiled roof and wooden walls			1	10	9	20	59
4-House made of cement and brick (on pillars)			7			7	21
5-House made of cement and brick							
Total	1	1	13	10	9	34	

In the Sne Irrigation Scheme houses of all the sample farmers were of type 1 and 69 percent of them were of *very poor* quality while the rest of the houses were of *poor* quality (table 7). The level of poverty in this area is reflected in the poor living condition of the farmers of the Sne Irrigation Scheme.

Table 7. House type of sample farmers of the Sne Irrigation Scheme.

House Type	Very poor	Poor	Medium	Good	Very good	Total	%
1-House built of leaf	25	11				36	100
2-House with metal roof							
3-House with tiled roof and wooden walls							
4-House made of cement and brick (on pillars)							
5-House made of cement and brick							
Total							

Farmers of the 5 February Irrigation Scheme are economically and socially better-off as shown by their better living standard, which is marked by the good income they receive. Living close to the district town and mostly along a main road might also have had some influence on their life styles. They have less poverty-related problems.

Chapter 5

Formation and the Level of Functioning of the FWUCs

The 5 February Irrigation Scheme

Formation of the FWUC

The implementation of PIMD in the 5 February Irrigation Scheme commenced in 2002. The whole process of the formation of the FWUC included 35 extensive activities which were a mixture of activities mentioned both under the 8 steps given in Pracas 306 and the 10 steps given in the Training Manual 5 (annex 4). The FWUC formed comprised the FWUC committee, 6 groups and 12 subgroups (2 subgroups for each group). The formation of the FWUC had taken place at a general farmer meeting held with the participation of around 85 farmers (about 25% of the total). The farmer leaders of both the FWUC and FWUGs that included the chairman, the first, second and third vice-chairmen had been selected through a formal election procedure of farmer votes with the leader positions having been decided based on a preferential voting system. The contestant who received the highest votes had been selected as the chairman. The six groups were formed at the same meeting mainly based on the number of farmers of each village, e.g., three groups for the Thnal Bek Keut village, two groups for the Bra Mat Dey village and one group for the Thnal Bek Lech village. The membership of each group was around 50 farmers. The leaders for each group had been selected at the same meeting by all the participants. Subgroups had been decided and respective leaders had been named later with the support from village chiefs. The FWUC had received legal registration with the formal approval of its statute by the MOWRAM.

Level of Functioning of the FWUC

When the study was conducted, activities of the FWUC formed in the 5 February Irrigation Scheme had declined and it remained only in name. The decline had been marked by the resignation of the chairman in 2003. In discussions with the former chairman he indicated that he resigned due to some disappointment with the divisional level officials for not providing farmers food rations for the free labor they provided for canal cleaning under the World Food-for-Labor program. It was learnt that the chairman had been selected at the general farmer meeting in absentia and he was looking for some reasons to resign.

A new chairman had been named by the chief of the commune who is the de-facto advisor to the FWUC. He had not been involved in any FWUC activity. Instead the first vice-chairman who is the chief of the village adjoining the irrigation scheme was doing the activities related to the FWUC such as collecting the ISF, attending to irrigation problems of farmers and convening farmers for training. He was doing these under his capacity as the village chief and not as the first vice-chairman. The second vice-chairman who was responsible for water management had delegated his responsibility to two others living close to the canal gates. He was not involved in any activity related to irrigation.

Group leaders could not explain either their group boundaries or the number of farmers in their groups. The subgroups had been named later by village chiefs. Farmers in general who were interviewed and involved in group discussions were not aware of the existence of subgroups.

According to the statutes given in the legal framework, FWUCs are expected to hold three categories of meetings: a) FWUC committee meeting, b) group meetings, and c) the FWUC general meeting. Apart from the initial meeting held to form the FWUC in the 5 February Irrigation Scheme no other meeting of this scheme had been held. Meetings of groups had never been held. Records were not maintained except financial account books which were in printed form as prepared by the PIMD office. It was observed that only the third vice-chairman who was responsible for financial management was having some required leadership qualities among the farmer leaders. He was maintaining records of finance and of the training provided. He was able to explain his roles and responsibilities and why the FWUC had been formed. But as the FWUC was inactive he was working in isolation.

Some committee members and several farmers had attended the training held. Some of them had attended the training with some interest and remembered the subject matters discussed. Others had attended the training only to fulfill the request of the village chief.

The total collection of the ISF in the previous season was said to be about 70 percent of the total. Farmers had paid this fee on the request of the commune chief. It was learned that most of the farmers abided by the request of the commune chief since they had to meet both the commune chief and the village chief frequently in their day-to-day affairs. Hence the payment of ISF was mainly due to some fear factor and to maintaining the relationship within the village rather than for expected service delivery.

Involvement of FWUC in System Management

The FWUC had not formally taken over any responsibility in system O&M as yet. According to the FWUC structure, the first vice-chairman is responsible for system maintenance and the second for water management. However, the second vice-chairman was not involved in any water management activity. The LB gate was being operated by a farmer living close to that gate. The RB gate was being operated by the first vice-chairman living close to that gate. There was no water distribution schedule and gate operation was done on farmer requests. If there were any irrigation problems farmers would meet either the village chief or the commune chief depending on the seriousness of the problem.

The overall responsibility for system maintenance was with the commune before the FWUC was formed. There was no involvement of farmers in system maintenance work. Until the recent rehabilitation of the RB overall system maintenance had been neglected as the system was in a dilapidated condition. During 2004, the chief of the commune had allocated some funds for earthwork repairs in the rehabilitated RB canal on the request of the first vice-chairman. He had made this request in his capacity as the village chief. Repair work had been done with hired labor. The maintenance of the LB canal was still neglected.

Process Followed in the Formation of the FWUC

An extensive process had been followed in the initial formation of the FWUC in the 5 February Irrigation Scheme (annex 4). Its initial formation and the associated formulation of the constitution and bylaws included about 60 percent of the total activities. In this process however, the other main component of organizational management necessary to make the FWUC a strong and effective organization after its formation was not given adequate attention. As per the institutional management, the process included only two sessions of training on internal administration and financial management.

The training on internal administration was concentrated only on some basic documentation. The training on financial management had been better prepared with the subject matters of preparation of balance sheets, cash registers, budgets and other necessary documents and receipts. This training had been somewhat effective.

At the next stage of the process the officials of the PIMD office had taken some attempts to re-organize the FUWC after identifying the weaknesses of the initial formation. However, they were not successful due to low levels of farmer participation.

Structure of the FWUC

The FWUC in the 5 February Irrigation Scheme had been formed on an assumed structure. The formation of the groups had taken place together with the activity of the election process of the FWUC but not as a separate activity. The group boundaries and the total number of farmers were not clear in the groups decided. Each group included about 50 farmers headed by a committee. The subgroups named later could be considered as the base-level groups. During the study both the groups and subgroups were not functional.

The participation of farmers at the meeting held in the formation of the FWUC was said to be about 25 percent of the total. The low level of participation made the FWUC weak as the majority did not have an adequate knowledge of the FWUC.

Leadership

As a whole, the leadership of the FWUC built in the 5 February Irrigation Scheme was very weak. The leadership selection in this scheme was the typical organizing process (Uphoff 1988) of calling a meeting of farmers to hold "elections" for leaders without making them well aware of the required leadership qualities beforehand which normally limits selection only to those ascribed. On the other hand, the election procedure followed in the 5 February Irrigation Scheme was to select the leaders in a proportional election system, e.g., the person who received the highest number of votes is selected as the chairman, the person who received the next highest number of votes as the first vice-chairman, etc. The selection criterion was thus based on farmer preference rather than on the required leadership qualities for each position. Next, in the proportionate system, apart from the chairman others might have been rejected by the majority according to the total number of votes they obtained. Their acceptability by the farmers was questionable particularly when the total participation of farmers in the selection meeting was about 25 percent of the total. Also, the present chairman had not been selected by farmers but had been handpicked by the commune chief.

Election of group leaders at a general meeting of all farmers was not an appropriate election procedure. Since farmer participation in the general meeting was about 25 percent of the total, farmer representation of particular groups might have been very low. The acceptability of group leaders to the majority group members was therefore questionable.

According to the leaders of the FWUCs, they were supposed to be nonvoluntary. According to them, they had been told, in addition to what the FWUC statute had stated that each would be paid some regular allowances from FWUC funds. Making such payments with the collection of fees in a small irrigation schemes like 5 February is questionable. Such arrangements would make the leaders overly enthusiastic and less devoted in the failure of such payments. Some farmer leaders in the 5 February Irrigation Scheme said that one of the reasons for their low level of involvement in the FWUC activities was that they were not paid these allowances.

Political Interference

It was learnt that there was a high level of political interference in the area, particularly against charging the ISF, which has created some negative impact on the FWUC. The ruling and opposition parties are equally powerful in this district and the former had been elected to this district by a very narrow margin at the last national elections held in 2003. It was also learnt that during election campaigns the opposition party had promised that if they came to power they would not collect any fee. According to the information available, some farmers do not pay the fee as they are influenced by the opposition party. It was further learnt that farmer involvement in FWUC is at a low level, partly due to the influence of the opposition party members. All the farmer leaders of the FWUC belong to the ruling party.

Link with the Local Administrative Institutions

Before the PIMD program was introduced, the overall responsibility for implementing any activity related to the 5 February Irrigation Scheme rested with the respective commune as in the case with other irrigation schemes. Some links with this village-level administrative institution had been established and maintained in the formation of the FWUC.

The chief of the commune was the de facto advisor of the FWUC committee, which was the same in some other irrigation systems where the PIMD program had been implemented by the PIMD office. The village chief of the village adjoining the scheme had been selected as the first vice-chairman of the FWUC. The chairman of the FWUC who resigned later had been nominated for that position out of the members of the commune council by the village chief.

