

The Principles of Participation
for Sustainable Irrigation Management

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for Sustainable Irrigation Management

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ABSTRACT

The Thai government has invested substantially in the irrigation sector and irrigation areas under national projects increased to 5.12 million hectares at the end 2006. The rate of irrigation area increase reached a peak of 53% in the Third Plan before diminishing to less than 2% under the Ninth Plan. Rather than the increase in the area, emphasis is now placed on the increase in productivity through sustainable irrigation management. Along this line, the 8-10th Plans and the on-going administrative reform recognized farmers' participation in irrigation management as indispensable because irrigation by open channel method to serve a large number of small farms is hard to operate solely by bureaucrats. Without their participation, reliable water supply cannot be provided to all farms, leading to inability to realize the expected project returns, and early deterioration or damage of irrigation facilities that the government has invested. Efforts have been made to promote participation in national irrigation management but they seem to have been running into perpetual problems. Thailand is not the only country that is facing these problems and there have been searches for ways across the world to promote participation for sustainable irrigation management.

The purposes of the study were (1) to analyze the situations of farmers' participation in national irrigation management in Thailand and clarify practical problems from the project initiation stage down to the on-farm management stage; (2) to identify the fundamental problem of participation, and scope for solutions; and (3) to generalize the principles of participation for sustainable irrigation management. The methodology of the study relied mainly on empirical data but also made use of background knowledge in irrigation management applied science and five major groups of theories including the Social and Cultural Changes Theories, the Multi-Disciplinary Approach, the Institutionalisms, the Social Organization Theories and the Development Program Management Theories. The empirical data were juxtaposed from five study cases. Two of these cases were the Mae Kuang and Thadi national irrigation projects and the others were the Pongsak and Soprong self-reliant Muang Fai irrigation systems and the autonomous Manno-ike Japanese land improvement district. The methods used in the obtaining the data included documentary reviews, field surveys and observations, questionnaires, farmers' meetings, focus group interviews, and participatory action research.

The results of the study revealed that national irrigation project processes from the initiation stage, to planning, designing, construction, operation, maintenance, repair and improvement stages were heavily centralized. In the planning and designing stages, the newly introduced large scale irrigation systems did not physically and socially integrate well with the local conditions and existing irrigation systems. Construction was then implemented with no commitment on users and bureaucrats to maximize returns of the public investment. Without adequate social integration in the previous stages, operation was largely decided and implemented by state bureaucrats whose attempts to organize the irrigation water users to follow their operation plans engaged a slow and digressive progress.

Maintenance and repair depended largely on the state budget allocation which was not enough to keep the system well-maintained. Bureaucrats and upstream farmers preferred adding or modifying physical irrigation facilities whenever public funds were available while downstream farmers saw the necessity of improving irrigation management. When the main system was being developed, on-farm irrigation development and management was left to the farmers unknowingly and the belated attempt to organize them to extend the system down to the on-farm level was confronted with the problems of the in-place hydraulic bias, gap of agricultural development in irrigation area, and agricultural land management. Attempts to support them with scattered on-farm facilities by using limited public funds were but to enlarge the bias and gap.

In contrast, Muang Fai members were involved in all irrigation management processes. Despite their lower technology when compared with that of the national irrigation systems, they could sustainably serve all their members who were willing to accept higher costs than beneficiaries of the national irrigation systems. All decisions on what and how to do things together were clearly laid out through exchange of local information and were strictly followed. The management structure of the small scale system was straightforward, using farm intake sizes as the priority criteria for all joint management matters. That of the larger scale system was in-laid with extended mechanisms for joint planning and operation, accountability check and balance, and social sanction instruments through association with local administrators. The commonality of the small and large scale systems is the observance of the equality of their members and their management agreements, and the emphasis on efforts to make all the irrigation management processes transparent to all members. Their management terminologies were simple and well-understood by members. The Japanese land improvement district case drew parallels in these aspects even though their autonomous management was partially supported by the public investment and technical assistance.

The fundamental problem in sustaining participation for irrigation management was the improper approach in identifying the beneficiaries of national projects. The top-down approach assumed that all farmers in the project plan were beneficiaries but the bureaucratically decided water management plans could not bring water to all of them. As a result, the public investment could not fully generate the targeted benefits. A participation framework is urgently needed for the proper identification of beneficiaries of public projects as well as for joint irrigation management. Despite its civil and hydraulic engineering expertise, the state irrigation agency which is far removed from the local life could not perform the role as the sole core in every aspect. The social dimensions begged for an increased role of the farmers, and local organizations, such as villages or *tambon* administration organizations, despite their presently limited cognitive capacity, so that diverse sociological attributes of small farmers for irrigation management are synergized to embrace effective irrigation management and to integrate the irrigation sector with agricultural production and natural resources management for their livelihood. The oversight role of the state irrigation agency should be to confirm the technical soundness of public projects and to ensure that truly effective joint operational

mechanisms are in place before public investment is made. The mechanisms should comprise those for consolidating field information for system-level operation planning, and those for obtaining the farmers' agreement on the plan and sanctioning.

Based on the fundamental problem of project beneficiary identification, the principles of equality and transparency are generalized as the foundation of participation for sustainable irrigation management. Equality in distributing benefits and costs of irrigation management will make farmers confident in increasing their formal participation. The bases of equality of benefits can take various forms depending on geographical and social conditions, the technologies in use and project scales, such as farm intake size, water volume, farm acreage, and household. The forms of costs can also be various such as fee, local tax, labor, equipment, and construction materials. These bases are subject to the agreements among the farmers who make joint decisions on irrigation management. The principle of equality needs the principle of transparency to assure the farmers that the equality principle is being really applied. Transparency of information on water demand and supply and organizational management will maintain participation for sustainable irrigation management.

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CHAPTER 1

INTRODUCTION

Rationale of the Study

The world modern irrigation development era started in 1940s and contributed substantially to the stability of food production to meet the demand of the increased world population. From then, the world irrigation area has tripled from 94 million hectares in 1950 to 276 million hectares in 2000 (Brown, 1999 and FAOSTAT, 2000). While the first modern irrigation structure of Thailand was built under the Pasaktai Project in 1914, the main modern irrigation development era has not started until 1960s, initially with supports from international organizations. Since then irrigation areas under national irrigation projects have expanded from approximately 1.38 million hectares during the First National Economic and Social Development Plan (1963-1966) to approximately 5.12 million hectares at the end of the Ninth Plan (2002-2006) (MOAC, 2006). The rate of irrigation area expansion reached a peak of 53.22% during the Third Plan and diminished continuously to 1.43% during the Ninth Plan as shown in Table 1-1. Presently, irrigation areas under national large and medium scale projects cover more than 20% of farmland in the country. The coverage increases to approximately 50% of the farmland, when small scale projects which are transferred to local governments are included. The coverage could be larger if the statistics of irrigation areas under people's irrigation systems were available. Irrigation has been important infrastructure for the social and economic stability of the country that has transformed itself from a subsistence farming country into one of the world's largest exporters of agricultural produce. With the diminishing rate of irrigation area expansion, the present missions are how to increase the productivity of irrigation and how to maintain the irrigation areas that have been developed.

Irrigation management is an applied science that has a complex nature, involving many kinds of conditioning field factors and relating to people of diverse background, capacity and constraints. To increase the irrigation productivity, not only agricultural and irrigation technology and skills have to be improved, participation of diverse people who are related through their being under the same irrigation system is indispensable. The importance of the social dimensions of development work has been internationally recognized at the Earth Summit 1992 where the necessity of balanced or sustainable development was raised. It has been accepted that the sole accent on the use of sophisticated technology without adequate consideration to the social and environmental contexts cannot make the development, irrigation included, economically, socially and environmentally sustainable. However, it is still widely admitted that it is a big challenge to integrate knowledge across disciplines to find solutions to the remaining theoretical and practical problems (Serageldin, 1993). Only high technology that creates sophisticated and sturdy irrigation structures which can be

Table 1-1: Irrigation Areas During the 1st-9th National Development Plans

National Plans Areas	1st Plan (1963-1966)	2nd Plan (1967-1971)	3rd Plan (1972-1976)	4th Plan (1977-1981)	5th Plan (1982-1986)	6th Plan (1987-1991)	7th Plan (1992-1996)	8th Plan (1997-2001)	9th Plan (2002-2006)
Irrigation Area (million ha.)	1.38	1.56	2.40	3.11	3.91	4.35	4.71	5.05	5.12
Irrigation Area Increase between Plans (million ha.)		0.18	0.83	0.71	0.81	0.44	0.36	0.34	0.07
Percentage of Irrigation Area Increase between Plans	0	13.34	53.22	29.66	25.97	11.17	8.39	7.16	1.43

Source: Ministry of Agriculture and Cooperatives, 200

a good foundation for efficient water management cannot guarantee an effective water distribution and infrastructure maintenance, and solution to social problems (Surarerks, 1986 and Depeweg, 1999) because managing agricultural water is highly complex and influenced by high variations in time and space conditions and in human behaviors which are stimulated by diverse motivations. Even though the state irrigation agency has a mandate to oversee irrigation management all over the country, it will not be successful if it lacks mechanisms to obtain and analyze the actual time and space information accurately and to co-work with related people to devise an efficient and acceptable method for allocating irrigation water that is limited in its availability due to the limitedness of the natural endowment or the capacity of irrigation facilities.

In a country where the open-channel gravity irrigation is the main type of systems constructed to support the agricultural production of a large number of small farmers like Thailand, participation of farmers in irrigation management is even more necessary because water contracts, either by the state irrigation agency or a concessionaire company, cannot be easily implemented like in the countries where pipe irrigation system is used, or the number of large farms is relatively small. The early versions of Thailand's irrigation laws have recognized this fact and stressed the importance of organizing farmers to participate in irrigation management, a task that has been somewhat overlooked until recently. The Eighth Plan (1997-2001) revived the attention to the social dimensions of development and the Ninth Plan (2002-2006) which was spurred by the Constitution of 1997 that came into being through extensive popular movements expressly emphasized the policy of people's participation in development work. The 10th Plan (2006-2010) has continued the spirit and squarely set it as the national goal to improve the water management efficiency of the country.

Most of irrigation systems in Thailand are sponsored by the state. They are planned based on the hypothetical water demand in the beneficiary areas of irrigation projects. In the actual irrigation water management practices, particularly in irrigation scheduling, actual data on cropping status are needed but require high costs in making them precise over a large space and over a long period of time. With a small number of personnel and low information technology, state bureaucrats have been struggling to find ways to deliver water in a reliable quantity and time, preferably through the simplest operating procedure, to avoid conflicts among farmers, especially those in different spatial locations, and between the farmers and the bureaucrats themselves. However, their efforts are still hitting several impediments, leaving room to shore up national investment returns to its planned target. The actually irrigated area as against the planned areas, and the actual cropping intensity as against the planned intensity have become matters of concern.

For decades efforts have been made to improve the situation by soliciting for farmers' cooperation in irrigation management. However, such efforts seem to be running into various practical problems, particularly in establishing and sustaining water users' organizations to perform joint management with the state

bureaucrats. The chronic problem points to the possibility that there must be some practical and/or fundamental problems in seeking farmer's participation in irrigation management. Thus, there is a need to scrutinize the conventional practices in national irrigation projects from the planning stage down to the on-farm management stage to understand the practical problems and fundamental problems and form a basis for identifying the underlying principles in solving them.

Purposes of the Study

The study has the following purposes:

- To analyze the situations and practical problems of participation in national irrigation management from the project initiation stage down to the on-farm management stage,
- To identify the fundamental problem of participation in national irrigation management and scope for solutions, and
- To generalize the principles of participation for sustainable irrigation management.

Research Methodology

Basically, this study followed the qualitative and holistic approach in view that the approach could provide better insights and fuller understanding of the complex situations and problems that had long beguiled irrigation practitioners in promoting participation in irrigation management. The empirical data provided by informants were analyzed for internal consistency and through cross-checks with other informants as well as physical field conditions and quantitative data. The study made use of the background knowledge in irrigation management applied science and five major groups of theories including the Social and Cultural Changes Theories, the Multi-Disciplinary Approach, the Institutionalisms, the Social Organization Theories and the Development Program Management Theories.

The study contains two major components, namely an analysis of participation situations and problems in national irrigation projects, and a clarification of the fundamental problem to generalize the principles of participation for sustainable irrigation management. For the first component, the research proceeded in three prongs. First, documentary reviews were done to understand the historical developments in national irrigation management in Thailand. Second, a contrastive analysis was conducted on the actual project processes and practices of the national Makuang irrigation project in Chiangmai Province and the Japanese Manno-ike irrigation project in Kagawa Prefecture. This analysis was based on reviews of official documents and working records, questionnaires and interviews of state irrigation agency executives, irrigation system managers, field irrigation operators, upstream and downstream farmers in the irrigation system, and local administrators.

Third, a three-year action research was conducted on the actual conventions used in national on-farm development and management practice in the Khlong Thadi Wier Irrigation System in Nakhon Si Thammarat Province. This years' long study employed several methods to follow up the situations, including the collection of socio-economic and irrigation management base line data through structured interviews and field observation; meeting with farmers, local administration and state irrigation bureaucrats to learn about their conventions; and the provision of ideas to enhance participation. Focus group interviews of farmers on their on-farm irrigation management were conducted and cross-checked with their actual cropping practice. Technical advice was given and study tours were organized for farmers, local irrigation managers, and local administrators as needed to enhance their cognitive capacity. Analyses were conducted on farmers' perception and adoption of new on-farm irrigation techniques. The Mae Kuang and Thadi study cases jointly portrayed the situations of participation in national irrigation management from the project initiation stage down to the on-farm management stage. Suggestions were given as to how the encountered participation problems could be tackled.

The second study component was aimed at gaining insights from the indigenous knowledge of the self-reliant Muang Fai irrigation systems in northern Thailand. Reconnaissance surveys were extensively conducted by visiting and asking preliminary questions to related people in several provinces in northern Thailand to select the Muang Fai systems that still maintain systematic participation. These tedious surveys were necessary because there is no clear data base of the Muang Fai systems and many of them have been physically modernized or incorporated into national irrigation projects by the state irrigation agency. Eventually, the large scale Soprong Muang Fai system in Chiangmai Province and the small scale Pongsak system in Mae Hong Son Province were selected. Subsequent detailed studies were done through field observations and in-depth interviews of Muang Fai leaders and members as well as community leaders. The focus of the Soprong study was the management structure of a large scale system, the results of which can be a counterpart of those on the project level of national irrigation systems which are normally large in scale. The Pongsak study concentrated on the relationship between water management method, cost sharing and the system sustainability factors. Its results can be treated as on the same level with those on the on-farm level of national irrigation systems.