When the study was conducted, the FWUC was totally dependent on the links it had with the local administrative institution of the commune. Any activity of the FWUC was implemented under the direction of the commune chief. The ISF had been collected under his direction. The chief of the village who was also the first vice-chairman had taken all the responsibilities of the chairman of the FWUC because the latter was not involved in any activity. The village chief was regarded as the chairman of the FWUC by many farmers. They used to meet the village chief if they had any irrigation problems.

The Sne Irrigation Scheme

Formation of the FWUC

Implementation of the PIMD program in the Sne Irrigation Scheme had commenced in early 2003. The implementation process included 43 activities (annex 5). The FWUC had been formed at a farmer meeting at which about 600 had participated (around 65%). Under the FWUC, two groups representing the two canals and 10 subgroups under them had been formed. The committee members of the FWUC, groups and subgroups had been selected at the meeting through a formal election procedure. The FWUC had received legal recognition.

After its formation, the FWUC had remained inactive for sometime. According to the PIMD staff, the leader selected was very weak and was not involved in any activity. In early 2004, some reorganization of the FWUC (activity no. 45 in the institution building process) had taken place. The subgroups had been re-formed, based on villages with 7 subgroups for 7 villages instead of the earlier 10. The re-formation of subgroups had taken place at village-level meetings convened at village pagodas and, according to the information available, the majority of farmers, sometimes

over 80 percent of the total number in the village, had attended these meetings. Generally, overall farmer attendance in those meetings had been over 60 percent. At these meetings, the group committees had been selected as per the FWUC structure.

Level of Functioning

During the study it was observed that those groups (subgroups as per the FWUC structure) formed at the village level were functional and emerging as effective organizations. The formation of these groups at the village level is logical as the hydrological boundaries of the schemes had also been village-based. Also, these groups had been formed with majority farmer participation. All the farmers involved in group discussions and interviews knew the existence of those groups, knew their group leaders and other office holders, and admitted that they were members of those groups. All the seven group leaders had a good understanding of their roles and responsibilities as group leaders and were found to be devoted to their duties. In an interview with six vice-chairmen of groups it was learnt that they too had a clear understanding of their respective roles and responsibilities. Farmers said that if they had any irrigation problem they would meet their group leader.

All the group leaders mentioned that they had attended the training programs conducted by the PIMD officials and that they could remember most of the subject matter discussed there. They said that the training was useful to them.

The group leaders were involved in the fee collection in 2004 and all the farmers except those who were extremely poor had paid the fee.

The two groups formed at the main canal level were not functional as they had not been assigned any responsibilities as yet. Farmers did not remember the existence of such groups.

In the reorganization process, the chairman of the FWUC had been replaced temporarily by a farmer organizer after a discussion by the commune chiefs and the PIMD officials until the new committee was appointed to the FWUC as the next step in the reorganization. The FWUC still remained to be reorganized with a fresh election of its committee members when the study was conducted. The existing committee had made requests for the FWUC reorganization. During the period of the study, it was observed that the FWUC was functioning at a marginal level, depending on the acting chairman. The acting chairman had taken some responsibilities in system management such as requesting water issues and organizing canal repair work. One commune chief was providing him with the necessary instructions and support.

Only the vacancies of two other positions, those of the second vice-chairman and the third vice-chairman, remained to be filled, i.e., apart from the position of the acting chairman. The position of the first vice-chairman had fallen vacant as the community chief selected for that position later resigned for want of lands under this scheme. The position of the second chairman remained a namesake while the position of the third chairman who was responsible for financial management was functional. The account books were being properly maintained by the third vice-chairman and a bank account had been opened for the FWUC with the water fee collected amounting to US\$775.

One general meeting of the FWUC was held in 2004 to mark the legal recognition of the FWUC. Around 600 farmers attended the meeting.

Involvement of the FWUC in System Management

The FWUC is not formally involved in system management as yet. The main gate operation was done by a gate operator appointed and paid by the PDOWRAM district office. There was

no operational plan, and decisions on gate operation were said to be taken on farmer requests but the decisions on the quantity to be released and the time period were taken by the gate operator. However, it was learnt that almost all gate operation decisions were taken by the gate operator himself.

When the study was conducted it was learnt that the acting chairman was taking some responsibility in water distribution with the start of the new season in November 2004 by making written requests to issue water. However, the quantity of water released and duration were still decided by the gate operator. It was also learnt that preparation of an internal water distribution plan was under discussion with the PIMD and PDOWRAM staff. Group leaders interviewed said that they were waiting to apply the distribution plan with the assistance of the PIMD officials. Meantime group leaders are involved in directing the irrigation problems of farmers to the acting chairman.

The Sne Irrigation Scheme is subjected to annual flood damages. The responsibility for repairing major damages rested with the PDOWRAM. Repairing the rest of the damages remained the responsibility of the communes. These repairs had been implemented through farmer group work organized by village chiefs as directed by the commune chiefs. The repairs had been done by farmers without any technical guidance. Sometimes, the repairs were beyond the farmers' ability, leading to rapid deterioration of the system. Whatever rehabilitation work was done, the system would be in disrepair and in a dilapidated condition within a short period. The seasonal maintenance of secondary canals had been done by farmers on the instructions of village chiefs.

The FWUC has been gradually taking some of these responsibilities. The group works to repair the flood-damaged canals had been organized by the acting chairman. During the study it was observed that the acting chairman had organized a group work activity to repair some flood damage in the RB canal. Although he expected only about 25 farmers to attend it altogether 62 including other able members of farmer families attended it.

Process Followed in the Formation of the FWUC

The formation of the FWUC in the Sne Irrigation Scheme had taken place about a year later than that in the 5 February Irrigation Scheme. The process followed in the Sne Irrigation Scheme was somewhat improved than that implemented in the 5 February Irrigation Scheme. The process which had been implemented with some flexibility was continual. The subject matters and time spent on each subject area had improved and increased.

Appropriate strategies had been followed in reorganizing the group, which was the latest activity included in the implementation process at the time of the study. The groups were reorganized with the experience PIMD staff had gained until then. The groups had been reorganized at meetings with majority farmer participation. At these meetings, farmers had been made aware of the leaders' roles and responsibilities and why they needed groups.

However, most of the activities included in the process were limited to the formulation aspects of the FWUC. Still the process needs to be improved with organizational management aspects. The groups were emerging as effective bodies with the initial motivation created among the farmers. They needed to be strengthened with the capacity building of farmers and leaders in organizational management aspects before they become inactive.

The FWUC still remains to be reorganized. At the moment, any functioning of the FWUC is dependent on the acting chairman and one commune chief.

Structure of the FWUC

The formation of groups on some logical village base in the reorganization process had strengthened the base level of the FWUC. It should be reiterated that the formation of the subgroups based on villages when they were reorganized was logical as the lands had been allocated in the irrigation scheme based on the villages. Each village has its own separate irrigation boundaries. Village groups cannot be categorized into the small groups of farmers which are described as the building blocks of the farmer organizations (Uphoff 1986). Instead, they can be identified as village-level organizations while the FWUC is an apex coordinating body consisting of them.

Leadership

The election process followed in the selection of leaders in the initial formation of the FWUC in the Sne Irrigation Scheme was similar to that in the 5 February Irrigation Scheme. The leaders had been selected at a general farmer meeting and leadership problems similar to those in the 5 February Irrigation Scheme had been experienced initially but the FWUC remained inactive for sometime. The chairman nominated by a commune chief was not suitable for the position and had to be replaced. One commune chief who had no lands under this irrigation scheme had been selected as the first vice-chairman. He resigned later and this position remained vacant. It was said that the names of the second and third vice-chairmen had been proposed by commune chiefs representing each of the two communes.

In the reorganization process however, a proper way of selecting the group leaders had been followed. In this process, the farmers had been made aware of the roles and responsibilities and some required qualities of the leaders to be selected. Farmers had selected their leaders with a better understanding. Also, the group leaders had been adequately made aware of their roles and responsibilities, and were gradually involved in system management activities. Still the leadership problems at the FWUC level remained to be solved till the ongoing reorganization process was completed.

In contrast to the 5 February Irrigation Scheme none of the leaders either at the FWUC level or at the group level in the Sne Irrigation Scheme were expecting any payments for their services. Their services were voluntary.

Link with the Local Administrative Institutions

After the reorganization of the groups, the FWUC was informally linked with the village administrative system. The lower-level groups had been formed on the village base and respective village chiefs had been elected by farmers as the leaders of all the groups. (Only one among them was a vice-chief of the village, as the relevant village chief is too old to hold new positions). The village vice-chiefs had been selected as the first vice-chairmen of the groups. The functioning of the FWUC at present is totally dependent on this affiliation.

Since the groups are incorporated with the existing village administrative institutions there is no duplication in the formation of village-level groups. These groups become effective as they are incorporated into the existing village-level administrative machinery. The village chiefs have a list of the names of farmers in their villages and the extent and location of the individual

landholdings of the latter. Even before they were appointed as group leaders they had been involved in organizing group works to repair the canals damaged in floods and solving irrigation problems. Farmers were also used to informing their village chiefs whenever they had serious irrigation problems. Some activities related to the formulation of the FWUC, such as meetings and training, were effective as they had been organized under the direction of the commune chiefs. The attendance of the village chiefs is a necessity in such events organized through the commune chief.

The acting chairman who was the farmer organizer was also a commune council member. He was the village chief prior to being selected as the commune council member. One commune chief was providing necessary support to him. The involvement of the commune chief and commune council member by virtue of their positions had also contributed to making the FWUC functional. Organizing group works to repair the canal was done by the acting chairman in his capacity as a member of the commune council and former village chief rather than in his capacity as the acting chairman of the FWUC.

Farmer Responses on Their Awareness and Involvement in FWUCs

The result of the survey of sample farmers in the two irrigation schemes on the formation of the FWUC is given in table 8. The analysis was done on some basic criteria, such as a) farmer knowledge on the groups, FWUC, farmer leaders and their roles, b) farmer participation in meetings and group work, and c) payment of the ISF.

According to this survey, the knowledge of the sample farmers of the 5 February Irrigation Scheme on the groups was extremely low. Only 3 percent of the sample farmers knew their group leaders. None of the sample farmers had been involved in the selection of group leaders or considered themselves as members of the groups. Knowledge on the formation of the FWUC of the sample farmers was better (71%). However, only 29 percent of the sample farmers said that they were members of the FWUC. Only 26 percent of them had attended the first meeting of the FWUC. Their knowledge on the FWUC leader was better because some farmers regarded the village chief who was the first vice-chairman of the FWUC as the chairman. Fifteen percent of the sample farmers had met the village chief because of their irrigation problems and 12 percent said meeting him was useful. Only 53 percent of the sample farmers had paid the ISF and only 44 percent knew that the fee was collected for system maintenance and repair. No one in the sample had been involved in any group work related to the irrigation scheme.

The farmers' knowledge and their involvement in groups in the Sne Irrigation Scheme were at a very high level. Only one farmer who had rented out his land said that he was not a member of any group and except for him all other sample farmers said that the groups were useful to them. All the sample farmers in this scheme knew their respective group leaders. Their responses on the roles of the group leader are given in table 8.

Table 8. Farmer awareness and involvement of FWUCs in the 5 February and Sne Irrigation Schemes.

Details	5 February		Sne	
	No. of responses	%	No. of responses	%
Know the group leader	1	3	36	100
Member of group	0	0	35	97
Involved in the selection of group leaders	0	0	23	64
Know the group leader's roles	0	0	35	97
Formation of groups useful to farmers	0	0	35	97
Know the formation of the FWUC	24	71	25	69
Member of the FWUC	10	29	16	44
Participated in FWUC meeting	9	26	19	53
Know the FWUC leader	19	56	12	33
Know the FWUC leader's roles	8	23	11	31
Meet the leaders	5	15	14	39
Meeting with leaders is useful	4	11	11	31
Formation of FWUC useful to farmers	15	44	25	69
Know why ISF is collected	15	44	32	89
Pay the ISF	18	53	35	97
Involved in group work in the scheme	0	0	24	67

Table 9. Farmer responses on roles of group leaders of the Sne Irrigation Scheme.

Response	No. of farmers	%
Fee collection and canal repair	21	58
Fee collection and O&M	7	19
Fee collection	4	11
Fee collection, O&M and communication	3	8
No idea	1	3

Since the present FWUC leader had been appointed temporarily by the project implementers till a new leader would be selected, the farmers' knowledge of the FWUC leader in the Sne Irrigation Scheme was at a low level. Of the farmers, 39 percent said that they had met their respective group leaders because of irrigation problems and 31 percent said that the meeting was successful.

A total of 97 percent of sample farmers in Sne had paid the ISF in the year 2004. All of them said that the fee was collected for system repair and maintenance. A total of 67 percent of sample farmers had been involved in group work to repair the canals.

A summary of the functional level of the FWUCs of the two irrigation schemes is given in table 10. The FWUCs still cannot be evaluated using proper indicators as they are at their incipient stage.

Table 10. Functional level of the FWUCs in the 5 February and the Sne Irrigation Schemes.

Levels	5 February			Sne		
	Nominal	Moderately functional	Functional	Nominal	Moderately functional	Functional
FWUC	X				X	
Groups	X					X
Chairman	X					X
1 st vice chairman	X				-	
2 nd vice chairman	X				X	
3 rd vice chairman		X				X
Group leaders	X					X

A summary of the level of involvement in system management by the two irrigation schemes is given in table 11.

Table 11. Level of involvement in activities by the FWUCs in the 5 February and the Sne Irrigation Schemes.

Activity	5 February			Sne		
	Not involved	Informally involved	Formally involved	Not involved	Informally involved	Formally involved
System operation	X				X	
System maintenance	X				X	
Collection of ISF		X				X
Problem solving	X					X

Chapter 6

Discussion

Historical Irrigation Development Management in Cambodia

There are two different schools of thoughts about whether the ancient huge Baray reservoirs were meant for irrigation or as a symbol of god king, sacral, security and providing city water needs. The main argument against the concept of Barays being meant for irrigation is that although they were huge they were not very deep and the volumes would have been adequate only for symbolic purposes and not for food needs. Further, they lack the outlet systems necessary for irrigation water supplies. Therefore, it is difficult to believe that there was a strong irrigation system related to tradition, management or memory among farmers. Therefore, it is reasonable to believe that the traditional irrigation before recent irrigation development was based on flood recession, especially of the Great Lake and Mekong tributaries, as the rainfall and floods were predictable and the recessions were slow in the flat terrain. Even in the irrigation systems built in recent times as during the Polpot period there was no possibility for developing any such traditions among farmers due to poor irrigation designs and unstable social and political systems.

Physical Condition of Irrigation Schemes of Cambodia

There are two dominant features related to Cambodian irrigation schemes. First, the majority of irrigation schemes in Cambodia cannot provide better services due to their technically poor constructions. This is true particularly of the systems built during the Polpot period that constitute 69 percent of the total irrigation systems, and because of their non-technical nature, many of them have little or no chance of providing proper irrigation services; or, in many cases, they can provide services, but only to some small fraction of the nominal number of users. Some countries may have their share of poorly designed facilities, or deteriorated facilities, but in Cambodia the construction of the systems was wrong from the very beginning, and yet they account for about 50 percent of the nominal irrigated area of the country. Second, the landscape of Cambodia is mostly in the flood plains of the Mekong river and the Tonle Sap lake. During the rainy season, particularly from July to November, most parts of the country get flooded. Floods are beneficial for agriculture (among many other benefits) such as land fertilization with fertile sediments and water supply for cultivation. On the other hand, they cause extensive damage annually to irrigation structures in the schemes located in the flood plains. Irrigation systems, whatever the rehabilitation and repair work done to them, are subjected to rapid deterioration. Due to those technically poor constructions and frequent damage, farmers cannot be provided with a better service in most of these irrigation schemes. Institution building in these irrigation schemes is not an easy task under these conditions unless farmers believe that there will be definite improvements of irrigation services, which they can aim to achieve by working together in their own organization.

Existing Legal Framework and Its Adequacy

Our second research question is based on the existing legal framework and its adequacy to support the formation of the FWUCs. As per the details given in chapter 3, it could be seen that the formation of FWUCs had been aptly supported beforehand with the necessary legal framework of policy and

statutes, ministerial circulars to implement them and guidelines on how to implement them together with the required training manuals. Only a few modifications may be required to the present legal framework. Some modifications may be required to clear up a few ambiguities while some may be required based on experience gained in implementing the institution building program.

The legal framework of the FWUCs indicates the formation of one FWUC per one scheme irrespective of their sizes. Farmers may find it very difficult to manage an FWUC built for a larger irrigation scheme with a large number of farmers as a single organization. Article 15 of the given FWUC statutes states that FWUGs can be formed below the FWUC level, depending on the size of the scheme based on the geographical location of farmlands and the boundary of the irrigation systems. They are base-level informal groups. In large irrigation schemes, the membership of such groups may be quite large to function as cohesive groups. Also, they may not have the characteristics of the group concept of irrigators, such as an informal group of self-identified small number of farmers under a common irrigation source who can interact with each other (Uphoff 1988). According to Olson (1968) in his theory of *The Logic of Collective Action* “unless the number of individuals is quite small, or unless there is coercion or some other special device to make individuals act in their common interest, rational self-interested individuals will not act to achieve their common or group interests.”

The legal framework does not provide a specific FWUC structure with the given levels; instead it provides some flexibility for the implementers in deciding the structure based on the size of the irrigation schemes with multi-levels. This is an appropriate feature that could be identified in the legal framework. Particularly, such a given structure cannot be applied similarly in all irrigations schemes in Cambodia due to their different characteristics. However, the existing guidelines given in the legal framework do not give adequate attention to the importance in the formation of base-level groups. Formation of base-level groups for getting the active participation of community members is the widespread and foremost activity in implementing community actions. Similarly, experience elsewhere in participatory irrigation management is the formation of base-level groups as the building block of the formal water user organizations (Esman and Uphoff 1984; Uphoff 1986; Korten 1987). From these, a structure can be organized as large as necessary. One cannot expect the structure to be very strong if its basic units are weak or nonexistent (Uphoff 1988).

In the legal framework, there is no separate secretary for the FWUC. It is stated in the given statutes of the FWUC that the first vice-chairman who is responsible for system maintenance should act as the secretary. His responsibility is to take the minutes of the meetings. The most important position after the chairman in any community organization is the position of the secretary. His responsibilities are much broader than the mere taking of minutes of the meeting reports. The total documentation of the organization (to which no adequate attention is given in the statutes) and correspondence are the main responsibilities of the secretary. Also, he should assist the chairman in implementing all other activities.

According to the legal framework, farmer involvement in PIMD is limited to the scheme level as there is no provision for farmer participation from the local to the national level. Participatory irrigation management does not, and should not, stop at individual scheme level.

Present Level of Functioning of the FWUCs

Our third and fourth research questions are related to the level of functioning of the FWUCs. The present level of functioning of the two irrigation schemes of 5 February and Sne is respectively discussed in detail in chapter 5. In summary, the FWUC formed in the 5 February Irrigation Scheme remains only at a nominal level. The FWUC formed in the Sne Irrigation Scheme was inactive for some time

but was getting effective after the reorganization process that followed. The groups had been reorganized with proper approaches and were emerging as effective village-level bodies. The FWUC still remains to be reorganized. The FWUC was involved in some system management activities.