Lessons and experience extracted from the five study cases were synthesized to identify the fundamental problems of participation in national irrigation management and form the basis for generalizing the principles of participation for sustainable irrigation management.

CHAPTER 2

THEORETICAL REVIEWS

This study employs a qualitative and holistic approach and relies mainly on field surveys and actions. However, since the period of the First National Social and Economic Development Plan (1963-1966), irrigation development in Thailand has been highly influenced by Western and external lenders and donors. Understanding the Social and Cultural Changes Theories and the Multi-Disciplinary Approach that influenced these entities would be worthwhile. This chapter reviews the theories and three others which are related to participation in irrigation management, namely, the Institutionalisms, the Social Organization Theories and the Development Program Management Theories.

Social and Cultural Changes Theories

The national irrigation development in Thailand tapped substantially from the western technology, some understanding in how such development is viewed from this group of theories is useful. In the initial development period, three major theories were related, i.e. the Diffusion of Innovation Theory, the Modernization Theory and the Trickle-down Effect Theory. The Diffusion of Innovation Theory describes the process of social changes as comprising four stages, namely the stage of innovation, followed by communication, recognition and instilling. The factors that make an innovation being accepted or not include the characteristics of the individuals as innovators, early adopters, early majority adopters, late majority adopters and laggards, and the types of the society, modern or tradition, as well as the availability and types of communication system. The innovation itself has influence on the acceptance, be it an idea or an object, be it more advantageous than the existing ones, or be it compatible with the local culture, farming tradition and personal preference. The innovations that are easily accepted are those which are not too complicated, or not too demanding on intellectual outlays or management skills, and those which require low cost. When innovations can be tried and partially adopted and adopters have the opportunity to observe the innovations and assess the risks in adopting them, the innovations can be more easily diffused. When there is a loss of flexibility, or physical and social infrastructure such as marketing infrastructure, or cultural norm is not present, reluctance to adopt the innovations may occur. The list of reasons for innovation adoption is not exhaustive and it is difficult for scientists to know and understand them completely (Packam, 2001). It is only by the adopters' participation in the innovation development that the causes of adoption failure can be reduced. This theory was partially applied in following up the on-farm irrigation technical adoption in the action research on the Khlong Thadi case as shall be presented in Chapter 7.

The technical diffusion occurred under the frame of the Theory of Modernization which is based on the belief that a society engages in Rostow's growth stages in developing itself from a traditional or rural society into an

industrialized or urbanized society. The process of modernization is based on diffusion of large scale technology, land reform and agricultural development. To start the development, developed countries were prepared to export industrial know-how, including irrigation technology, and capital through aid programs (Worsley, 1991). The process toward such social changes needed structural adjustment and international assistance and was well-portrayed by the irrigation development in Thailand since the First National Development Plan which started by using the World Bank loan as shall be presented in Chapter 4. The theory's assertion that developing countries follow the development path or the Blue Print that Western countries had previously developed and used in transforming themselves from traditional societies into "modern" ones was criticized for trying to "westernize" them (Moore, 1963) and lacking the sense of local settings.

Modernist theorists assume that people have a high sense of rationality and know how to participate for their own interest; in other words living in the context of capitalism and liberal democracy. After early trials, problems encountered prompted the theorists to identify the cause of poverty in developing countries as their remaining traditional and tending only the immediate needs of the people, without stimulating growth with effective economic strategies (Lerner, 1964; Parson, 1966; Eisenstadt, 1966; Bauer, 1981; and Webster, 1984). To modernize these countries, attention must be placed on changes in their values, norms and beliefs, and an augmentation of traditional organizations to a capitalist form of production and democratic form of political authority (Eisenstadt, 1973). To speed up time and save resources for social changes, the Trickle-down Effect Theory took the stage in several countries including Thailand. To effect the changes, the people who were more readily to accept changes and the provision of infrastructure were the primary focus. The effects of changes were expected to trickle down to the less ready people such as through creation of employment opportunities. The application of this idea was rampant during the early national development plans when infrastructures such as roads were extensively constructed, and the country was rolling towards industrialization for import substitution and export targets.

The Theories of Diffusion of Technology, Modernization and Trickle-down Effect are criticized for ignoring differences in the social structures of the Western and developing countries and the fact that the Western countries themselves took a long time to amass capital and mould their structures for capitalist development (Brookfield, 1975 and Hoogvelts, 1982). Even though the sudden injection of foreign capital and technology could bring about a high gross national product, the distribution of the wealth in developing countries was highly skewed (Hulme and Turner, 1990). The application of these theories on Thailand has changed the traditional village social structures, bases of family solidarity and reciprocal relationship, to a practical exchange of benefits and encouraged materialism, conspicuous consumption, social disruption, inequality, and social disorganization (Kulick and Wilson, 1992; Turton, 1984; Konjing and Wangwacharakul, 1990; Girling, 1984; and Bhuchongkul, 1985). To balance the development, the Income and Wealth Distribution Theory was introduced. The

theory placed a special emphasis on changes in the rural areas and the agricultural sector especially for small or tenant farmers through raising the productivity and standards of living. Major ramifications of the theory were in intensive agriculture, irrigation, marketing, communications, power decentralization, land reform, labor-intensive production, handicraft and traditional technology as well as the improvement of access of the poor to services.

However, as the developing countries had already hooked themselves to the capitalist world system, they subjugated themselves in an unequal trade regime and their production for the world market generated underdevelopment in their own countries. The Underdevelopment and Dependency Theories explain the effect of earlier theories on the Third World countries that the Third World countries simply end up producing resources-intensive primary goods which they sell at rather low prices while they need to import capital goods at high prices. The countries were highly dependent on imported technology and their economic system was dominated by transnational companies and international organizations. The neo-Marxists theorists denied the necessity of the Third World countries to follow the Western development stages to attain the ultimate socialism and communism, or classical Marxist belief. “Backward” culture or value system did not cause underdevelopment. The associated Modes of Production Theory explains that a society contains several modes of production which co-exist and articulate with each other. The capitalist modes of production are reproductive while the non-capitalist modes are resistant. Underdevelopment occurs when the two modes articulate (Schuurman, 1993), in other words, by exploitations of the periphery or developing countries by the core or developed countries through their imperialist arms of multinational corporations, international organizations and national political and economic affairs (Blomstrom and Hettne, 1984; and Frank, 1969, 1967, 1972), with conspiracy of the ruling elites of the periphery, including those in the central government and the self-interested bourgeoisie (Frank, 1971 and Roxborough, 1979).

The Multi-disciplinary Approach

The Social and Cultural Changes Theories are criticized on several aspects including their ethnocentrism (Vandergeest and Buttel, 1988; Hofstede, 1980; Amin, 1990; and Tipps, 1973), overemphasis on the macro-level (Harrison, 1988; Buttel and McMichael, 1991; and Laclau, 1971), ignorance of internal factors associated with political institution, internal economic and social conditions (So, 1990), disregard for socio-cultural factors of individual actor, family, class, social organizations, lineage and patronage (Hulme and Turner, 1990; Kramsjo and Wood, 1992; and Jansen, 1987) and diversity and gender issues (Harrison, 1988; and Schuurman, 1993). The attention is then shifted to localization of development.

The Actor-Oriented Approach

Actually, the Actor-Oriented Approach emerged around the end of 1960s but it did not gain attention until 1990s. It places emphasis on the concept of internal

determination, and individuals and their organizations. Individuals are viewed as having the capacity to process information and strategies in dealing with various other actors and institutions (Long and Long, 1992), hence their ability to formulate and pursue their own development projects. It combines the transactional and decision-making models with symbolic interactionist and phenomenological analysis.

Actor-oriented theorists contend that scientific knowledge cannot solve poverty, equality and social organization problems but leads to subjugation of people and countries. Its most prominent concept is that of deconstruction (Lummis, 1991). Actors can produce social movements to resist even the state power and generate changes in developing countries. The associated Gender Study Theory is very prominent for its focus on personal empowerment in both the public and private spheres and integration of individuals in development projects rather than following the top-down strategies (Townsend, 1988; Radcliffe and Townsend, 1988; Sen and Grown, 1987; Dankelman and Davidson, 1987; and Moser and Peake, 1987).

However, these theories are still criticized, first, for their inadequate consideration of diversity and pluralism of individual, historical and cultural variables (Giddens, 1976; Laclau and Morffe, 1985; and Delsing, 1991). Second, they do not give socio-cultural factors such as social structure or local organizations enough attention, but place too much emphasis on political determinism (Frieden, 1987; and Beckr and Sklar, 1987), making them under-estimate internal factors that affect development process. Third, they fail to combine structural analysis and structural constraints with actors' perspective (Long and Long, 1992).

Neither macro nor micro based development theories can singly bring about satisfactory development results. A new thrust took place in integrating both kinds of theory. Concerns on the environment are also introduced to produce the sustainable development ideals and people' participation approach. More importance is placed on the meso level of development and its linkage between the macro and micro levels.

People's Participation

The people's participation approach spawned in the weaknesses of top-down development approach that failed to bridge the gap between theories and practices. It has been emerging in recognition that science and technology cannot solely provide the answers to all problematic issues. There is a need to integrate the single world-view of reductionist science with the multi-perspective views of holistic or systemic approach. It is recognized, as in the science of Complexity and Chaos (Packam, 2001), that not all things can be controlled, but that through participation or organizing efforts, situations can be improved or some clear images can be grouped.

Slightly different from the pure Actor-Oriented Approach, while both put emphasis on the actors, the main gist of the People's Participation Approach is on the

role-sharing, interactions and organizations, networks of knowledge and power involved in development process. The linkages between individuals and the state in development projects are accentuated. Initially, the participation approach was exploited as a form of therapy to transform backward, traditional, unresponsive populations into modern responsive citizens ready to assume their duties and obligations in a process predetermined by developers (Stiefel and Wolfe, 1984). Gradually, participation became accepted as having greater importance than a mere development project therapeutic measure. Through participation, the participants can contribute to project design, planning and implementation, checking the validity of socio-economic data gathered by external agencies, provision of local technical knowledge, and evaluation of project performance (Cernea, 1991). People can be empowered as planners and beneficiaries of development to induce efficiency and equity (Uphoff, 1991). It is also viewed as an ideology for redistributing the control of resources and power to disadvantaged social groups. Through the process, social mobility, social cohesion, cultural identity and institutional development are also addressed. The terms “target group” are replaced with “intended beneficiaries” or “development partners”.

Problems in following this approach are mostly related to the high-level policy operating organizations that still maintain anti-participatory structures and ideologies, resulting in resistance and insistence to maintain the “trickle-down mechanisms” and power (Pearse, 1980; UNDP Discussion Paper, undated; Hollsteiner, 1976; UNRISD, 1978; and Schuurman, 1993). As political circumstances influence the participation context, there is a need to strengthen political organizations toward “bottom-up” development efforts and clearer definition of participation (Uphoff, 1991), as well as the deconstruction of the orthodox view of policy and planning. While several countries across the world issued policies to underscore the importance of participation, there is much skepticism if real participation has been developed. It seems technocratic planning continues to rule (Cernea, 1993).

In addition to the structural problems, the People’s Participation Approach is faced with the problems on social characteristics that can create practical problems in promoting participation. Verhagen (1984) found that in planning development with Thai small farmers, “the conclusions reached in meetings did not reflect consensus, but rather an unwillingness to publicly contradict certain powerful people”. To overcome the culture of silence in the public arenas, preliminary conversations with the individual farmers were necessary. Traditional, poor rural communities are not homogenous; their interests and willingness to share burden and benefits, rights and duties are not equal (van der Drift, 1992). Differences in gender, age, knowledge, and kinship imply differences in social status, which may be incompatible with a one-person, one vote rule. In the stage of implementation, such hidden disagreement is clearer. Costs and benefits of participation at different stages also differ (Galjarat, 1995) and participants tend to compare individual ratios of costs and benefits, or equity rather than equality. With uncertainty surrounding the participation process, an unsuccessful collective

grassroots development effort can be positively viewed as creating social energy that may re-emerge later in the expected direction (Hirschman, 1988).

Participation has long been the rhetoric of development. Numerous studies have been done to scope for the methods in soliciting meaningful participation, of which action research is one of the major study approaches. Two major social models are referred to as underlying methods for participation, i.e. enlightenment and social engineering models (Uphoff, 2005). The enlightenment model focuses on knowledge, and education; in other words it places emphasis on the cognitive aspect of individuals related to the development process. This can be classified as an evolutionary approach. This method is very useful in the long term but it alone cannot guarantee that the social action will always be realized by using the knowledge. The social engineering model focuses on the social fabric and dynamics. It provides an environment for using knowledge to purposively organize social actions. The social engineering approach used to face with criticisms of social manipulation. Those who believe in the evolutionary approach are skeptic and feel that “professional experts” or “master models” look down upon local people and consider development projects as a form of charitable welfare (Holloway, 1989). However, with greater recognition of ethics, the model can be developed to chart the relationship between the development means and goals (Cernea, 1993).

The term “participation” has been coined in numerous ways. The United Nations (1981) defines its scope as covering social, economic and political systems. Participation opens the opportunity for every member of a community and society to take part in activities that will lead to or influence the development process, which will render development benefits to all equally. Participation reflects voluntary and democratic involvement in development and equal sharing of benefits, establishment of the goal, policy, planning and implementation of socio-economic development projects. People’s participation in all levels, local, regional and national, creates linkages between their investments and benefits. The formats of participation may vary according to national economic conditions, policies, administrative structures, and socio-economic conditions of the people. Participation is not only a method but it is an important factor to guarantee that the development process will bring benefits to the people.