Among many others, the appropriateness of the process followed in the formation of the FWUC is one of the main underlying factors in the present level of functioning of the FWUCs in the two irrigation schemes. Initially, almost the same process had been followed in the formation of the FWUCs in both irrigation schemes. However, some improvements had been made in the process followed in the Sne Irrigation Scheme based on some experiences gained and they had been effective.

The process followed in the formation of the FWUCs had some strong areas, such as implementing an extensive program in their formulation. The constitutions and bylaws of the FWUCs were formulated in both schemes with adequate discussions with farmers. Also, the strong area in the process followed was the aspect of financial management. As explicit in both irrigation schemes the training provided on financial management had been effective. The reorganization activities of the FWUC implemented in the Sne Irrigation Scheme is another strong area included in the process.

The process followed initially in the formulation of the FWUC was somewhat similar to that of a machine model; if the design is followed with the assembling of interrelated parts it will work (Smith 1989). It is said that sometimes such models work if the environment is stable but not in changing environments as in irrigation where such models do not work. Different approaches and strategies need to be followed in different irrigation schemes depending on their overall physical, socioeconomic and political environments. Also, the institution building should be a continuous process (Uphoff 1986; Ostrom 1992) until farmers are fully capable of taking over system management responsibilities. An effective process provides three characteristics in the formation of farmer water user organizations: strengthening, sustaining and taking over system responsibilities. On the other hand, the process should be flexible to adapt to a changing environment and implemented as a learning process (Korten 1987).

Effective organizational development for irrigation management should focus on both the aspects of organizational management and system management. In most cases, the importance of the development of organizational management capacities, which should come as part of the strengthening of the organization after the initial formation, is overlooked and taken for granted. In the institution building process of both irrigation schemes only financial management had been given adequate attention in organizational management. Developing organizational management capacities may include activities such as leadership development, participatory decision making and conflict resolution, record keeping, communication and coordination, etc. Otherwise, the FWUC formed would remain active only on paper. The staff implementing the PIMD program could not be blamed for this because they had little exposure and experience in institution building and implementing it as a social mobilization program. Even the consultants who prepared the training modules on establishing and developing FWUCs had not paid adequate attention to this area of organizational management. The staff implementing the PIMD program has prepared, within their capacities, an extensive program for formulating the FWUC which is very important, and it is being gradually improved.

The leadership selected initially with the formation of the FWUC in both irrigation schemes was very weak due to the election procedure that followed. Also, many of the leaders elected were not acceptable to farmers. Initially, the farmers and the prospective leaders were not adequately made aware of the required leadership qualities. Also, according to the proportional election procedure followed, there was the possibility of selecting candidates for some positions who were rejected by the majority.

Before selecting the leaders, there should be discussions with farmers and they should be made well aware of the required leadership qualities so that unqualified candidates can be tactfully screened out. Also, common consensus is preferred rather than formal election, as in a formal election some division is created among the members (Esman and Uphoff 1984). Also, the leaders should be selected individually for each position after explaining to the farmers the requirements of each candidate.

A proper election procedure had been followed in the selection of leaders during the reorganizing of the groups in the Sne Irrigation Scheme. Farmers and prospective leaders had been made aware of the required leadership qualities as well as their roles and responsibilities. Farmers had been able to select suitable leaders with the awareness they had of the required leadership qualities.

Making some payments for farmer leaders might have been included to make them more devoted and for achieving better performance such as in the collection of ISF. However, this cannot be considered as a good approach unless the farmers themselves decide on it in due course, depending on the quality of the service the leaders provide. Such prior payment arrangements would make their services not voluntary and hamper the development of proper leadership since they work for money.

The implementing staff of the PIMD program has to face two difficulties in deciding the structure of the FWUC in its formation. First, in most irrigation schemes, due to their system deficiencies it is difficult to identify groups and subgroups based on common irrigation sources. Therefore, the tendency is to form them arbitrarily as seen in the 5 February Irrigation Scheme. Second, they find it difficult because the structure of the FWUC is limited to a maximum of three levels irrespective of the size of the irrigation scheme so that those groups formed at the base level may not have the characteristics of small groups. On the other hand, the formation of the FWUC is almost concentrated to building of the upper level of the formal organization. It makes the base level of the FWUCs weak. Although the village-level groups formed in the Sne Irrigation Scheme provide some firm base they have the characteristics of formal middle-level organizations with a large number of members with formal rules and regulations. Smaller groups may be still needed in implementing system-management activities.

With regard to the involvement in system management, the FWUCs in both irrigation schemes had not still formally taken responsibilities in system management. But the FWUC in the Sne Irrigation Scheme was gradually taking over some responsibilities in system O&M which were implemented before by the Provincial Department of Irrigated Agriculture.

The rate of the collection of fees by the FWUCs in both irrigation schemes was at a better level. However, collection of ISF in 5 February is moreover due to the patron-client relationship between farmers and the Chief of the Commune rather than on better understanding on why the fee was collected. Therefore, as already indicated by the farmers, continued payment of ISF cannot be expected in this irrigation scheme. In contrast, the farmers of the Sne Irrigation Scheme had paid the ISF with a better understanding of why the fee was collected.

Physical Environment

The details of the physical environment and related farmer irrigation behavior of the two irrigation schemes of 5 February and Sne as per the fifth and sixth research questions were presented in chapter 4. Types of irrigation schemes in 5 February and Sne are different to each other. The 5 February Irrigation Scheme had been built during the Polpot period and has system deficiencies such as lack of a proper irrigation system that is typical of those built during this period. The Sne Irrigation Scheme had been built by the French with better technical specifications. Although the two schemes are different to each other in their design systems both have similar problems with respect to existing

physical systems. The existing physical system of the 5 February Irrigation Scheme, apart from its inadequate structures, is that it is dilapidated. The physical system of the Sne Irrigation Scheme is dilapidated with frequent flood damages. In both schemes it is not possible to provide a better service for the majority of its farmers. As mentioned earlier, institution building is difficult unless farmers can be assured of a better irrigation service.

At the main system level, both irrigation schemes have an adequate supply of water. Also, in both schemes the main system level is functional. However, there is no good management at the main system level. Even if water is abundant, bad main system management makes gross inadequacies in water distribution (Chambers 1988). Apart from system deficiencies, the lack of system management in both irrigation schemes has aggravated the existing irrigation problems of farmers.

Below the main system level there are severe disparities in sharing water among farmers in both irrigation schemes. Some farmers have direct access to water, while others have no access at all as structures are not available. Such situations reduce the incentives for farmers to be involved in farmer organizations (FWUCs) because some groups have a surplus and no need for organizations while others see the situation as hopeless (Joshi and Hooja 2000). This situation is further aggravated by the highly individualistic behavior of farmers. There are no joint efforts among farmers to share water. Farmer behavior is characterized with adequate availability of water at the main system level, poor system management and nonavailability of proper controlling systems. The existing individualistic farmer irrigation behavior is unfavorable to have farmer participation in building an effective FWUC in both irrigation schemes.

System repairs in the Sne Irrigation Scheme after annual flood damages require continual group actions. The existing group behavior of farmers to implement these repair works will be contributory to have active farmer participation in an FWUC if they are properly mobilized.

Social and Economic Environment

The social and economic environments of the two irrigation schemes of 5 February and Sne as per the fifth and sixth research questions are described in chapter 4. These two environments are totally different to each other. The 5 February Irrigation Scheme is located in an area considered to be relatively rich. The living standard of farmers in this scheme is better and their income level is high as reflected in their lifestyles. On the other hand, paddy cultivation is not the main livelihood activity of the farmers of this scheme. They derive their incomes from highland cultivation whose income level is higher than from paddy cultivation. The majority of farmers cultivate paddy only for consumption purposes. All the above conditions are not contributory to have active farmer participation in an FWUC unless the FWUC can provide incentives high enough to compensate for the cost of participation (Bryant and White 1986) of farmers, which is not possible with the present efforts.

Since paddy is not the main income-generation activity of most of the farmers in the 5 February Irrigation Scheme they neglect their cultivation after the initial stages of crop growth to engage in other main activities such as upland cultivation. To some extent, they can follow this practice as the traditional paddy variety they cultivate is somewhat tolerant to water scarcity, pest and crop diseases. Also, the farmers' reluctance to pump water to irrigate their fields and letting their crops be affected with water scarcity shows their modest interest in the cultivation of irrigated crops. Getting active participation of farmers in the FWUC is difficult in such cultivation behavior.

The land tenure pattern of the 5 February Irrigation Scheme is somewhat complicated as most of those who are fully involved in highland cultivation have rented out their paddy lands. These different land-tenure arrangements can affect the willingness and ability of the farmers to participate in irrigation system management (Uphoff 1988) although the constitution of the FWUC allows both the landowners and tenants to be members. The tenants with an insecure claim to the land they cultivate are usually less willing to be involved in FWUC and associated irrigation system management.

The farming community in this system is not a cohesive group, particularly because about a quarter of the number of farmers had migrated to this area, some time after the fall of the Polpot regime. This area might be attractive for migrants. Also, there is no evidence to show any experience in collective action among farmers in system-management activities.

The Sne Irrigation Scheme is located in an area considered one of the poorest. The main livelihood activity of the farmers is paddy cultivation. The production cost of the farmers of the Sne Irrigation Scheme is high as they have to bear the cost of agro-chemicals and fertilizer required for the high hybrid paddy variety they cultivate. Yet there is no difference between the average yield of this paddy variety and that of the traditional variety. The only benefit they have in cultivating this paddy variety is the ability to complete their cultivation within a short period of 3 months. Due to the high cost of cultivation the overall farmer income from paddy cultivation is very low.

The production system of the farmers of the Sne Irrigation Scheme exhibits the poverty trap that most of them are in. Due to the informal credit arrangements with the dealers they are compelled to buy probably low-quality inputs at higher prices and inputs less than needed due to high prices. According to the credit arrangements they are compelled to sell the produce to these dealers at a low price. Any remaining produce, if any is sold in small quantities to maintain their subsistence level. The level of poverty of the farming community is reflected in their poor living condition.

The present agriculture-related problems associated with the cultivation practices of farmers in the Sne Irrigation Scheme and the resulting very poor living conditions provide some opportunities for building an effective FWUC. Particularly, these agriculture-related problems and their poor living conditions provide good entry points for institution building.

The farming community of the Sne Irrigation Scheme is homogeneous and cohesive. They are used to be engaged in group work. The farmer participation in social events such as in meetings is at a higher level. Also, there are no land-tenure-related problems in the Sne Irrigation Scheme. These are contributory factors for institution building in the formation of the FWUCs (Meinzen-Dick et al. 2000).

Link between FWUC and Local Administrative Institutions

In this section, it is expected to address the seventh research question which is one of the most contributory factors in the formation of an FWUC. It was found that the FWUCs formed in both irrigation schemes—5 February and Sne—were closely linked in implementing their functions with the local administrative institutions. The very existence of the FWUC formed in the 5 February Irrigation Scheme depended on its link with this local administrative system. The FWUC formed in the Sne Irrigation Scheme was at a functional level mainly because it had been linked and working closely with the local administrative system. Similar links had been identified in two other sample irrigation schemes visited during the study (box 1). In this section, it is expected to further discuss recent changes that have taken place in the local administrative bodies and the appropriateness of linking the FWUCs with them.

Box 1.

Colmatage canals: These canals, which come under one of the different irrigation systems in Cambodia, had been built by the French mainly to protect the national road from annual inundation. They help agricultural development by bringing silt-bearing water into farmlands and backswamps behind natural levees. The four Colmatage canals along National Road No. 1 were rehabilitated in 2000 with funds from JICA. Under the PIMD program one FWUC has been formed for the four canals.

The main reason the FWUC for these canals is weak is that it is built on four canals which are independent, having no link with one another. They are located about 5 kilometers from each other. Any functions of the FWUC totally depend on its chairman who is a commune chief. The FWUC is involved in some limited activities such as coordinating the provision of pumps from MOWRAM to the Colmatage canals during drought.

The Kap Seh Irrigation Scheme. The Kap Seh Irrigation Scheme is a rain-fed irrigated system built during the Polpot period. It is located in the Kampong Chanan province. The total command area under the reservoir is 765 hectares but the actual cultivated area is about 1,200 hectares. This irrigation scheme has an acute water shortage as the command area is very much larger than the reservoir capacity. Only about 70 percent of the total command can be irrigated even if the reservoir is in its full capacity. Also, there are some communal differences among the farmers.

A Farmer Water User Association had been formed earlier during its first rehabilitation program in 1995 and it had functioned at a better level during the project period and has remained at a moderate level afterwards. Later it was reorganized under the PIMD program and the FWUC was formed in 2003. Both the physical and social conditions of the irrigation scheme are not contributory for an effective FWUC. Both the chairman and the first vice-chairman of the FWUC are village chiefs. They try to maintain the FWUC at some functional level by calling regular committee meetings with the recognition they have as the village chiefs and the support they receive from the commune chief.

Recent Changes Made in the Local Administrative System of Cambodia

In Cambodia, the local administration at the commune level had remained largely unchanged since 1979 and the commune authority has become largely an instrument for political control and for mobilization of both forced labor and soldiers. The result was that people tended to associate the commune with state coercion and control rather than as agents for development (Eastmond and Ojendal 2000). In 1996, the Royal Government of Cambodia established a program called *Seila* as a model to strengthen local governance and, in turn, to achieve sustainable poverty alleviation. It is a collective of seven ministries concerned with local development and decentralization of Cambodia managed by a Secretariat. *Seila's* identity can best be summarized as a Cambodian program for

institutional strengthening of local authorities within the context of decentralization and deconcentration strategies adopted by the Royal Government of Cambodia (Ayres 2001).

In February 2002, Cambodia had its first commune elections in four decades under its decentralization reforms. Decentralization in Cambodia has the following three central objectives:

- To promote democracy, good governance and improved quality of life.
- To give ordinary people greater opportunities to determine their future.
- To ensure sustainable development, including the delivery of basic services (Ayres 2001).

In these elections, 1,621 communes in the 21 provinces and 11,261 councilors were elected. These elections were conducted using a proportional system of representation where seats were allocated based on the proportion of votes received by each of the parties contesting the elections. The commune council is headed by the commune chief (annex 6). Committees composed of councilors and other representatives as necessary play an advisory role, helping the council on different issues and subjects. These commune councils are said to be active and performing a wide range of activities of fulfilling administrative tasks, dispute resolution, planning and implementing development projects such as small-scale road and irrigation development, etc. Many programs have been implemented by different agencies mainly those of NGOs promoting decentralization through the commune councils (Mansfield et al. 2004).

Positive Effects of Linking FWUCs with Local Administrative Bodies

Initially Working with Existing Institutions Is a Better Option

The local institutions that are not working are most often related to the introduced institutions. The preexisting institutions, despite many faults, had the advantage of being familiar and of having accumulated some legitimacy, support and commitment over time. Trying to use and work through them or trying to work with and build on the existing institutions is a promising alternative rather than opposing and undermining the existing institutions (Uphoff 1986).

There are good examples of traditional local government institutions involved in handling irrigation management in Indonesia, Mexico and Northern Pakistan. The local government bodies in Spain have been handling irrigation system management for hundreds of years (Uphoff 1986; Joshi 2000). Under certain conditions, such as recognition by all in the villages, the local governments are a feasible local institution for irrigation management.

Trying to work through the local government institutions at the initial stage is a better option in the formation of FWUCs as well because many of those built are very weak and many unfavorable conditions adversely affect the building of effective FWUCs.

Involvement of Local Administrative Bodies Already in Irrigation System Management before the Formation of FWUCs.

Working with the existing local institutions and building on them are more promising where the local institutions or roles are co-opted to work on activities defined and determined from outside (Uphoff 1986). Before the introduction of the PIMD program the communes were responsible for irrigation-related activities in their locality. Both the commune chiefs and village chiefs were involved in at least some maintenance work of the irrigations systems. The village chief, under

the direction of commune chiefs, had organized those works. After the introduction of the Siela program all the local development activities including those related to irrigation are expected to be forwarded as development proposals of the communes. Each commune has a Commune Development Committee to identify and prioritize the village development activities and prepare Commune Development Plans. The Siela program decides the activities to be implemented based on the availability of funds.

Since the communes are already involved in irrigation-development activities and maintenance, particularly after the introduction of the Siela program, it is appropriate to work with them in building FUWCs and implementing other PIMD interventions.

Decentralization Reforms of Local Governments and PIMD Interventions Are Contributory to Each Other

Both the decentralization reforms at local level and participatory irrigation management have been introduced during the same period. Both are based on the same ideals. Decentralization is basically devolution of decision-making powers from the central government to local government institutions in combination with measures aimed at strengthening people's participation in political decision making (Engquist 2003). People's participation in political decision making can be defined as the process whereby people gain influence on decisions that concern their own lives through representative local government institutions. What is embedded in the decentralization process is the idea that people have the right to participate in the decision-making process that has an impact on their own life (Ojendal et al. 2002). Building local institutions (such as FWUCs) itself is a strategy of decentralization to create capacities at several levels (Uphoff 1986).

On the other hand, together with the government, many other organizations started nationwide capacity building of councilors and commune chiefs, such as skill development in good governance, participatory appraisal, planning and implementation, and partnership of the general public, advocacy, and other related subjects (Mansfield et al. 2004). This training is contributory to applying for the PIMD.

Lack of Other Community Organizations and Rural Leadership to Support the FWUCs

It was argued that the Cambodian peasants were not keen on either organizing themselves or being organized (Delvert 1961, cited in Mekong Secretariat 2001) that village and family organizations were weak and that villages were not cohesive units (Thion 1982). In both irrigation schemes it was found that except for Pagoda-associated *Acha* committees for organizing religious activities there were no other village-level organizations. The Achas who are the members of the committee are elderly people who have given up their mundane work and devoted their time to religious activities. Earlier, Achas were considered as traditional leaders of the villages.

With the lack of village organizations there is no avenue for emergence and development of community leaders. This local leadership vacuum is filled by the village chiefs and commune chiefs. The village chiefs are particularly involved in all the day-to-day affairs of the villagers. During the study it was observed that the village chief was a useful village institution.

In the absence of traditional institutions and local leadership the option available in the formation of an FWUC at least for the time being is to get the involvement of those existing leaders such as village chiefs and commune chiefs of the local administration body.

Possible Negative Effects of Linking the FWUC with the Local Administrative Bodies

Possibility of Not Developing Independent Water User Organizations

The close link and affiliation with the local administrative body may prohibit the development of FWUCs as independent water user organizations in the long run due to the dependency gradually developed by them on the local administrative body. Initially, it may be useful to have such a link particularly with the lack of local leadership. Since the chiefs of both the village and the commune are involved in the day-to-day affairs of the people and they have some local-level political power their actions and decisions usually go unchallenged.