While participation stresses the equal benefits for all, such development programs like pro-poor or poverty alleviation raises a question whether participation can be used as a means to empower the poor and whether power is a variable sum or a zero sum. When power is seen as a variable sum, the powerless can be empowered, for instance by equipping them with more knowledge, without pulling the power away from the powerful. This is a win-win situation which is believed by functionalist sociologist Parsons and economist Schumacher that the powerless can share the development results with the powerful. However, some “pro-poor” programs that stress equitable allocation of development opportunities cannot always benefit the poor even though programs are aimed to support them while some other programs may benefit them by “stimulating overall agricultural output and

employment” (Mellor, 1980 in White, 1987). When power is viewed as a zero sum, the powerless had to negotiate with the powerful in a wider social reform. Marxists view that political power in a capitalist society cannot be separated from the economic power, thus the powerless must understand this and challenge the powerful in a political struggle to gain political and economic power (Craig and Mayo, 1995). The pro-poor programs also raise a question whether such programs are negatively looking down on people’s self-image and self-reliance or are a positive way of selecting an appropriate target group for public intervention (Rahman, 1995).

Participation is often viewed as a continuum and there have been attempts to classify the level of participation. Arnstein (1969) classifies participation into eight levels. The highest three levels are related to decision-makings, i.e. citizen control or direct decision-making, delegated power for decision-making to representatives, and partnership developed through consultation and negotiations. The three moderate levels of participation or partial participation include expression of opinions in public meetings, public consultations and information for the public. The lowest two levels of participation include the therapeutic measures that allow participants to take part only to reduce pressure but have no influence on decisions and the manipulation measures under which pressure is under complete state control.

Oakley & Marsden (1984) classifies participation into seven levels. The highest level is empowerment or the participants taking control of the development. The next two levels are related to the organization of participants to make them either active and initiative or having rights and duties to participate. The fourth level is the community development in which people will be active only in the parts that affect them. The last three levels are termed as collaborative-input-sponsorship under which people voluntarily participate in development projects, or sensitized to participate, or can participate only when they are allowed.

Domestically in Thailand, there have been efforts to define participation in the local setting. Commonly, participation is defined as a process to involve people in development work by sharing time in searching for solutions to their own problems, sharing their creative ideas, knowledge, and expertise with process facilitators, and supporting and monitoring the performance of related organizations and their staff. The scope of active participation encompasses all levels of decision-makings related to all kinds of social, economic and political activities especially in the stage of planning and establishing institutions. The Participation Forum, organized by the Public Health Policy Center of Mahidol University, defines participation as the development of the people’s or community’s capacity in managing and controlling the use of resources and production inputs that are available in their society for their social and economic life as needed and appropriate to their status as a member of the society. Through the development, their information will be enhanced and their intelligence is demonstrated through their independent decisions on their life.

The Social Research Center and the Environmental Research Center organized sessions to brainstorm on the local definitions of participation. Most of the definitions more or less follow the United Nations' definition. To note is Vattanasap's (2001) definition that participation is a process in which the public concerns, needs, and values are integrated with the state decisions. The process mediates between both sides and has an objective to reach a better decision.

Sustainable Development

Although Sustainable Development does not develop into a theory *per se*, its integration of environmental issues into the paradigm through the participation of actors in development work has created a challenging development goal. The World Commission on Environment and Development gives the classical definition of Sustainable Development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987). When sustainable development is a target, several theories must be applied to different aspects of development to achieve economically, socially, and environmentally sustainable development (Serageldin, 1997).

The National Economic and Social Development Board (NESDB) of Thailand (2005) has adopted the concept of sustainable development since the Eighth National Development Plan. In conjunction with the Thai Environment Institute, the NESDB elaborated the national development goals in the economic, social and environment dimensions as reviewed below.

In the economic dimensions, national development must be quality development that can be achieved through efficient production mode that is suitable to the country's potentials and market needs. The production must use materials efficiently under well balanced production and consumption plans without destroying the environment. The economic stability means both internal and international stability, and people can be self-reliant and protect themselves from drastic changes in a sustainable way. To distribute wealth, accesses to economic activities, production inputs and infrastructure must be equitable.

In the social dimensions, a knowledge-based society must be developed so that people and organizations can adapt and use their potential to develop knowledge, ideas, occupational and managerial skills. The quality of life must be improved so that people equitably have higher quality of life, live in good living condition, have security in life and property, have good health and hygiene and have access to social protection. Communities must be strengthened and cultural safeguard must be boosted so that the Thai society maintains value and way of life that is economical, using resources in a sustainable way, applying local wisdom harmoniously, and maintaining culture, way of life, tradition, and arts of the country. Equality and participation must be promoted so that Thai people are equal in gender, education, occupation, welfare, environment and liberty within the scope of the law,

humanitarian principle, and good governance, and can participate in making decision relating to public policies.

In the environmental dimensions, conservation i.e. the utilization, protection and management of natural physical and biological resources, must be efficient, integrating the conservation and development processes in managing the limited natural resources for the maximum benefit by considering the present needs without compromising the future, the carrying capacity, and the renewal of natural resources. National development must maintain the quality of environment for a good quality of life for the Thai people, control water, soil and air pollution, and prevent pollution in production and consumption processes. People from all regions must be widely and equally allocated with natural resources and development benefits, must participate in decision-making for policies, plans and projects for environmental management for the well-being and quality of life for the world population.

It is noted that in the NESDB's elaboration of sustainable development concept for the country, people participation has already been included as one of the major policy directions.

Institutionalisms

Institutionalisms are spawned within the contention that there are always conflicts among rival groups for scarce resources. Irrigation water is such a resource, as accepted by Thai irrigation executives in the APEC foresight study (NASDA) that irrigation management cannot escape from political influences. To solve the conflicts, institutions are needed. The term "institutions" is defined as formal and informal rules, procedures, routines, norms and conventions embedded in the organizational structure, such as constitutional order or standard operating procedures of a bureaucracy, to govern social behaviors or relations (Steinmo, 2001; Hall and Taylor, 1996) and to resolve the conflicts by structuring collective behaviors. To effectively resolve the conflicts, institutionalism theorists are interested in the relationship between institutions and their impacts on the behavior and outcome; thus they tried to understand the process whereby institutions originate or change and are crafted and what make them robust or fragile (Hall and Taylor, 1996; and Ostrom, 1990).

Institutionalism theorists identify the type of scarce resources that require collective governance as common pool resources. These include community forests, grazing land, irrigation water and other resources users of which are hard to exclude, and benefit from the use of a resource unit by one person depriving the opportunity of others to use it. These resources are subject to damage, or in the most illustrative term of Hardin (1968), a tragedy of the common, if there is no proper way to control their uses. Three major policy prescriptions are suggested for their control. The first one is the state control. In this prescription, the state has the power to allocate resources such as water according to the status of the resources. Problems that the

state encounters in so doing is the availability and accuracy of time and place information, the high monitoring cost, and the low sanction reliability, as a result the resource allocation becomes unpredictable, ineffective, or inefficient. The second prescription is the privatization of the resources. In this prescription, there is a need to establish property right over the resources such as quantified water volume and there is a set-up cost for doing so. The prescription can be applied with some kinds of resource but it is questionable when it is applied to water. This is related to the problem whether water should be regarded as a commodity or human right because water is an important base of all life. It is also related to the nature of the resources and the technologies used in the actual resources allocation. Some kinds of resources are hard to measure; and some kinds of technology cannot precisely measure some resources. The third prescription is the regulation of the resources use by users themselves. The advantage of prescription is the users' possession of information and avenues to make agreements, their ability to monitor resources use at low cost, and their social instrument for sanctioning violators of their agreements. This prescription appears enticing but there are questions whether it can be possible in all cases. To realize it, there are needs for developing some essentials keeping in mind the plurality and diversity of settings.

The development of institutionalisms came in from three directions: history, economics and sociology. Historical institutionalism views individuals as deeply embedded in a world of institutions and using these institutions to interpret situations for determining their course of action. Historical institutionalism can be classified as a system theory as it accepts the world as a system of interacting parts where the operation and development of institutions is associated with power asymmetries, providing incentives for or privileging some interests and constraining or demobilizing some others. It views the state, not as a neutral broker among competing interests, but as a set of complex institutions capable of structuring the character and outcome of group conflicts. Institutional changes are highly influenced by convergence of a number of factors (Orren and Skowronek, 1994). The analytical method of historical institutionalism is inductive by path analysis or ways in which a number of factors have intersected and affected one another over time and/or process tracing (Steinmo, 2001). Little attention is given to understand how institutions affect behaviors (Hall and Taylor, 1996).

Rational Choice Institutionalism combines the concept of institution with the micro-economic concept of self-interest and interactions of self-interested and independent individuals. Interactions achieve equilibrium when individuals maximize their utilities; and that is when institutions stabilize and individuals do not want to change the interaction rules for fear of uncertainty of the outcome of the new rules (Shepsle, 1986). Only punctuated equilibriums or external shocks can change the institutions. Institutions structure behaviors by affecting the range and sequence of choices of behavior or by providing information and enforcement mechanisms. This school adds to the outstanding that not only structural variables influence behavioral decision, but also does the strategic calculation of individuals. Similar to this idea is the Human Development Report (UNDP, 1993 in Craig and Mayo, 1995)

which stresses that the best route to human development is to unleash people's entrepreneurial spirit for them to take risks, to compete, to innovate, and to determine the direction and pace of development. However, the problem of this school is their viewing of individuals as independent, unaffected by asymmetries of power, and accustomed to strategic action or equal standing, all of which are not always the case in many settings including Thailand. Its stress on equilibrium or efficiency is problematic because such may occur in extremely limited settings.

Sociological Rational Choice Institutionalism re-defines rationality as not referring to rationality of a decision-making of an individual but rather the rationality of the social outcome (Hechter and Kanazawa, 1997). It views that rational choice has a multi-level structure, with cognitive capacities and values containing in the lower level and social structure in the higher level. Individuals act with intentionality. If the motivations of their decisions are known, then their behavior can be predicted. Motivations include values, beliefs, preferences, self-images and identities, local status, past experience, side-way looking, moral templates, and other culturally-specific repertoire, as well as utility maximization and uncertainty reduction of the efficiency-oriented approach. Institutions in this school provide the frame of meaning that guide behaviors and roles (Hall and Taylor, 1996) and can be used for economic efficiency and growth as they can specify expectation and obligation, information channel and efficiency in rule enforcement (Coleman, 1988). The risk of the institutions that are resulted from a sociological process is that unless they are properly institutionalized, they can replicate inequality.

The historical institutionalism, rational choice institutionalism and sociological institutionalism all demonstrate potential for combining the local setting with the macro and micro concerns into an integrative approach (Hall and Taylor, 1996) for irrigation management. However, institutional changes for participatory development involves grand scale redistribution and the assumptions that majority votes rule and organizations would increase gains for everyone were heavily preoccupied with legislature at the expense of executives and especially bureaucracies (Fiorina, 1990). As a result, who will be in charge of the changes for the common good is often a problem. How much one country can redistribute is also related to its idiosyncrasy, initial institutional structures, and the world economic environment (Freeman, 1993) as shall be presented through cases from several countries in doing irrigation reforms in Chapter 3. An emergence of new organizations can also be a pressure agent of institutional changes. Existing organizations can be prohibited by inertia from implementing their internal organizational changes and creating the impetus for institutional changes. They can even try to protect their entrenched interests in their old ways of operation by resisting institutional changes (Ingram, undated). This is also an issue in Thailand where the public organizations are undergoing administrative reform and organizational changes, introducing the newly founded Water Resources Department and local governments throughout the country. Merrey (1996) proposes a matrix of legal framework, governance, organization and finance as tools for analyzing irrigation institutions of countries. See Table 2-1 for details.

Table 2-1: Framework for Analyzing Irrigation Institutions

Legal Framework	<ul style="list-style-type: none"> • Effectiveness of laws: Philosophy of law and consistency of law and reality • Rights to water: Clarity, security, and transferability • Environmental protection: Threat to irrigated agriculture, or irrigation as threat to other sectors
Governance	<ul style="list-style-type: none"> • Centralized, decentralized, or devolved to local organization
Organization	<ul style="list-style-type: none"> • Organization at the policy level: Specialized ministry of irrigation, ministry of agriculture that includes irrigation work, or ministry of water resource that includes irrigation work • Organization at the implementation level: Specialized irrigation civil engineering department, integrated authority for irrigation and agriculture, government-owned autonomous corporations or utilities, management by local entities, with government regulation
Finance	<ul style="list-style-type: none"> • Who pays for irrigation: Free to users, users pay parts of the costs, or users pay the full costs. • The structure of financial flows: No one pays directly, indirect financing, or direct payment by users to provider.

Source: Merrey, 1996

Social Organization Theories

As earlier stated, an irrigation system always involves a number of farmers, and such number is large in Thailand where most farmers are small holders. Support knowledge on Social Organization Theories is useful, particularly the Structural-Functional and the Social Conflict Theories. The Structural-Functional Theories have basic assumptions that a society has many parts and each part has its own function. Plurality and diversity are thus the main characteristics of a society. Individuals in the society act voluntarily, have their own goal, are subject to some situational conditions in choosing their means to achieve the goal and at the same time are influenced by some social norms. The patterns of social dynamisms can occur in three major types. The first type is solidarity of individuals, which can be very much mechanical in a small society but rather organic in a complex society. The second type is the integration of individuals. The third type is the avoidance of conflicts and a search for equilibrium. The measures for social organization in the Structural-Functional Group include rules, roles and socialization. The results of

social organization can be a strict heeding or a casual following of the rules, a violation of the rules, or a leave from the social organization or even a try to change the society.

While the Structural-Function Theories view society as contending complementary parts, the Social Conflict Theories believe in dialectics and use conflicts as the starting point for social organization. From the ancient time, the dialectic has been shifting from the dialectic of God and Man, to the World and Self and Man and Man over Materials. In social organization, there are always struggles between the superstructure and the substructure as can be seen in primitive communism, slavery, feudalism, capitalism and communism. However, the Social Conflict Theories consider conflicts as opportunities to find consensus and organize the society.