The relation between farmers and the village chief, and between the village chief and the commune chiefs is like that of the patron-client. For reasons that are not clear, the village chiefs are not included in the commune councils in the decentralization reforms. Under the commune council law of 2001 the village chiefs are expected to be appointed by the commune chiefs to carry out their instructions at the village level. The village chief is not a representative of villagers. The farmers may have selected them for the FWUC because of the lack of other local leadership, because of their power relations and because their services were necessary in their day-to-day activities. In his study, Engquist (2003) found that council members had a reasonable knowledge of the purpose of decentralization but some still held the same attitude that their role was to control the people. Under these situations it may be difficult for those FWUCs linked with the local administrative bodies to develop themselves as independent bodies.

Possibility of Not Developing Local Leadership for Irrigation Management

Although some village chiefs had been nominated by commune chiefs they may have developed leadership qualities with the acceptance they gained among the villagers. However, their leadership styles may not match the participatory ideals of PIMD. Also, in the long run the FWUCs may need their own leadership. Since the village chiefs are involved in the day-to-day affairs of the people including those related to irrigation, and due to their power relations with upper levels, there is not much possibility of development of other leadership qualities such as for water management. At present, the development of other leadership qualities is barred by the position of the village chief.

Possibility of Political Infiltration into the FWUC

The local government institutions are political bodies. The commune and village chiefs had been initially appointed by the ruling party. Most of them still hold their positions even after the commune council elections. Since the village chiefs are now being directly appointed by the commune chief from among his close associates their allegiance to the commune chief is very high. The possibility of political infiltration into the FWUCs is high if these become powerful local organizations particularly in the irrigation schemes like 5 February where the political divisions are intense.

Chapter 7

Conclusions and Recommendations

1. Introducing participatory management in Cambodia is greatly inhibited under the existing irrigation systems most of which had been built without proper technical specifications that prohibit the provision of better services to the farmers. Due to their nontechnical nature, particularly many of those built during the Polpot period, they have little or no chance of providing proper irrigation services to the farmers. Although this is a factor that inhibits the functional operation of FWUCs, on the other hand, if the facilities are poor, this fact can be used as a basis for institution building if the farmers can be assured of some better services. In Cambodia, it can be recommended to use the poor services as a basis for institution building mixing it with proper system modernization and rehabilitation. System rehabilitation is already incorporated into the PIMD program. However, the systems have to be modernized with new designs which can also withstand annual flood damages. In this respect, there is a significant need for technical expertise for improving and modernizing the irrigation schemes, an area that needs to be addressed in the PIMD program.
2. Formation of FWUCs has been adequately supported with the necessary legal framework of policy and statutes, ministerial circulars to implement them, and guidance on how to implement them together with the use of the required training manuals. Only some modifications and revisions may be required, based on the experience gained in implementing the PIMD program. One aspect that needs some consideration for modification in the legal framework is the conception of building one FWUC representing the scheme irrespective of its size. The other area that needs some modification is in the formation of groups. The groups formed in the FWUCs now are similar to those of the middle-level organizations. Therefore, as suggested by Uphoff (1986) a multilayer organizational structure should be recommended for larger systems, starting from base-level small groups. Different models may be tested depending on the size and type of the irrigation systems. It should be noted here that such flexibility is possible in the given legal framework. The training manuals state that the whole PIMD program should be implemented with flexibility as a learning process. Already, such changes have been made by the PIMD staff as seen in the structure of the FWUCs introduced in some irrigation schemes with three levels. These changes need to be further expanded down to the lower-level watercourses. Above the FWUC level there should be a mechanism to link the FWUCs to the national level.
3. It is suggested that the leadership of base-level small groups formed at lower-level watercourses should be limited to one position of a group leader. The formal leadership positions as of FWUCs are not required at this level since the tasks to be performed are small and simple. Also, it is suggested that the leadership roles should be revised such as those of a secretary to facilitate better functioning of the FWUCs.
4. The present institution building process in implementing the PIMD program is strong in the aspect of formation of the FWUCs. But the other three aspects that should be included in an effective institution building process of strengthening, sustaining and taking over system management responsibilities are not very strong in the process of the building of FWUCs.

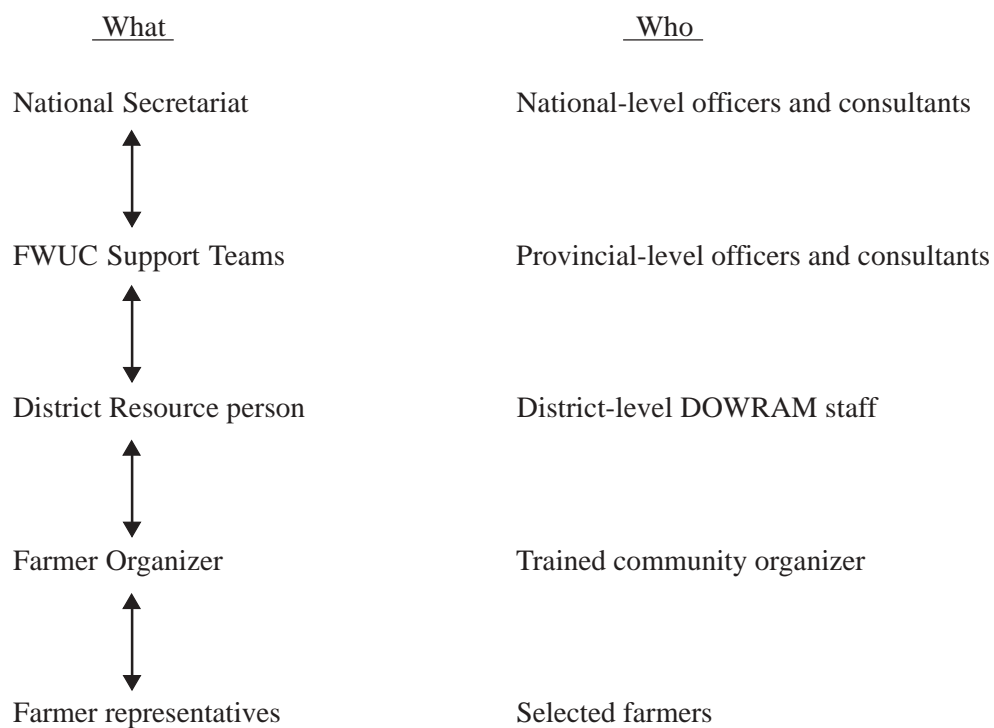
Particularly the initial formation of the FWUCs should be followed by a strengthening program and the implementation of the other two aspects of sustaining and taking over system management responsibilities, which are almost dependent on how effectively the FWUCs have been strengthened. The strengthening of the FWUCs is mainly based on developing organizational management capacities. Therefore, it is recommended to include in the institution building process of the FWUCs the activities for capacity building of farmer leaders and farmers in organizational management. The necessary subject areas to be included in the strengthening the FWUCs in organizational management are leadership development, participatory decision making and conflict resolution, proper conduct of meetings, record keeping, resource mobilization, communication and coordination.

5. Leadership is a crucial area and a significant factor in the effective functioning of the FWUCs. The FWUCs are beset with many leadership problems due to lack of village-level community leaders, and some weaknesses in the selection procedure followed. Before the selection of the leaders farmers should be made well aware of the required leadership qualities. It could be seen that, later, the PIMD staff had followed some better methodologies in the selection of farmer leaders, such as explaining to farmers the expected leadership qualities and their roles before selecting the leaders. Yet, the same preferential election procedure is being followed. It is recommended, therefore, that farmer leaders should be selected after giving them a detailed description of the roles of each position before selecting them individually for each position. This would help select the more acceptable and suitable leaders for each position. As far as possible, leaders should be selected with common consensus to avoid any possible division among the farmers. After the selection of leaders it is strongly recommended to provide them proper training in leadership development to suit the requirements of participatory management.
6. Making payments for farmer leaders cannot be considered as a good strategy unless such remunerations are decided by the farmers themselves depending on the quality and workload of their services. Therefore, it is recommended to develop leadership qualities rather than making payments for getting the active involvement of farmer leaders.
7. Institution building under the PIMD program is predominantly the responsibility of the PIMD staff. However, their main responsibility is providing training for farmers and field-level officials of the PDOWRAM. Since their time is limited for full involvement, and due to the lack of adequate resources to get the service of social mobilizers the field-level officials are supposed to assist actively in institution building and other PIMD-related activities. But such involvement could not be seen in either of the schemes where the study was conducted. Any progress in the formation of the FWUC almost rests on the efforts of the PIMD staff. Therefore, it is recommended to have more involvement of the field-level officials similar to those catalytic roles. Beforehand, they should be provided with some training on catalytic involvement. The main responsibility of these officials should be motivating and mobilizing farmers. Meantime, problems should be immediately identified and farmers assisted in solving them. Also they should identify potential leaders among farmers and gradually develop their skills. However, the best option is to get the involvement of carefully selected and trained institutional organizers to organize the farmers.

8. The physical environments of both systems are similar. At the system level, there is no water shortage in both irrigation schemes. In spite of water adequacy at the main system level there are severe irrigation problems at the field level due to lack of proper system management both at the main system and below, and due to system deficiencies and farmer behavior. Proper system management at both the main system and field level and some physical improvements are required for farmers to get some fair share of water. Changing the farmers' irrigation behavior is a matter of changing their attitudes and behavior through training and proper mobilization. One major incentive for farmers to participate in FWUCs is efficient and reliable water delivery.
9. There are differences in the socioeconomic environments between the two irrigation schemes. In one irrigation scheme almost all the physical, socioeconomic and political factors and even the cultivation practices are not contributory to the formation of the FWUC. On the other hand, most of the socioeconomic factors are contributory to the formation of the FWUC in the other irrigation scheme. The formation of an FWUC under such unfavorable conditions in the first irrigation scheme is a highly challenging task. In such conditions it can be recommended to have extensive farmer mobilization programs with the close involvement of the field-level officials. Frequent dialogues are required with farmers and their views should be properly considered. Meantime, it is necessary to identify the incentives for farmer participation in the FWUCs. Increasing the agricultural productivity is one of the options available as an incentive.
10. The links and affiliations with the local administrative institutions constitute one of the most contributory factors for the present functioning of the FWUC in both systems. Local administrative institutions had been involved in irrigation-system management-related work before the formation of the FWUC. A decentralization process is taking place in local administrative institutions similar to the ideals of the PIMD program. There are no local leadership and other institutions to be involved in, and support of, the FWUC. Therefore, working with and building through the local administrative institutions are a better option available for the FWUC at least in the short run. In the long run, there is the possibility of having political interference in, and influence on, FWUCs, particularly those built in irrigation schemes where the political divisions among farmers are high. Therefore, it is necessary to develop the FWUCs as independent water management organizations in the long run. It is recommended to identify and develop proper leadership as the first step to be taken in building the FWUCs as independent organizations.

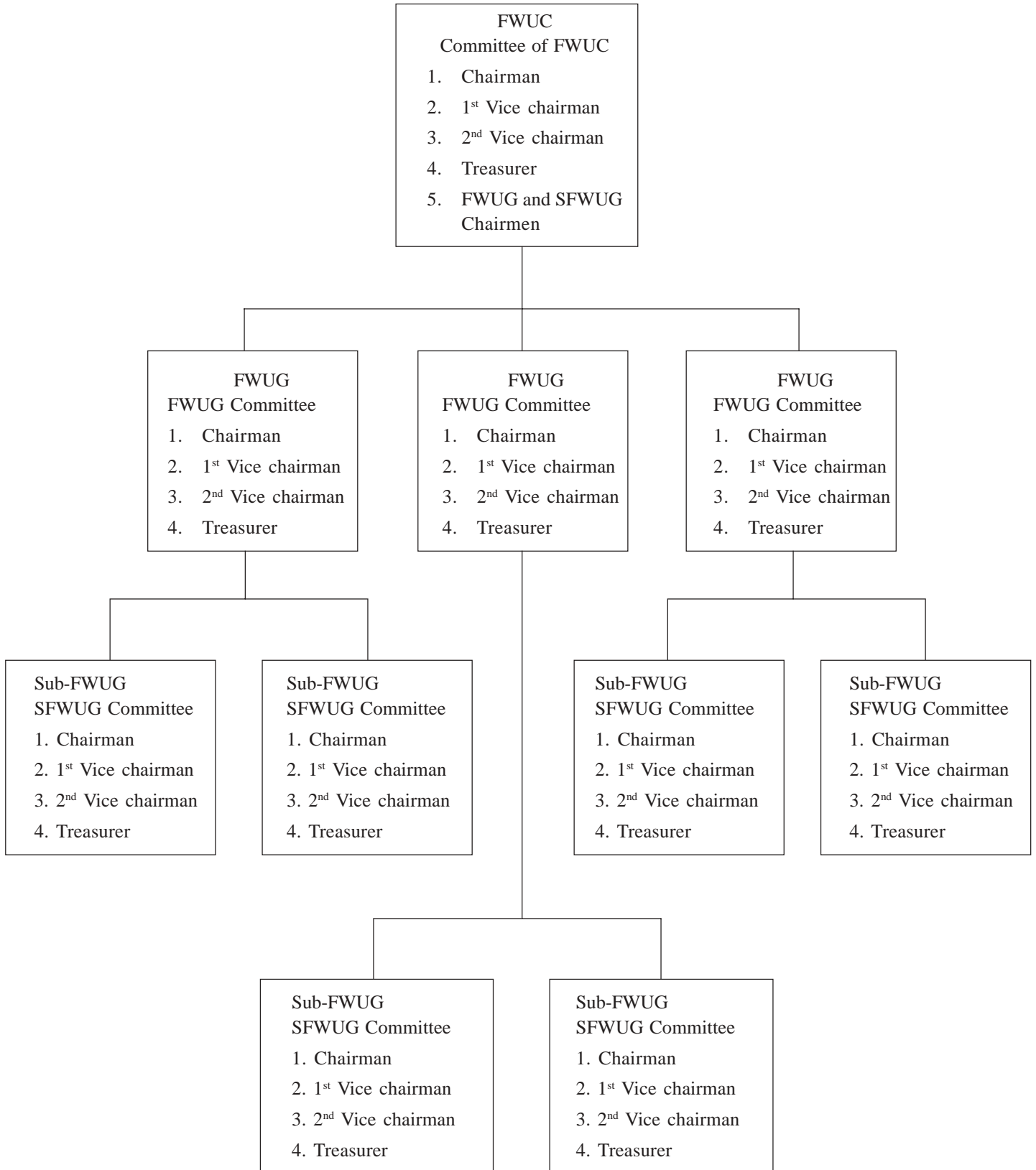
ANNEX 1

The National Structure for PIMD



ANNEX 2

Organizational Structure of the FWUC



ANNEX 3

Table 1. Area of crops cultivated in each province in the year 2002.

Provinces	Paddy		Maize		Cassava		Peanut		Soyabean		vegetable		Mung		
	Area	%	Yield	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%
1 BanteayMean Chey	187,014	8%	1.7	7,804	8%	357	1%	110	1%	2,700	5%	1,015	3%	7,055	21%
2 Battambang	224,268	10%	2.1	44,173	47%	1,230	5%	2,957	20%	12,549	24%	2,182	6%	5,964	18%
3 Kampong Cham	207,157	9%	2.4	7,540	8%	13,098	51%	4,513	31%	28,898	55%	6,036	16%	8,997	27%
4 Kampong Chhnang	110,219	5%	1.7	1,340	1%	460	2%	333	2%		0%	2,903	8%	260	1%
5 Kampong Speu	95,436	4%	1.9	903	1%	3,392	13%	503	3%		0%	1,686	5%	1,068	3%
6 Kampong Thom	128,637	6%	1.4	985	1%	1,343	5%	422	3%	2,573	5%	2,599	7%	1,356	4%
7 Kampot	124,031	5%	2.3	2,014	2%	812	3%	611	4%		0%	3,100	8%	1,653	5%
8 Kandal	96,210	4%	3.3	14,044	15%	249	1%	1,152	8%		0%	4,824	13%	642	2%
9 Koh Kong	8,003	0%	1.6	538	1%	165	1%		0%		0%	153	0%	8	0%
10 Kratie	35,546	2%	2.9	1,328	1%	187	1%	265	2%	181	0%	1,113	3%	189	1%
11 Mondulkiri	13,454	1%	1.9	265	0%	305	1%	171	1%	136	0%	273	1%	272	1%
12 Phnom Penh	7,930	0%	2.7	387	0%	60	0%	6	0%		0%	979	3%	9	0%
13 Preah Vihear	22,105	1%	1.9	753	1%	118	0%	1,298	9%	946	2%	205	1%	640	2%
14 Prey Veng	295,311	13%	2.2	1,842	2%	119	0%	728	5%		0%	804	2%	469	1%
15 Pursat	75,694	3%	1.8	482	1%	332	1%	222	2%	2	0%	590	2%	221	1%
16 Ratanakiri	22,335	1%	2.1	567	1%	380	1%	483	3%	1,374	3%	278	1%	461	1%
17 Siem Reap	184,773	8%	1.3	1,645	2%	1,045	4%	17	0%		0%	3,110	8%	2,145	6%
18 Preah Sihanouk Town	10,681	0%	2.7	76	0%	114	0%		0%		0%	242	1%		0%
19 Stung Town	20,450	1%	2	784	1%	342	1%	282	2%		0%	755	2%	471	1%
20 Svay Rieng	173,291	7%	1.8	34	0%	560	2%	13	0%		0%	759	2%		0%
21 Takeo	234,025	10%	2.6	668	1%	690	3%	159	1%		0%	1,854	5%	412	1%
22 Oddar Mean Chey	35,910	2%	1.6	191	0%	225	1%	86	1%	12	0%	796	2%	294	1%
23 Kep Town	2,910	0%	2.5	386	0%	142	1%	96	1%		0%	778	2%		0%
24 Pailin Town	463	0%	2.7	4,613	5%	15	0%	136	1%	3,467	0%	56	0%	424	1%
	2,315,853		2.1	93,362		25,740		14,563		52,838		37,090		33,010	

ANNEX 4

Process followed in the formation of FWUC in the 5 February Irrigation Scheme

Steps	Activities	No. of days	Level
1	<ol style="list-style-type: none"> 1. Providing training on FWUC for the farmers 2. Identifying the problems, constraints and solutions within the farmer water users in the irrigation system 3. Training the farmers on FWUC 4. Deciding on irrigation system area 5. Electing the Farmer Organizers (FOs) among farmer water users 6. Training of FOs 	2 days	Scheme level
2	<ol style="list-style-type: none"> 7. Meeting with District-Level officers to decide on: <ol style="list-style-type: none"> 1. Total cultivated and irrigated areas 2. Land titles and landownership 3. Determination of irrigation boundary 4. Mapping the scheme 5. Data on Farmer Water Users 8. Being aware of farmers on FWUC (household visits) 	3 days	District level
3	<ol style="list-style-type: none"> 9. Meeting with FOs to explain and decide the procedure to organize the FWUC Committee based on the irrigation layout 10. Election process and selection of FWUC Committee 11. Training of the FWUC Committee on the National Policy on PIMD, FWUC and FWUC Committee 12. Meeting with FOs and Farmer Water Users to elect the committee to draft the constitution and bylaws (3 persons) 13. Select the core FO (1 person) 14. Meeting with the FWUC committee and draft committee to discuss the preparation of the draft constitution and bylaws 15. Drafting the constitution and bylaws 16. Meeting with the FWUC Committee to discuss irrigation problems and modernization of the irrigation system 17. Preparing TOR for core FO, FWUC, FWUC committee and draft committee 	3 days	Scheme level
4.	<ol style="list-style-type: none"> 18. Discussing the Draft Constitution and bylaws with local authorities and FWUC Committee 19. Reviewing Draft Constitution with FWUC, Core FOs and Draft Committee 20. Holding discussion with FWUC committee on rehabilitating the irrigation system 21. Preparing work plan for 5 years for formulated FWUC 	2 days	Scheme level