Development Program Management Theories

White (1987) summarizes the theories of development management as including six major groups as shown in Table 2-2. The Goal-Directed Theory places emphasis on rationality and establishment of objectives and monitoring of results. In this theory, program management functions give weight to development of content of work, capacity to perform the work and strong leadership. Its shortfalls are in the readiness to seek wider supports. The Anarchy Theory highlights the reactive capabilities to maximize control and flexibility. Program management functions throw weight to work content, capacity and leadership similarly to the Goal-Directed Theories. The Bureaucracy Theory stresses on procedures and uses of sanctions/incentives to stimulate bureaucrats to observe the procedure. Thus, it concentrates on capacity and networking with related entities, often the content of the program is overlooked. The Institutionalism Theory provides a set of institutions to lower the cost of decisions and make decisions responsive to development needs. Its management functions incorporate development of work content and capacity and involve development beneficiaries but often it has problem with political network and leadership. The Social Learning Theory highlights roles in designing and implementing programs, involvement of stakeholders, provision of power bases and re-orienting organizations. It emphasizes content of work, capacity, expansion of resources and political support and collaboration of multiple stakeholders. Often leadership is unclear in the process. The Political Influence Theory accepts diverse interests, establishment of objectives and strategies that reflect patterns of influence, capacity to influence for support, to lead, to broker interests, to persuade and to educate. It has limitedness in enhancing the capacity of implementing organizations and working with multiple groups.

The theories reviewed above contain some elements related to the participation in irrigation management. Although they were not applied directly during the course of the study which relied mainly on the actual phenomena in the field surveys and actions, they certainly provided some frame of thoughts.

Table 2-2: A Framework for Studying Development Program Management

Theories of Management Management Functions	Goal Directed	Anarchy	Bureaucratic Process	Institutional Analysis	Social Learning	Political Influence
Contribute to development content of program design	√	√		√	√	√
Enhance the development capacity of implementing organizations	√	√	√	√	√	
Expand program resources and political support					√	√
Work with and coordinate multiple organizations and groups			√	√	√	
Exercise leadership	√	√				√

Source: White 1987

CHAPTER 3

PARTICIPATION IN IRRIGATION MANAGEMENT

Emergence of Participation in Irrigation Management

Recently, participation in management has been much discussed in the public irrigation sector in many countries for three major reasons, namely the national budgetary crisis, the changing national policies to place irrigated agriculture on a sound economic footing, and the extensive deterioration of public irrigation infrastructure (Svendsen and Nott, 2000). Among the international organizations and donors, the Food and Agriculture Organization (FAO) was first to establish in 1981 the Panel on People's Participation in recognition of the importance of participation as a development objective and of the need to strengthen the participation imperative in the rural development activities of the United Nations agencies. The World Bank established in 1995 the International Network on Participatory Irrigation Management, a non-profit organization with a mission to facilitate participatory irrigation management. The Japan International Cooperation Agency is searching for ways suitable for promoting participation in irrigation development and management in developing countries with an idea that the concept of Japanese land improvement districts can be useful. In its Development Policy Concept of 1996, the German Federal Ministry of Economic Cooperation and Development (BMZ) required that the affected people participate actively in the development process and in decision-making. Likewise, several countries have issued policy statements underscoring their aim to promote people's participation in several activities including irrigation management.

Terminologies and Definitions of Participation in Irrigation Management

There are many terminologies that have been used to signify participation in irrigation management. The World Bank's terminology of Participatory Irrigation Management (PIM) has been widely used in the public irrigation sector. The Bank defines "Participatory Irrigation Management" as referring to the involvement of irrigation users in all aspects and at all levels of irrigation management. "All aspects" include the initial planning and design of new irrigation projects or rehabilitation or improvement, as well as the construction, supervision, financing and resources mobilization, decision rules, conflict resolution, operation, maintenance, monitoring, and evaluation of the system. "All levels" refer to the full physical limits of the irrigation system, up to the policy level (Groenfeldt & Svendsen, 2000).

The term "irrigation management transfer" is often used in place of "participation", and confuse "transfer" with "participation". Transfer does not necessarily mean participation in all cases because it does not guarantee that effective participation would follow. In some cases, participation may realize but, in most cases, decision making power is not transferred and, in some others, the management is only be monopolized by some groups of people. Some academia

even coined the word transfer as a transfer of problems. Transfer can refer to the transfer of the management of irrigation systems or the transfer of irrigation assets. Management transfer can be from the public sector to other entities like farmers' organizations or companies or local governments and actually occurred mostly in large scale irrigation systems so that water users participate in the lower level of system operation and maintenance. The transfer can be initiated in a top-down approach and bottom-up approach, depending on the relative vision and condition of the top and the bottom.

Varying to the level the development of the relevant settings, there are also other terms like "customer participation" which are used in Australia where farm size is large and farmers participate like an executive board of a private company. In less developed countries or in traditional irrigation systems like those in South and Southeast Asia, the terms "farmers-managed irrigation" are used. These have the closest meaning to an actor-oriented development. Such autonomous irrigation management is highly illustrative as to how people would implement their irrigation management on own but is lacking in identifying the appropriate role of the public sector and the national policy proper.

Strengths and Weaknesses of Participatory Approach

It seems only a very broad idea on participation in irrigation management is there for ones to devise their own way of achieving it. As a result, in some cases, it is not even known what the real rational background of participation in irrigation management is. Yet, several positive aspects of participation in irrigation management are often cited, especially the lower cost to the central and local governments because farmers would perform some work or pay some costs. When participation is perceived as a way to cut public spending like this, it is criticized for being used as a tool "to cut back the welfare state and privatize problems and provision (Meekosa and Mowbray, 1995 in Craig and Mayo, 1995). Participation should not be reduced into the tool to achieve engineering work but it should take place early in the project in the sense of co-decision, self-responsibility and self-determination. It should be the path and goal of development (Bliss, 2001).

The positive aspects of participation in irrigation management include the following: mobilization of better information on needs, constraints, ideas, knowledge and experience as background for better planning, managing, and monitoring irrigation systems or solving common problems more effectively. The sustainability of irrigation systems is boosted because the systems are designed and compatibly operated to serve farmers effectively and/or efficiently. Conflicts are reduced; transparency in processes is increased and rent seeking opportunities are reduced; and negative political influences are reduced. Farmers have higher sense of ownership, have more skills in working together, in planning, operating and monitoring irrigation management. The rate of facility damage can be reduced while maintenance skills can be enhanced. Participation in irrigation management enables farmers to make a better matching production plan, and obtain higher agricultural

productivity. Participation brings in the opportunity to adapt irrigation management to suit social changes.

Participation in irrigation management also has weaknesses. Different social groups have different ability to mobilize themselves. For example, salary-men tend to have high mobilization capacity and have the capacity to manipulate other groups. Of particular relevance is the fact that professionals tend to throw their initiatives to participating farmers, render their eventual participation but a mere pseudo-participation. Participation process is rather time-consuming, making it hard to fix a time frame and achieve it in a public development project process that is tied to such thing like fiscal year time frame and work plan. Related entities do not always want to participate. Motivations as well as hidden agenda are always there. Participation increases burden on farmers in many aspects including financial aspect, time, and other resources. In some cases, they may obtain less disaster and rehabilitation assistances from the governments or their water rights become less secure. Participation in irrigation management can also decrease agricultural productivity. Unable to control cropping patterns, the governments may lose an important tool for agricultural policy. In transition to the participatory approach, uncertainty of irrigation agency's role, its downsizing of manpower, and reduced control of water resources can harm national security. Oakley and Marsden (1984) summarize obstacles to the participatory approach as including three categories, i.e. operational obstacles such as inappropriate working procedure, technology, project content; cultural obstacles such as culture of silence; and structural problems such as relations of the power and production and the ideological values.

Prominent Cases of Institutionalizing Participation in Irrigation Management

The State of California in the United States and Japan are the two countries that have clearly institutionalized participation in irrigation management. The Japanese land improvement districts which are the farmers' autonomous body for irrigation management have many similarities to the Californian water districts. To avoid redundancy, the Japanese institution shall be covered in Chapter 6 when a contrastive case of Manno-ike is presented. More recent cases in which farmers have increased their role in public irrigation system management are Mexico, Turkey, Colombia, the Philippines and Sri Lanka. Their experiences are reviewed here.

Mexico began irrigation management transfer in 1988 after the economic crisis that necessitated the irrigation reform. Prior to the transfer, the federal government subsidized 75% of the operation, maintenance and administration of irrigation districts but the maintenance was not adequate, causing deterioration of the infrastructure. Within eight years, the management of 87% of areas in units smaller than medium and large scale irrigation districts was transferred from the National Water Commission (CAN) to the federated water users' associations (WUA). The transfer is allowed by the Mexican Water Laws which provide that water rights are transferable. The transfer process started with CAN's extensive meetings with farmers to explain how participatory irrigation management would render better and

more responsive service. Subsequently, WUAs were formed with government promise on irrigation system rehabilitation and equipment purchases. The internal balance and check of the WUAs were crafted. Externally, they were federated under the umbrella of their irrigation system and under the national federation. In farmers' opinion, irrigation service and maintenance has improved. The government is spending only 25% of the funds needed for system operation and maintenance.

Major problems in the transfer process were related to legal provisions, water charging, users' organization and bureaucratic reform. The Mexican laws stipulate that transfer units must be smaller than the irrigation districts. As a result the transfer was limited. The poorly specified rights caused conflicts between WUAs and municipalities. Water charges increased 400% to achieve self-sufficiency which was the pre-transfer condition, creating a sudden heavy financial burden on farmers. Revenue was not sufficient for operation and maintenance and book-keeping was poorly managed. Organizing water users associations to take charge of operating modules was difficult. There were problems of staffing and nepotism, political interests and poor condition of infrastructure. The restructure of the hydraulic bureaucratic system faced difficulty and shook the morale of the bureaucrats.

Based on the Mexican experience, Palacios (2000) contended that explanations on the advantages of participatory irrigation management were essential initial activities for successful transfer programs. It was also important to raise irrigation tariff to the level of financial self-sufficiency before transferring so that the WUAs could support their own operation and maintenance programs. Government agencies needed to continue providing rehabilitation and modernization of infrastructure and supporting the directors of WUAs because the larger the module, the cheaper the unit cost would be. The representation of the membership, the leadership capacity and the managerial spirit of WUA directors, especially the first set, was critical for the future of the associations. A clear legal framework was needed to define the water rights, organizational forms, the responsibilities of each party, the regulations of the activities, and fiscal benefits for companies that manage the irrigation and drainage infrastructure. Training was needed for the directors and operating staff of the WUAs. Government subsidy was needed to foster the participation of users and local and national governments. Public agencies in charge of water management should be restructured to take the role toward guidance and supervision of the new managing entities and act as a link between the WUAs and the government. In the case of Mexico, their major roles should be oriented toward solving problems relating to operation, use, negotiation and management of water, and to support WUAs and the application of the National Water Law.

Turkey began the management transfer of large irrigation units in 1993 due to high labor costs, hiring freeze in government agencies, the Directorate of State Hydraulic Works (DSI)'s inability to operate and maintain expanding irrigation area and the World Bank pressure for improved cost recovery. Within three years, 61% of the publicly-managed irrigation area was transferred to local government units or to

special irrigation associations (IAs). The transfer process started with orientation for field personnel on the transfer approach. The implementation that followed was through the existing local government structures and leaders rather than through the grassroots organizations of farmers. The transfer units were rather large, 6,500 ha on average, and the organizational structure was a unified, not a federated, one.

Transfer problems were related to water charging, restructure of water agency and its future roles, financing for rehabilitation and new projects and participation of farmers (Svendsen and Nott, 2000). The transfer resulted in doubling irrigation fee as operation and maintenance expenditures were shifted from the public to the private sector. IAs faced with difficulty in purchasing and maintaining heavy equipments. The true impacts were not yet known. The absence of a charging mechanism for bulk water supply to the IAs resulted in an inability to restrain their water demands and the insecurity of the IAs' water rights.

It was difficult for DSI to reduce manpower, especially the operation and maintenance staff and DSI had indistinct vision on its supporting role in the post-transfer period. There was a lack of clear policy on future cost-sharing for rehabilitation and new system construction. Direct farmer participation was needed in the IA governance to reduce dependence on village and municipal leaders in filling the IA leadership roles.

Irrigation management transfer in Colombia was initiated by two farmers' groups and later joined by other groups, not the government policy. This is a unique case of grassroots movement. The management of 66% of irrigation areas in large and medium scale systems was transferred to local associations. These water users' associations were legalized by the newly issued water law. They entered into contracts with the national irrigation agency INAT for the management, but not the ownership of the system facilities. Positive results included more flexible irrigation plans and cropping patterns, reduced unit cost of maintenance, more regular maintenance schedules, reduction of government subsidy for operation and maintenance cost from 90% when managed by INAT to only 25%, control over the form and frequency of their fee payment and flexibility in handling with defaulters, less staff requirement and higher local employment. Concerns over their sustainability were the legal deficiency such as on ownership and cumbersome procedure for securing legal water rights, deferred maintenance due to low fee and no asset accumulation, financial management of IAs, lack of operational data and unclear functions of the INAT and the IA national federation in supporting them.

For sustainable transfer of Colombo's irrigation systems, Quintero-Pinto (2000) suggested that a comprehensive program was needed to define the concepts of WUA property, infrastructure and assets, and the procedures to secure water concessions, and the establishment of an autonomous regional corporation to oversee water resources management, and establish equitable water fees. A comprehensive rehabilitation program was needed as heavy machinery and other equipments were not transferred. Support from INAT staff members and clear commitment to the

transfer process from its top management was needed. There were also needs for research on irrigation management and transfer, validation of technology, and strengthening of WUAs organizations, leadership skills and attitudes of self-reliance.

The Philippine effort in large scale systems was geared toward joint management rather than a complete management transfer. It started in 1984 with the major aim to increase cost recovery to make NIA financially self-reliant. NIA employed community organizers to help farmers to establish small irrigation associations (IAs). These IAs entered into contracts with the National Irrigation Administration (NIA) to perform various management functions. Over the past 12 years the contracts covered about 90% of areas in large irrigation projects. The data on the program results were scattered with some positive reports on increases in the areas served, cropping intensity and fee collection efficiency. The effects of the transfer on functional responsibility were hard to assess because the transfer was often accompanied by rehabilitations. Collection efficiency was still low compared to other countries. The operation and maintenance manpower had declined.

Raby (2000) identified that problems of the joint management program were related to low commitment, self-reliance attitude and capacity of members, unclear demarcation of IAs and NIAs responsibilities, and the exclusion of local governments' role in the program. Membership in IAs was voluntary. IAs had limited tools to compel compliance of members with rules and obligations and were still much dependent on community organizers and NIA. The rate of non-payment was still high and financial management by IAs was inefficient, especially where subsidies were involved and there were interventions by NIA. Capacity building programs on self-management were not adequate. There was no clear distinction between NIA and IA roles, making both involving in lower level management functions. Consideration of the social, technical, and managerial requirements of national systems was inadequate. A possible solution was to involve local village administrations to work with IAs and NIAs.

The Agrarian Research and Training Institute of Sri Lanka with support from the Rural Development Committee at Cornell University tried to organize farmers to improve irrigation management in the irrigation-based 65,000-acre settlement on the left bank of Gal Oya Irrigation System. The project was prompted by the pathetic conditions of the irrigation system of which facilities were poorly maintained, or even destroyed, making it able to irrigate much smaller areas than planned. Farmers lacked trust towards each others and towards officials of the Irrigation Department. The major purpose of the project was to mobilize farmers throughout the area to contribute free labor to rehabilitate and maintain the channels within four years. The project employed college graduates with farming background who were willing to live in the remote areas as institutional organizers. These organizers built rapport, facilitated problem-solving in small groups and encouraged them to send representatives to work out problems with other groups. As a result, farm channel organizations, distribution channel organizations, area councils and the project level committee were developed. The results included more effective

irrigation rotation, larger cropped areas, a decline in water conflicts, better attitude among farmers, even across the Sinhalese and Tamil ethnic groups, and with officials. Even with clearer boundaries and membership, available rules and monitoring and collective choice arena, the institution was evaluated as not so robust because the rights of farmers were not recognized and guaranteed, conflict-resolution mechanisms were not in place and the Irrigation Department engineers still presumed that local farmers had little to offer (Uphoff, 1986; Perera, 1986; and Kasyanathan, 1986).

Indigenous Knowledge in Traditionally Participatory Irrigation Management

As presented in the previous section, several governments and international donors are trying to promote participation in irrigation management, and there have been lessons learnt from their experience. On the other side, there are also many locally-managed traditional irrigation systems in many countries, such as *huerta* in Spain, *muhtars* (village)-based and *imece* (labour exchange) communal irrigation systems in Turkey, *muang fai* (weir-ditch) system in Thailand, *zanjeras* in the Philippines, *panchayat* in Nepal, and *subak* in Bali, Indonesia. These systems may appear as unimportant when compared with large scale irrigation technology, but they have one thing in common that is all of them have devised irrigation institutions that are participatory in their own ways. Many have been in existence over a very long period of time to support local life. Some researchers have paid attention on getting to know their secrets. To note is Ostrom (1990) who describes the characteristics of an effective self-organizing institution for irrigation management as having a clearly defined resources and users' boundary, and appropriation and provision rules that are congruent with local conditions. Most of its members have an access to modify the rules and its monitors are accountable to the members, if not the members themselves. Its rules include penalty code graduated according to the seriousness and context of violation; and there are low-cost conflict resolution mechanisms. Its self-organizing right is not challenged by external authorities; or it is integrated in the form of nested enterprises in case of externalities exist.

The experiences in participatory irrigation management of other countries as presented above provide useful lessons from actual practices that, when combined with relevant theoretical ideas, have given concepts for studying the situations of participation in irrigation management in Thailand.

CHAPTER 4

IRRIGATION IN THAILAND

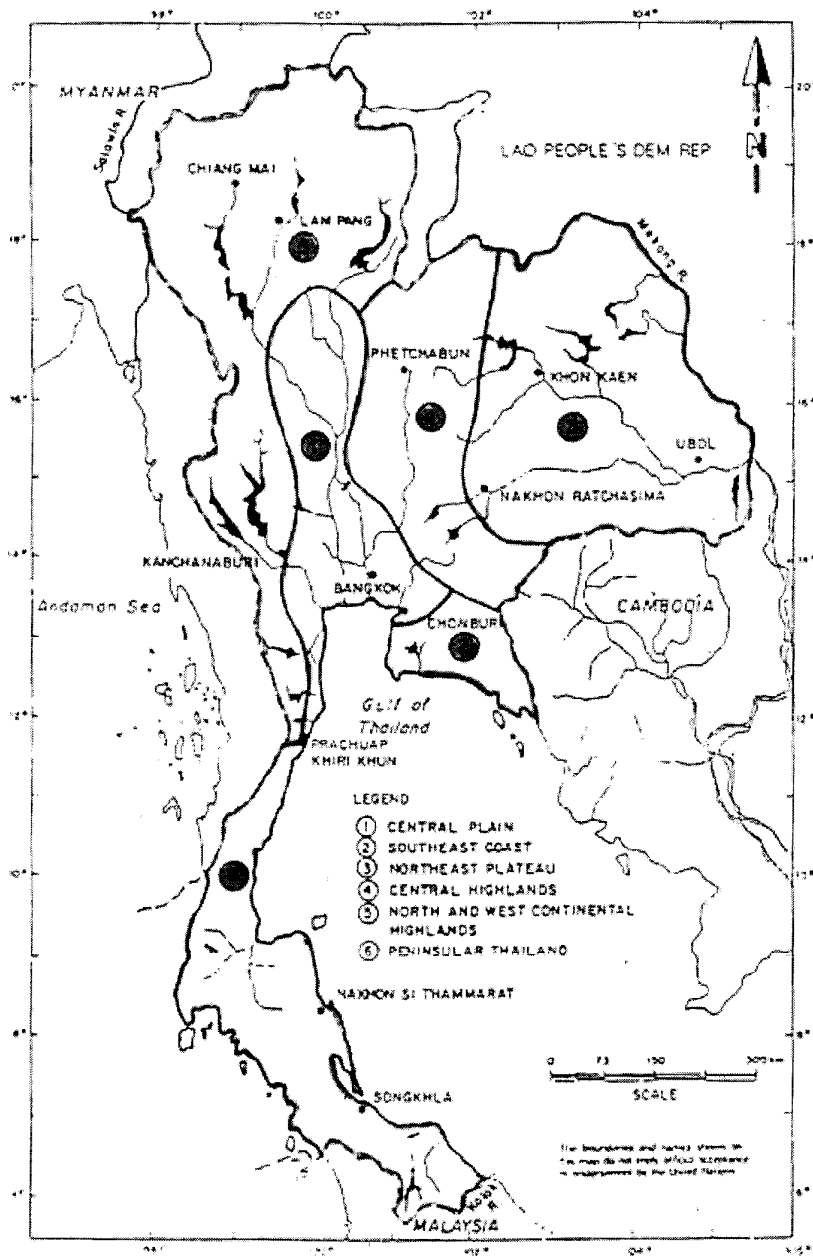
General Conditions

Irrigation management in Thailand is subject to a wide variation of land form and precipitation. In terms of physiography, the National Research Council (1989) classifies the 513,000 km² country area into six as shown in Figure 4-1. The Central Plain or the lower Chao Phraya alluvial plain is formed by the sedimentation brought in by the upper tributaries of Ping, Wong, Yom and Nan. The Southeast Coast which is an important economic development zone features small and undulating marine terrace and small watersheds. The Northeast Plateau has rolling terrain with several small rivers draining into the Chi and Mun rivers. The Central Highland features hills, plateaus and valleys with a wide range of elevation from 300-1200 meters above the Mean Sea Level. The North and West Continental Highlands comprises a long mountain range in the west of Thailand from where the Ping, Wang, Yom and Nan rivers originate and the hills and valleys in the north of Thailand. The Peninsular Thailand is sided by the Indian Ocean and the Gulf of Thailand and features many small watersheds. In terms of rainfall, the meteorological statistics show that the average annual rainfall of the country varies from 800 to 5,000 millimeters across regions. See Figure 4-2 for a rough isohyetal map. In addition, the regional average monthly rainfall statistics in different regions in Figure 4-3 shows that, even in the same country, the wet and dry seasons may vary from regions to regions. Over the past five decades, the overall trend of rainfall of the country is decreasing from 1,750 mm per year to less than 1,550 mm per year as shown in Figure 4-4.

Historical Irrigation Development

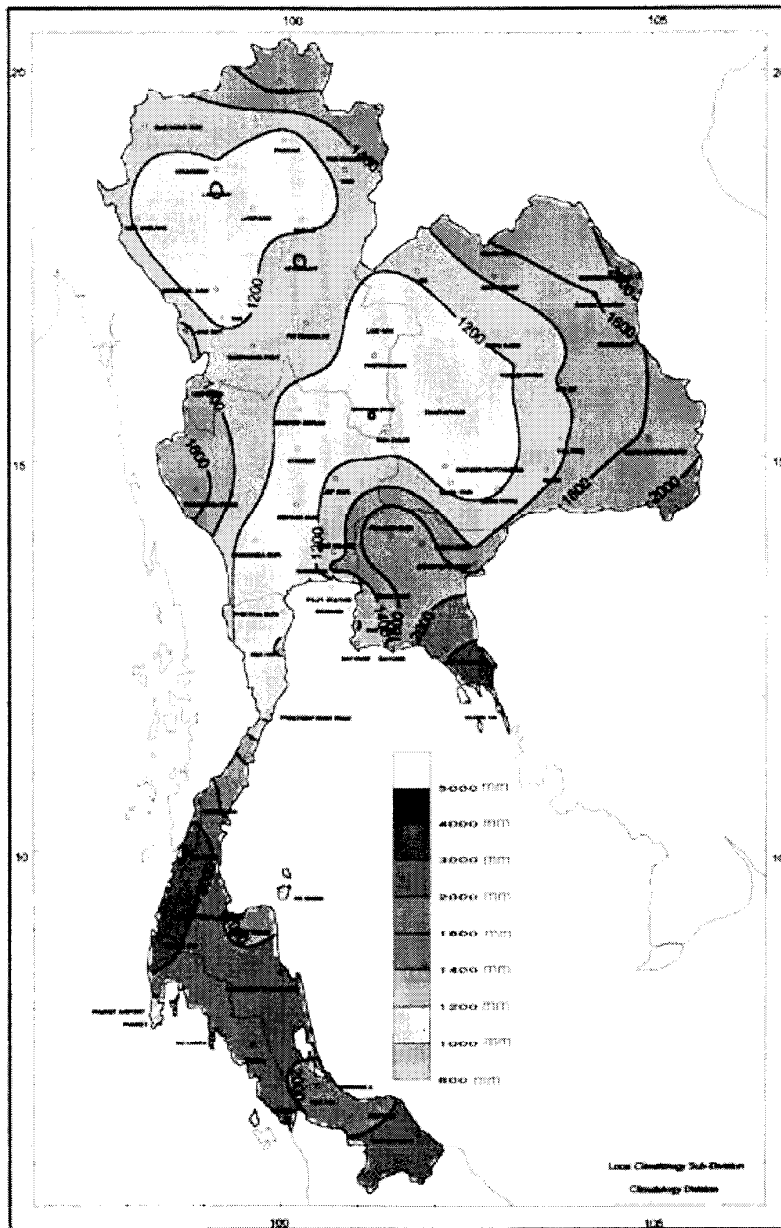
Pre-Modern Irrigation Period

Prior to the modern irrigation era which started in 1960s, there were five typical methods for managing agricultural water in the country. The most outstanding one was the farmers-organized Muang Fai irrigation systems in northern Thailand. This kind of systems was small scale systems which were run exclusively by respective system members or large scale systems which were led by community leaders or regional rulers. The Muang Fai irrigation technology has been common in the Tai region covering northern Thailand, eastern Myanmar, southern China, northern Laos and northern Vietnam where topography is mountainous and the arable land in small valleys is limited. In the old Lanna Kingdom, the weir and ditch technology was extensively used to divert water to paddy fields through organization of users who shared costs and benefits; and Muang Fai irrigation institution was developed. The institution attained its height in northern Thailand in the form of the Mangrai Satre of the Mangrai Reign (1362-1417). Today, there are still a number of Muang Fai systems. Some of which are still maintained by users; some are improved