5	22. Reviewing and improving the draft constitution and bylaws with local authorities and the FWUC 23. Reviewing and finalizing the 5 year work plan 24. Training on internal administrative and financial management of the FWUC to the provincial staff, members of FWUC and the FWUC committee 25. Final review and improvement of the draft Constitution and bylaws with the local authority and the FWUC committee 26. Discussing the water fee	2 days	Province level
6	27. Getting the signature to the FWUC Constitution and bylaws from district and provincial authorities 28. Continuing the training the provincial staff, members of FWUC committee and members of the FWUC on internal administrative and financial management of the FWUC 29. Finalizing the 5-year work plan 30. Deciding the water fee	3 days	Province level
7	31. Reviewing the formulated Constitution and bylaws with a sample of 30 FWUC members 32. Training the members of FWUC on PIMD	2 day	Scheme level
8	33. Providing training for FWUC members (committee) and Provincial Working Group on: 1. System operation 2. Cropping patterns and cropping calendar 3. Collection and recording of flow data	2 days	Scheme level
	34. Providing training for FWUC members (committee) and Provincial Working Group on: 1. Training Module 5 on development of FWUCs 2. Continuing the training on water deliveries - Wet season - Dry season	2 days	Scheme level
	35. Promoting the fee collection as per Article No. 24 of the Constitution and bylaws: 1. Providing training on Article No. 24 to FWUC committee and FWUC members on the need for collecting irrigation service fee 2. House-to-house visit by members of the FWUC committee and Working Group to make farmers aware of the need of PIMD and collecting fee		
	36. Concluding Forum for: 1. Final verification of irrigated area 2. Progress of irrigation service fee collection 3. Walk-through in rehabilitated areas	3 days	Scheme level

ANNEX 5

Process followed in the formation of FWUC in the Sne Irrigation Scheme

Steps	Activities	Time Needs	Level
1	<ol style="list-style-type: none"> 1. Conducting training on FWUC for the farmers. 2. Identifying problems, constraints and solutions within the farmer water users in the Sne Irrigation Scheme 3. Training farmers on FWUC formulation 4. Selecting the farmer organizers (FOs) 5. Training the FOs 	2 days	Scheme level
2	<ol style="list-style-type: none"> 6. Meeting with district-level officers to collect information and decide on: <ol style="list-style-type: none"> 1. Total cultivated and irrigated area 2. Land titles and ownership 3. Irrigation boundary 4. Mapping the scheme 5. Data on farmer water users 7. Training the farmers on the FWUC constitution (house-field visit) 	3 days	District level
3	<ol style="list-style-type: none"> 8. Meeting with FOs to explain and decide the procedure to organize the FWUC Committee based on the irrigation layout 9. Election process and selection of the FWUC Committee 10. Training on National Policy of PIMD, FWUC for FWUC Committee 11. Meeting with FOs and Farmer Water Users to elect the draft committee of constitution and bylaws (3 persons) 12. Selecting the core FO (1 person) 13. Meeting with FWUC Committee and Draft Committee to discuss the preparation of Constitution and bylaws to draft the Constitution and bylaws 14. Meeting with the FWUC Committee to discuss the irrigation problems and modernization 15. Preparing the TOR of the Core FO, FWUC and Draft committee 	3 days	Scheme level
4	<ol style="list-style-type: none"> 16. Meeting to discuss the draft Constitution with local authorities, FWUC Committee, Core FO, Draft Committee 17. Reviewing the Draft Constitution and bylaws with local authorities, FWUC Committee and the draft committee 18. Discussing with FWUC members on rehabilitating the irrigation system 19. Preparing work plan for 5 years for the formulated FWUC 	2 days	Scheme level

5	20. Reviewing and improving the draft Constitution and bylaws with local authorities (DOWRAM) and the FWUC committee 21. Reviewing the 5-year work plan with local authorities (DOWRAM) and the FWUC committee 22. Training on administration and financial management of the FWUC to members of the FWUC committee and waters users 23. Preparing the FWUC Constitution and bylaws for signature of local (DOWRAM) and provincial level (PDOWRAM) 24. Discussing and deciding on the collection of the water fee	2 days	Provincial and district level Scheme level
6	25. Final review for any improvement of the draft Constitution and bylaws with the local authority and the FWUC committee 26. Continuing training on administration and financial management of FWUC to the provincial staff and members of the FWUC committee 27. Training on PIMD for the provincial staff and the FWUC committee 28. Reviewing and finalizing the 5-year work plan 29. Re-correcting of the Constitution and bylaws 30. Data collecting on farmers and irrigated area	3 days	Provincial and district level Scheme level
7	31. Reviewing the formulated Constitution and bylaws with samples of 30 families of the FWUC members 32. Training the members of the FWUC on PIMD 33. Discussing the application of the constitution and bylaws	2 day	Scheme level
8	34. Submitting the constitution and bylaws to MOWRAM for getting official registration of the FWUC 35. Getting official registration 36. Training on PIMD for Provincial Working Group, FWUC committee and members of the FWUC 1. Implementation of PIMD 2. Duties and responsibilities of the FWUC committee 3. Operation and maintenance 37. Training of Provincial Working Group and the FWUC committee and members of the FWUC on: 1. Crop water requirement 2. Gate and canal operation 3. Water distribution scheduling and delivery 38. Training of Provincial Working Group, the FWUC committee and members of the FWUC on: 1. Monitoring and evaluation 2. Gate operation 3. Flow data collection and recording 39. Training of Provincial Working Group and FWUC committee and members of FWUC on: 1. Gate Operation 2. Deciding cropping pattern and cropping calendar 3. Data collection and recording	14 days 2 days 2 days 2 days 2 days	At: -MOWRAM HQ Scheme level Scheme level Scheme level At the scheme level of the Sne Irrigation Scheme Scheme level

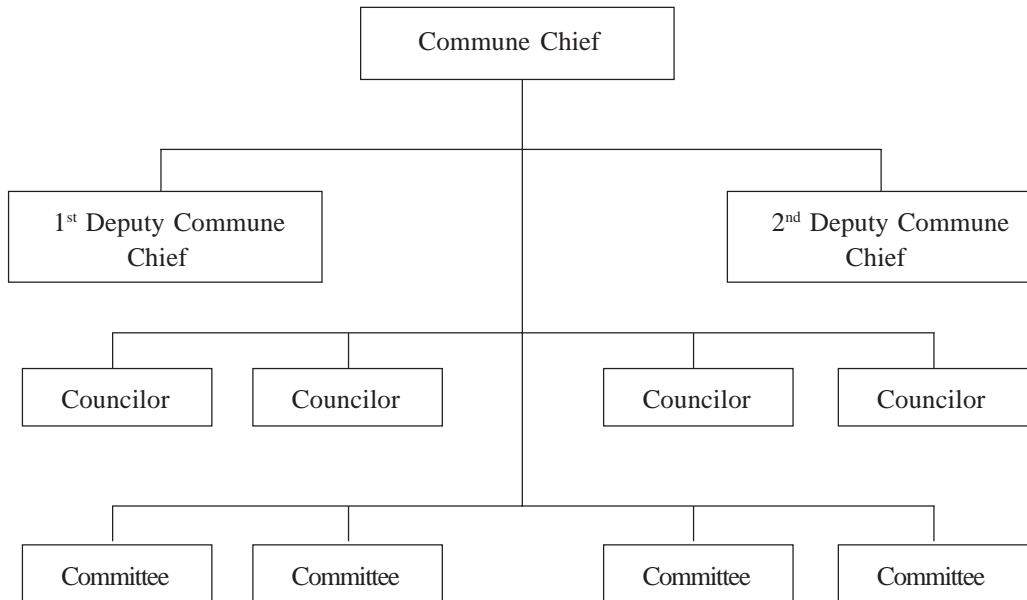
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ANNEX 5—Continued

40. Training of Provincial Working Group, FWUC committee and members of FWUC on:		
1. Module 5 of formation and establishing the FWUC		
2. Data collecting and recording of:		
- Wet season (calculating irrigable area and quantity of water)		
- Dry season (calculating irrigable area and quantity of water)		
41. Training of Provincial Working Group, FWUC committee and members of FWUC on article No24 (on collecting ISF) of constitution and bylaws:	2 days	Scheme level
1. Paying of the ISF for sustaining their own irrigation systems		
2. Preparing a plan for developing the irrigation system with ISF		
42. House to house visit by FWUC committee and local authorities to make aware on PIMD and need for collecting ISF and collecting ISF		
43. Concluding Forum to record on:		
1. Total collection of Irrigation Service Fee		
2. Record on who paid ISF	3 days	Scheme level
3. Verification of actual cultivated areas		
4. Making a walk-through		
44. Re-selecting the chairmen and vice-chairmen of committee		
1. Meeting and selecting suitable candidates		
2. Selecting new chairmen and vice-chairmen	2 days	Scheme level
3. Drafting TOR for new chairmen and vice-chairmen		
4. Preparing commitment letter for newly selected chairmen and vice-chairmen		

ANNEX 6

Structure of Commune Council



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