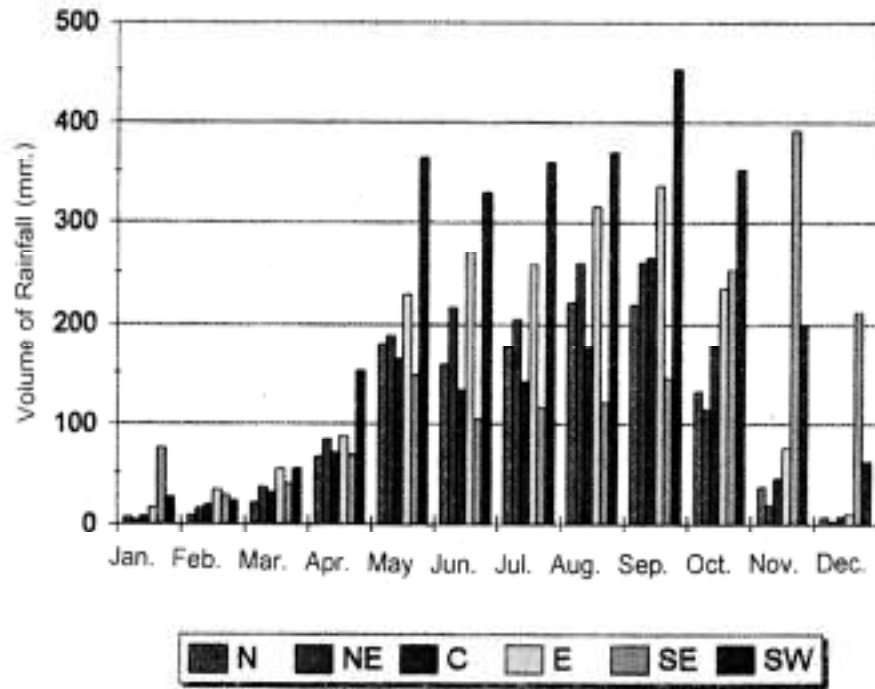
Source: National Research Council, 1989

Figure 4-1: Physiography of Thailand



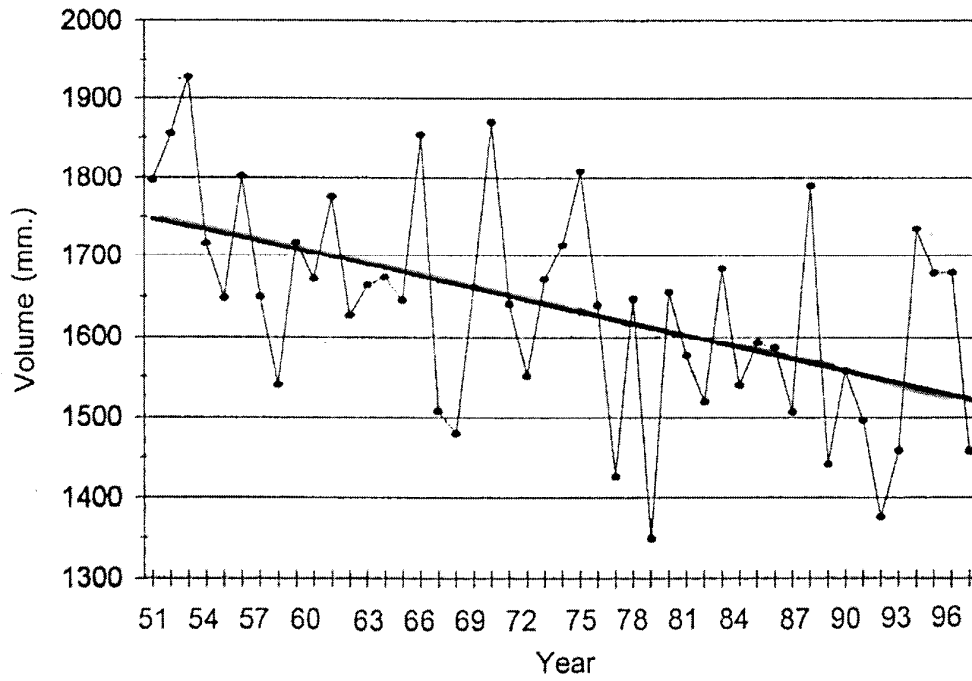
Source: Vorakupt, 1999

Figure 4-2: Average Annual Rainfall (30-year Cycle from 1961-1990)



Source: Vorakupt, 1999

Figure 4-3: Average Monthly Rainfall in the Regions



Source: Vorakupt, 1999

Figure 4-4: Trend of Average Annual Rainfall in Thailand

by state government agencies and some are incorporated into the service areas of larger scale national irrigation systems. The People's Irrigation Act of year 1939 has been promulgated to legitimize the Muang Fai systems under the Thai state administration system. Major contents of the Act follow a typical Sanya Muang Fai irrigation contract.

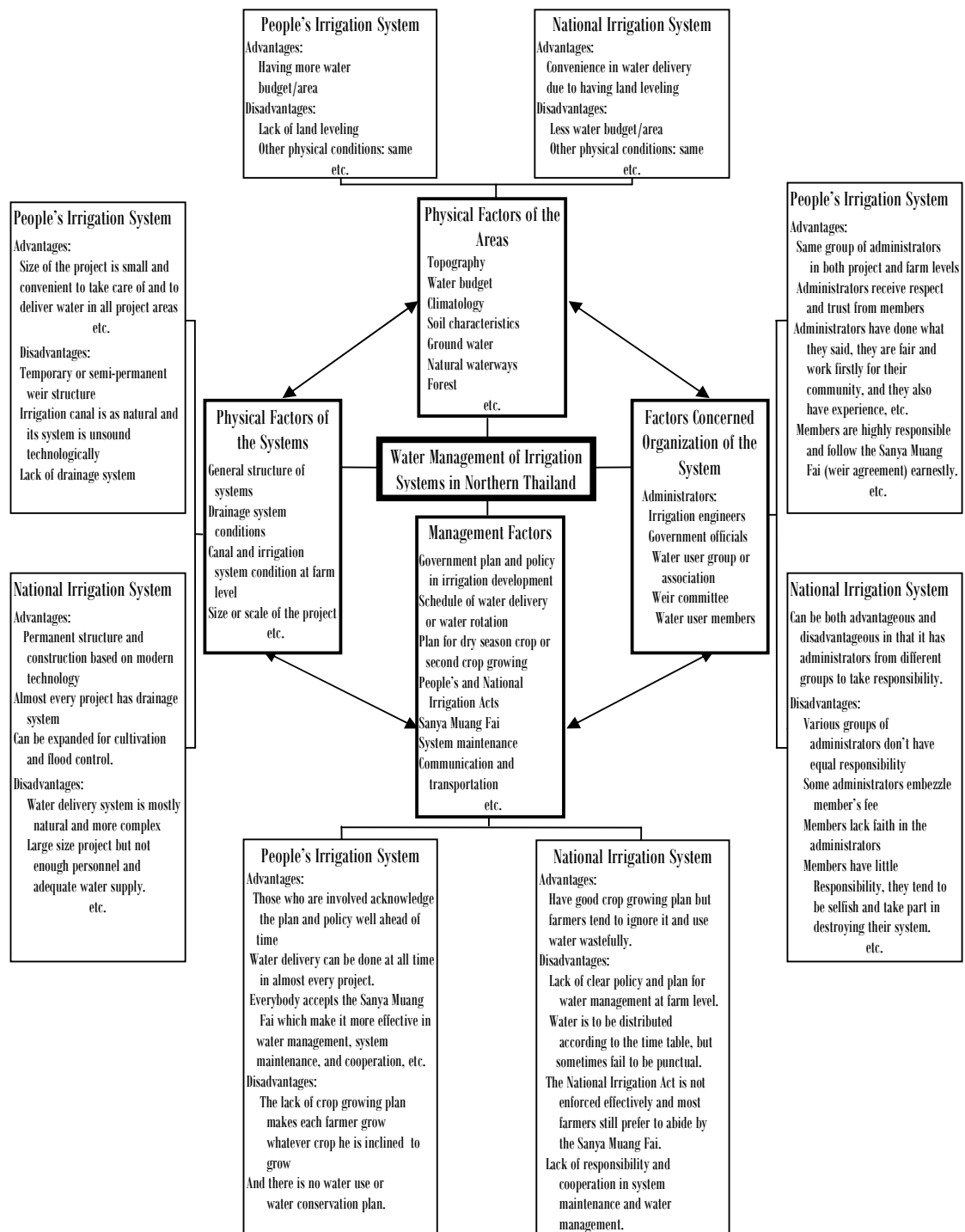
Other methods of agricultural water management in other regions include the management of farming to suit the natural flood conditions in alluvial plains such as in the Chaophraya Delta areas, the construction of ponds or *barai* along the concept of the Khmers to serve the centers of the kingdoms, the development of rain-fed culture in the northeastern region where social interdependency becomes high because of problematic soil moisture retention capacity, and the *somrom* mixed farming and bartering culture in the rainy southern regions.

Pro-Growth Period: Emphasis on Infrastructure

The mainstream irrigation management has been dominated by the Royal Irrigation Department which is authorized by the State Irrigation Act of 1942. It is only recently that the Department of Water Resources has been established to check and balance the water resources development for environmental concerns. The present setting of irrigation management in Thailand is in a transition from a heavily centralized management but how much the centralization degree can be lowered is still a subject of discussions and negotiations.

During the first three National Development Plans (1963-1976), focus was given to building the nation to withstand external socialist and communist forces that were prevalent in the region and against the choice of the then pro-USA government. As a result, if observed from the people participation perspective, the institutional setting rarely allowed for people's participation. Most the infrastructure was provided by the state government, not initiated by the people's expressed necessity or demand. Irrigation management was conducted mainly by the state irrigation agency with a great influence of foreign development ideas, loans and grants. During the period, it was believed that if the government provided the infrastructure, the generated wealth would trickle down to everyone. This so-called "Blue Print" was believed as having a capacity to modernize the country. Large-scale water storage projects were then expedited, mainly in the Central Region. During the period, the Chao Phraya Barrage, the Bhumibol Dam and the Mae Klong Project were constructed to stabilize water supply. Surarerks (1986) compared the Maung Fai or people's irrigation systems with national irrigation systems and found that in terms of organization and management the former have clearer advantages than the latter. See a diagrammatic results of her study in Figure 4-5.

Concentration was then placed on the development of main systems, leaving the responsibility to develop on-farm irrigation systems to farm land owners, almost unknowingly. The idea to divide the irrigation development between the state



Source: Surarerks, 1986

Figure 4-5: Water Management of Irrigation Systems in Northern Thailand

provide every farmer in irrigation areas with irrigation water as targeted. However, when considered from the practical point of view, it was found that since the beneficiaries included in the national irrigation projects were not the initiators of the projects, for them to get organized after the national irrigation construction was completed was a mission with no responsible agents. Engineers were oriented only to their construction goal, placing high emphasis on the efficiency of time and budgetary use and engineering expertise, overlooking the importance of people's participation. Most infrastructure was realized, not by the people but rather the potential physical conditions as calculated by the engineers. The laws on farmers' groups simply provided that the government was to promote the organization of farmers, without clearly identifying which agency was responsible for so doing. As a result, each agency tried to organize farmers according to their different focuses such as irrigation groups, paddy groups, land improvement groups, etc. During the period, the expansion of irrigation area kept rising by 13% between the first two plans and 53% between the next two as shown in Table 1-1 while the potential of the people in working in a new environment was somewhat overlooked.

In the second half of 1970s, water demand was calculated as increasing rapidly. Efforts were continued to develop more water resources in the form of large and medium scaled projects. The criteria used in classifying the project scales as shown in Table 4-1 were created to facilitate assigning staff for different project administration styles required by each project scale.

Table 4-1: Classification of Irrigation Project Scales

Scale	Storage Capacity	Water Surface	Irrigable Area	Construction Period	Land Acquisition Budget
Large	100 million cubic meters or more	15 km ² or more	12,800 hectares or more	-	Available / Not Available
Medium	Less than 100 million cubic meters	Less than 15 km ²	Less than 12,800 hectares	-	Available / Not Available
Small	-	-	-	Within 1 year	Not Available

Intended Management Intensity Period

From late 1980s to early 1990s, more attention was paid on distributing development to rural areas. Small scale projects gained more emphasis, but with the same conventional division of work between the state agency and farm land owners. The attention to the society increased, theoretically, by making local communities as requesters of small scale irrigation projects from the state government agency. But

still there was no systematic framework for the people to participate in the subsequent planning, design and installation of the operation system. The state irrigation agency still took charge of all design and construction work and turned over the facilities to the provincial governors, appointed by the state government for further management. In the period, the rates of irrigation area expansion were still high, 29.6% and 25.9% between the Third to Fifth National Development Plans.

Gradually, the importance of operation and maintenance aspects of large and medium scale projects begged for a greater attention. This shift, partly necessitated by less availability of water resources that have apparently high development potential, gave operation and maintenance staff greater recognition than previously accorded. In the same period, people's participation was gaining worldwide attention after international organizations evaluated development projects funded by themselves as hardly achieve the project target because of lacks of involvement of development beneficiaries.

In late 1990s, the expansion of irrigation area shrank with only 11.16% and 8.38% increase in irrigation areas between the Fifth to the next two National Development Plans. Amid a rapid expansion in the non-agricultural sector, the water resources development style started to change from the irrigation project-based to the river basin-based. During the period, significance of natural resources conservation also started to gain ground. Requirements have been stipulated that environmental impact assessment must be assessed for large scale projects and mitigation measures must be provided. However, the identification of new projects was still handled by hydraulic bureaucrats who concentrated on calculating and focused on water deficit areas especially the Chao Phraya and East Coast Basins. On the other side, more small scale irrigation systems were constructed to support subsistence farming. Campaigns to promote people's participation in operation and maintenance irrigation system were conducted. Balance between economic wealth, quality of life and social equity were mentioned.

At the advent of the new millennium, the rate of irrigation areas expansion reduced to 7.16% and 1.42% during the last two National Development Plans. These two plans brought into prominence the significance of people's participation in managing natural resources for their self-sufficient livelihood. The Tenth National Development Plan continues in the same spirit and states explicitly that there is a need to improve the efficiency of water management of the country.

People's Participation Period

Social movements that led to the enactment of Constitution of 1997 signify that social paradigm has been changing. It has become clearer that the state affairs are being handled through movements of interest groups or advocacy groups. This paradigm is common in societies where social structure has been developed through time with check and balance mechanisms to ensure the movements are for the benefits of all or the majority of the people. This paradigm can pose danger if

applied in imbalanced societies. In such societies, powerful interest groups can abuse their power solely for their own interest and to the detriment of the society as a whole. The Constitution 1997, which is the first ever drafted by the people, not only politicians, provided for role changes and paved ways for reforms in many aspects of public administration such as local administration and education reforms. Several articles in the Constitution underscore the indispensability of people's participation. For example, Article 46 stresses the right of communities to participate. Article 56 stresses the right of individuals to participate with the state and communities in maintaining and benefiting from natural resources and bio-diversity, and in protecting, promoting and maintaining the quality of the environment for their normal way of living without undermining their health, welfare and quality of life.

As may be pointed out when the path analysis of Historical Institutionalism is applied that the present time is the historic juncture of the country. Several conditions are pointing towards changes, and institutions will change when several factors converge and settle themselves. In terms of agriculture, Thailand has come a long way from a traditional farming society to one of the world's major exporters of agricultural produce, thanks partially to water control technology. At the same time, urbanization and industrialization in many parts of the country have also led to tremendous changes in water consumption pattern. Per capita water consumption increases to 200 liters per day while environmental conservation is also yearning for changes in water resources management.

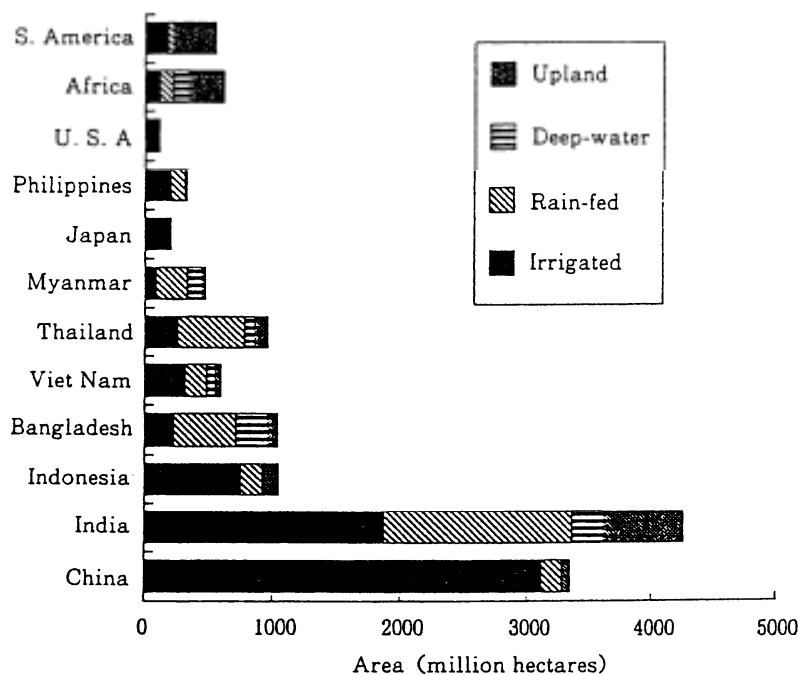
Despite its flaws that raised the need for a new constitution, the Constitution of 1997 has charted a clear overall direction for the country. It, in principle, intends to widen and redistribute opportunities for the people to participate in decision-making, contributing and benefiting for their livelihood. The Ministerial Cabinet issued on October 31, 2000 the National Water Policies in recognition of the limitedness and the depleting status of water resources, demographic increase and development necessity. One of the nine major policy issues is the intention to support and promote people participation and determine the participation pattern, the right and duties of the people, private organizations and government agencies in water resources management. Some actions have been undertaken to fulfill the policy. Following the Act on Plan and Procedure for Decentralizing Power to the Local Administration Organizations of 1999, the state irrigation agency has planned to transfer seven kinds of work to the organizations as follows: Maintenance and improvement of small scale irrigation systems, maintenance of irrigation channels, maintenance and improvement of pipe irrigation systems, maintenance of embankment roads, dredging of swamps and natural canals, operation of on-farm irrigation systems and water pumping outside irrigation areas. There are still problems such as the clarity of transfer process and related laws and regulations, the sincerity of transfers by state agencies such as transferring only work but not budget, and the readiness of the recipient organizations. However, these are normal problems that may occur in any transitional periods when power relations (Cameron, 1998) are at work, making related entities trying to maintain their status quo (Ostrom et al, 1993).

Present Status of Irrigation in Thailand

At present, Thailand has a capacity to store approximately 40,000-57,000 million cubic meters or 20-30% of its annual surface runoff. This is quite a record for the Southeast Asian region. The number of national irrigation systems located throughout the country includes 85 large scale systems, 684 medium scale systems and more than 10,000 small scale systems. The state irrigation agency plans to increase the national storage capacity to 30-50% of the surface water. The annual water capita in Thailand is 6,500 m³, compared to 3,337 m³ in Japan.

Problems in the Irrigation Sector

The state irrigation agency has been providing irrigation infrastructure to support agricultural production, particularly the production of the water sensitive high yield paddy varieties. Thousands of millions of dollars has been spent for the construction, operation and maintenance of irrigation systems each year. Most of the irrigation areas in national irrigation systems are under large and medium scale projects which are operated and maintained nearly completely by the state irrigation agency. Despite huge annual government budget, the country has not yet achieved complete water control and most farmland are still rain-fed areas or rely on ground water as shown in Figure 4-6.



Source: IRRI Rice Fact 1993 in Karube et al 1995

Figure 4-6: Distribution of Rice Crop Area by Production Environment in 1990

In addition, while irrigation is so myopic on paddy cultivation and Thailand can produce cereal surplus as shown in Table 4-2, the level of malnutrition in the country during the years 2002-2004 still stood high at 22% or higher than the average of Southeast Asia and the Asia Pacific, according to the Food and Agricultural Organization (FAO) report on its monitoring of hunger reduction goals of the World Food Summit and the Millennium Declaration. The problem then is not the production but the food, as well as wealth, distribution and this raises a question how the government should support irrigated agriculture.

Table 4-2: Rice Production (1989-1991) and Self-Support Ratio (1984-1986) of Best Ten Rice Producing Countries and Other Selected Countries

	Paddy				Self-Support Ratio		
	Production		Harvested area		Yield	Rice	Cereals
	(1000 tons)	%	(1,000 ha)	%	(Kg/ha)	(%)	(%)
China	187,036	36.0	33,265	22.5	5,622	99.9	98.8
India	111,070	21.4	42,321	28.6	2,624	106.0	103.3
Indonesia	44,742	8.6	10,403	7.0	4,301	105.9	101.5
Bangladesh	27,559	5.3	10,303	7.0	2,681	94.5	88.4
Vietnam	19,216	3.7	6,069	4.1	3,168	-	-
Thailand	19,172	3.7	9,878	6.7	1,939	141.4	160.7
Myanmar	13,658	2.6	4,774	3.2	2,862	107.5	107.3
Japan	12,688	2.4	2,073	1.4	6,118	107.7	38.2
Philippines	9,483	1.8	3,413	2.3	2,779	100.1	92.3
Brazil	9,322	1.8	4,446	3.0	2,093	98.1	88.2
USA	7,031	1.4	1,109	0.7	6,344	224.1	224.2
Australia	800	0.2	97	0.1	8,215	565.1	375.0

Source: FAO 1991 in Karube et al 1995

Inside the irrigation systems, there are also some practical problems. Frequently mentioned are the early degradation of irrigation facilities, mainly the distribution systems in all levels, primary canal level down to the on-farm levels, due to quality of construction, maintenance and operation. The problem of the insufficient budget that each public irrigation management office is receiving is often cited while only farmers in consolidated areas are required to recover some investment costs; otherwise there is no other cost on farmers. Uneven water distribution and problems of unclear on-farm level irrigation delivery schedule for farmers results in low efficiency at the on-farm irrigation level but is often camouflaged by the high efficiency at the system level. Water reuse control is not

systematic or complete, leaving out farmers who are in irrigation area but have no direct access to irrigation channels. The low on-farm irrigation efficiency has impacts on the yield, and the actually irrigated acreage as against the planned acreage.

Agricultural Context of Irrigation Management in Thailand

Presently, the scale of the agricultural sector in Thailand is decreasing. The gross domestic product in the agricultural sector decreased from 38.11% during the First National Development Plan to approximately 11% during the period from the Seventh to the Ninth Plans. The ratio of the crop sector also decreased from 30.42% to 6.6-7%. In particular, the ratio of paddy, which has long been the most important crop, also decreased from 58.14% to 15-20%. The changes in the agricultural sector put irrigation work in a new context. The flagship strategy for irrigation development through expansion of agriculture, farmland and irrigation area of the old days will need very strong justifications if it is to be pursued today. Without reasonable justifications, additional investment in irrigation development will surely diminish. In the past, irrigation served agriculture, particularly paddy cultivation. In the future, an analysis of proper cropping pattern, particularly mixed farming, and appropriate irrigation methods is necessary to provide a compass for the future investment. Existing spatial distribution of paddy production and its productivity needs a careful analysis and has high relationship with irrigation management.

As there are two major types of agricultural production, i.e. commercial and subsistence farming, a question arises as to how the government should balance its support to the two sectors. The support for commercial farming, particularly for export, needs a more valid justification in face of several factors, including high competition in the world market, especially on rice which the major irrigated product, protectionism, spread of diseases, patents, etc. The ratio of Thai agricultural export has decreased from 56% in 1982 to 21% in 2005. The ratio of on-farm income and non-farm income has decreased from 1:4.2 during the first national development plan to 1:7.7 in the ninth plan, leading to the migration of agricultural labor to other sectors. The ratio of labor in the agricultural sector and other sectors has decreased from 5:1 during the First National Development Plan to 1:1 during the Ninth Plan. In this context, an additional investment for irrigation facility which involves high cost may not be appropriate. It can be compared to an industrial investment by purchasing expensive machines and equipments to produce the same products which are more difficult to sell. Economic justification of the investment is not appealing. From the perspective of environment and society, the sale of primary product like agricultural produce has been much debated on its low and buyer-determined prices and its forsaking the domestic environment and people. Irrigated products easily fall into this category. Simple or complex processing to increase the value of the products cannot excuse the irrigated products that are produced without thorough resource use plan such as without recognition of significance of watershed conservation, negative environmental and social impacts of water transfer on the source watersheds from such criticisms. A significant strategy of the Ministry of

Agriculture and Cooperatives for commercial farming should then be a modification of the present resource-based production to knowledge-based production. From the perspective of social impact, problem is in the justice in development benefit distribution. Often the government investment on agricultural production for export yield benefit to the agricultural trader and large scale farms who can make profit from the economy of scale. This is an important point because the majority of Thai farmers are small farmers who have no capacity or mechanisms for effectively unifying themselves into a larger trader. Large scale traders and farmers often have the capacity to invest in their own irrigation systems. The public irrigation sector should take a greater role in supporting small farmers who practice farming either for subsistence or small trade.

To support subsistence farmers, there is a need to take a look at the fact that the ratio of farm and non-farm population has reduced from 3:1 to 1:1. Ninety percent of the farm population has the basic education but only 14% have the opportunities to receive occupational training (MOAC, 2006). Question is how many of the farm population are in the irrigation area and outside. If they are still outside, it is necessary to know whether they have good access to some kinds of water resources. What action the government should do in supporting those inside irrigation area and outside?

Challenges of the Public Irrigation Sector

General social changes have posed new challenges for the public irrigation sector. A series of question can be listed but not exhaustive. How to develop irrigation for mixed cropping systems? How to maintain existing irrigation areas amid competitions of land and water demand of other sectors and urbanization? How to select the appropriate investment projects for the future? How to develop sustainable irrigation technology? How to find a proper role of the public irrigation sector? How to promote participation of small holders in irrigation management? All of these questions and others should be considered based on the dilemma of the true nature of water: a public good or a human right or social good (Arce and Maume, 2005; and Perry et al, 1997).

In terms of participation in irrigation management, the state irrigation agency has been groping for ways to pursue the participatory irrigation management approach. Several studies were done to investigate the reasons for non-participation in Thailand and outside. The results showed that the reasons for non-participation included low income, especially from paddy which is the main irrigated crops in Thailand (Rice, 1997), the state's failure in integrating farmers during the early stage of irrigation system design, resulting in seriously flawed designs and unwillingness of farmers who did not fully or equitably gain benefits from the system to participate in the subsequent construction, operation, maintenance and repair (Surarerks, 1980). Other reasons were the complexity of the chosen technology that required complicated operation and high maintenance costs than farmers could afford (Vermillion, 1998) and the availability of more choices of non-agricultural

occupations (Brosma, 1997). Also cited was the patronage system that groomed the perception of farmers that irrigation management was the duty of the state despite their accumulated capability to fully manage the system themselves. There were also cases of rent-seeking in which some were leaving others to invest while they were waiting to reap only (Hardin, 1968; and Ostrom, 1992). It was also noted that non-participation was usually resulted in unjustified subsidy for only some privilege groups to achieve the national aggregate growth, not welfare distribution (Goulet, 1989).

The real situation of participation in irrigation management in Thailand is still unclear. Practitioners have been trying for decades and the results are extremely slow. There must be some practical and/or fundamental problems that need to be clarified before setting up the goal that practitioners should move toward and the principles that they should remember in devising their working approach. The next five chapters present the results of five study cases. Two of them are the cases of national irrigation systems which clarify participation problems in the project initiation stage to the on-farm management stage. A comparative Japanese case juxtaposes differences and makes it easier to understand participation situation in the project processes in Thailand. The last two study cases are small and large scale Muang Fai irrigation systems which are locally exemplary cases of absolute participation.

CHAPTER 5

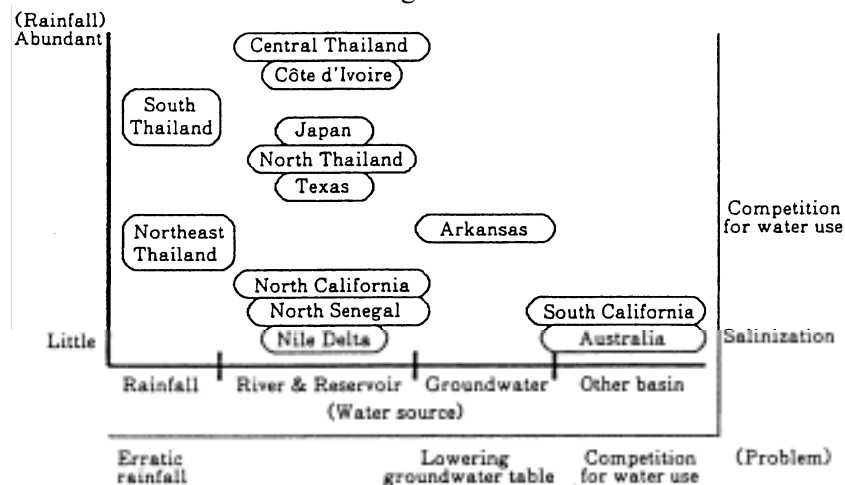
PARTICIPATION IN THE NATIONAL PROJECT PROCESSES: THE CASE OF MAE KUANG

Introduction

The study on the situation of participation in national irrigation project processes started with the case study on the Mae Kuang Irrigation System in Chiangmai Province, conducted during the period from August 2000 to October 2001. The objectives of the case study were to analyze the actual practices in national irrigation project processes, to evaluate the level of participation in the processes and to explore ways to augment the participation situations. The project processes include the initiation, design, construction, operation, maintenance, repair and improvement stages.

Research Methodology

To prick understanding, the study was conducted concurrently with the study on the case of Manno-ike Irrigation System in Kagawa Prefecture in Japan, which will be presented in the next chapter. Both the Mae Kuang and Manno-ike are relatively large scale projects for their respective countries. Both have reservoirs and distribution systems and people' irrigation systems incorporated in them. Both are located near the urban centers of their respective regions and have the common major crop of paddy. Their paddy environments are generally comparable in terms of rainfall and water sources as shown in Figure 5-1.



Source: Karube et al, 1995

Figure 5-1: Development of Paddy Fields under Different Rainfall and Water Sources

Cognizant of diverse conditions within the wide systems, sample sites covered both upstream and downstream areas. For the Mae Kuang case, three sites were selected in FTO No. 26-LMC and the 16R-LMC canal. For the Manno-ike case, 17 sites were sampled to cover the high number of main canals and urban centers. The study methodology comprised reviews of official documents and working records, observations of irrigation facilities and irrigation management activities, questionnaires, and individual and group interviews of state irrigation agency executives, irrigation system managers, field irrigation operators, upstream and downstream farmers, and local administrators on their participation in each process.

Profile of the Mae Kuang Irrigation System

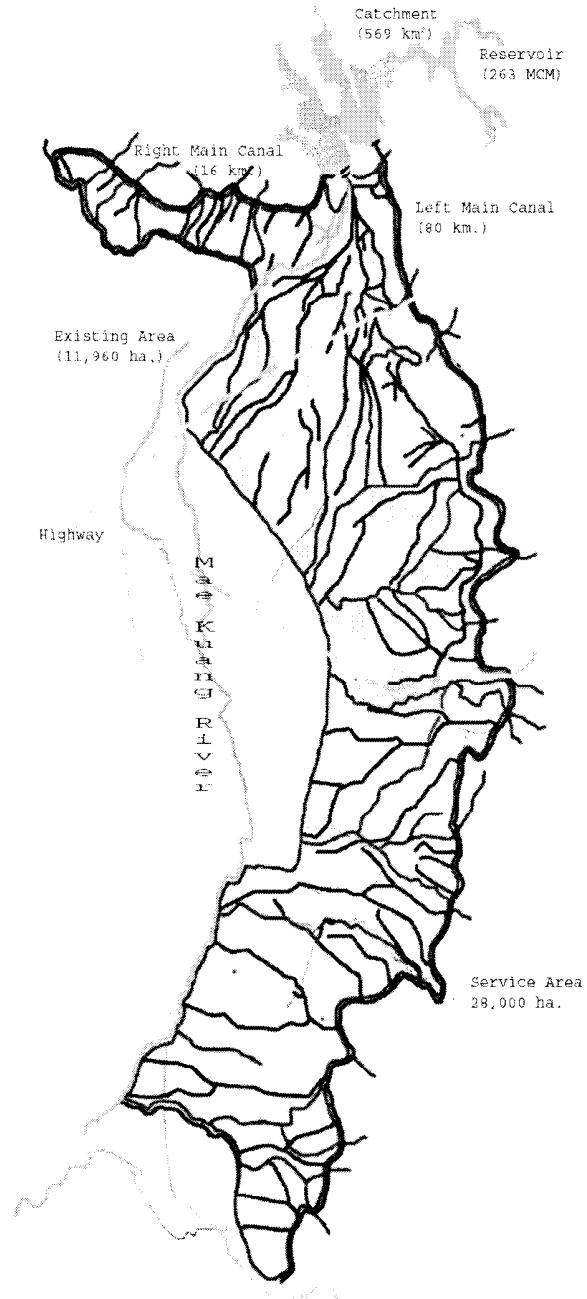
The Mae Kuang Irrigation System is a large scale national project laid over areas where some people's irrigation systems and smaller scale national irrigation systems had existed. Eighteen of the people's systems still exist (Kimura, 2004) as part of the national Phataek sub-system which was improved in 1957 to irrigate 11,960 ha. After the 569 MCM Mae Kuang reservoir was built, the irrigation areas were extended to a total of 28,000 ha. See the layout of the Mae Kuang Irrigation System in Figure 5-2.

Findings

Project Initiation: Non-Systematic Participatory Framework and Pro-Growth Rush

Information on the initiation of the Mae Kuang Project was diverse. The interviewed water users were not clear who initiated it. Some possibilities were His Majesty the King, the Royal Irrigation Department (RID), Chiangmai Governor, Airforce Unit 41, some local politicians, or the chief of the Phataek Weir. Irrigation officials believed the initiation was resulted from the villagers' request to the RID regional office, lobbying of authorities by politicians, and petitioning of villagers to the King. RID officially recorded that His Majesty the King suggested in 1975 that RID study damming the Mae Kuang river to retain excess water that would flood the Mae Kuang and Ping river basins for irrigation in the dry season. The subsequent planning process was monopolized by RID.

The Office of the National Economic and Social Development Board concurred to the project and the Cabinet approved the preliminary implementation of the Mae Kuang Irrigated Agricultural Development Plan in 1976. RID commenced the survey, design and primary construction in 1977 and received the Technical Assistance from the Japan International Cooperation Agency to review the feasibility study of the project. Subsequently, the Thai Government signed a loan agreement with the Overseas Economic Cooperation Fund of Japan under four Yen Loans (the 9th, 11th, 12th and 13th) for the procurement of consulting services for detailed design and construction at the total amount of US\$ 70.035 million.



Source: RID, 1986

Figure 5-2: Layout of the Mae Kuang Irrigation System

Several RID offices took part in its planning. The regional irrigation office conducted a preliminary study with assistance from related technical offices on socio-economic, topographical, geo-technical, and hydrological surveys. Then, the central Project Planning Division employed external consultants to conduct the feasibility study, calculate inflow and determine the service area. When the project was considered as feasible from the technical, social and economic points of view, it was ranked for government budget allocation. The project planning had little involvement of the people in the target area. Interviewed farmers informed that their roles were limited to assisting surveyors in re-orientating themselves in the unfamiliar locality, showing water sources and flow direction, and identifying the natural streams and bridges that should not be disturbed. They gave information regarding the acreage of their land and negotiated when their land was purchased for construction work. Their roles were limited to providing and receiving information while decisions were made totally by the developers. It is only recently that the National Environment Protection Act of 1992 requires that the environmental impacts of large-scale development projects be assessed and undergone public hearings. However, there are still criticisms regarding their partiality and the limitedness of chances for people to provide their opinions in the early project stage.

Interviewed farmers evaluated that the ex-post income did not increase substantially in real terms. The project base line survey recorded that the net income per household in 1984 was US\$ 79.5. A monitoring survey in 1997 found the income rose to US\$ 500 (OECF, 1998). However, this study found that on average farmers in the upstream sample areas could make US\$ 497.8 from two crops while those in the downstream earned only US\$ 197. The reasons for lower project impact were related to unmatched agricultural development and ineffective irrigation water distribution. Interviewed farmers were averse of risks of production failure, citing higher production cost through use of employed labor instead of family labor as deterring them from intensifying production. Positive project impacts were water convenience, ability to turn some previously idle land into farmland, increased harvest opportunities and possibility of tree cropping.

Design: Non-Integration of Existing Systems and Social Capital

The design of the Mae Kuang system was contracted out by using the Japanese Yen loans. With a specific timeframe to finish their work, the designers had obviously circumvented the integration of the existing people's irrigation systems, and smaller national irrigation systems such as the Phataek and Mae Tip systems. This resulted in two kinds of problems, i.e. less water resources for the people's irrigation systems and the wasteful use of water from the Mae Tip and Mae Kuang systems which would be otherwise saved for larger irrigated area especially in the dry season. The circumvention also deprived the new system of the existing social capital, i.e. the existing water users' groups.

Upstream farmers evaluated that the design could distribute the water well. The design of farm turnouts (FTOs) required that canal water level be checked

up to allow downstream farmers to receive water before upstream users. In practice, upstream farmers took water as soon as they saw water, thus the water level could not be raised to the threshold of downstream FTOs. See Figure 5-3 for design concept. This concept was not different from that of the local Muang Fai systems, but the lack of group control in the newly developed system led to unscrupulous water taking by upstream farmers, resulting in inefficient water distribution.

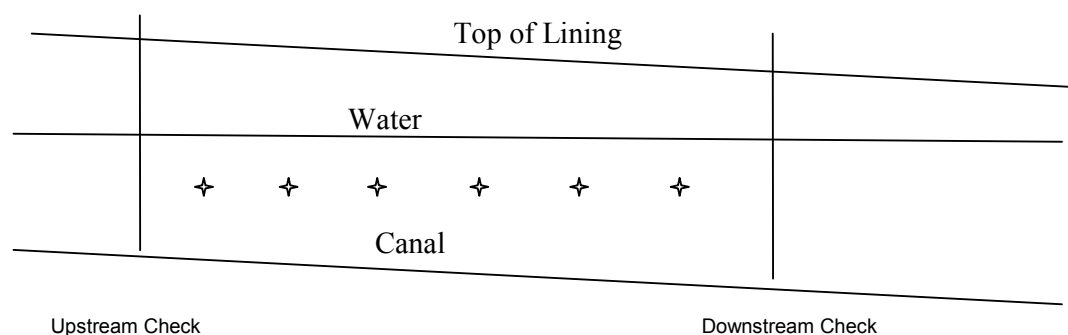


Figure 5-3: Design Concepts of Mae Kuang Irrigation Canals

Construction: Non-Commitment of Users on Maximization of Returns

The construction of the Mae Kuang Irrigation System was made possible with the external financial loans. There was no mechanism to commit any entity, especially farmers, to generate the expected returns. The construction was contracted out in three phases for the left main dam and right main canal in 1986-1991, the main dam and right bank dam in 1987-1992, and the left main canal in 1989-1992. Those were the construction boom time in Thailand, making it difficult for contractors to recruit manpower and finalize construction drawings. Interviewed villagers had limited roles in re-orientating constructors regarding location and direction and working as daily paid workers for the contractors. Local villages made about 20% of the project workers and foremen. Some of the foremen are now employed to work as the project zonemen. It was only in the tertiary canal construction that farmers sometimes did the construction by themselves with some materials and guidance provided by the department.

Operation: Passive Participation

At the construction completion, the department's construction team transferred the irrigation system to the Regional Irrigation Office I who assigned an operation and maintenance team to take charge of operation, ordinary maintenance, repair and improvement (RID 1988 a, b, c and d). See the organization of the water management team of the Mae Kuang Operation and Maintenance Project in Figure 5-4.

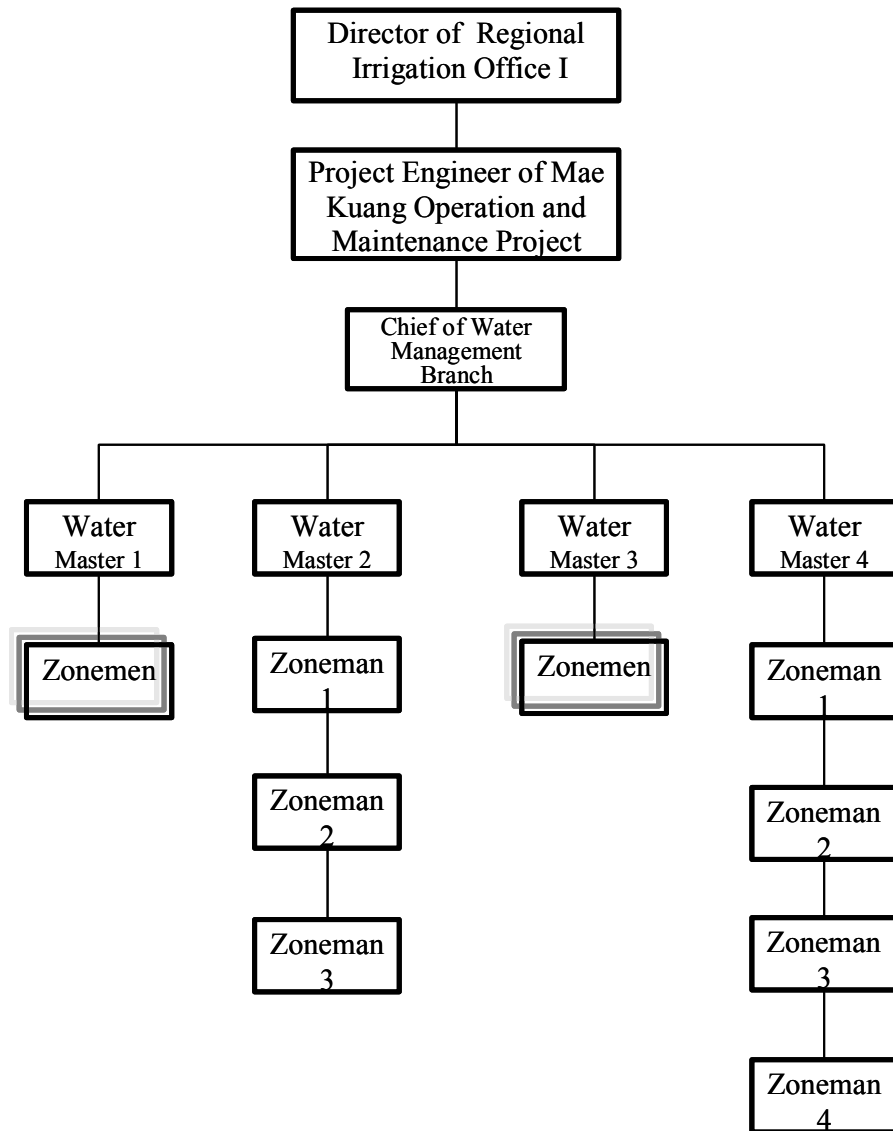


Figure 5-4: Organization of the Water Management Team of the Mae Kuang Operation and Maintenance Project

Interviewed regional executives revealed that their office served as the supervisor of the Mae Kuang Project Office and linked it with the Bangkok headquarters especially on requesting budget which was based on the acreage of service areas. The budget received each year was in the range of 5-10% higher or lower than that of the previous year.

The Project Engineer was responsible for the operation of Mae Kuang irrigation system and office, and the submission of water management plan to the Bangkok headquarters. In principle, the work of the Project Engineer included (1) Planning the seasonal and weekly water diversion requirements, (2) Implementing water allocation and distribution, (3) Promoting efficiency of water use by setting and publicizing the start and the end of irrigation seasons, (4) Supervising the weekly allocation, (5) Deciding on allocation scheduling during water shortage or excess periods, (6) Representing the project office in coordinating with other authorities, (7) Maintaining good contacts with the farmers and their organizations and motivating them to make use of the available irrigation facilities efficiently, (8) Supporting farmers' organizations and providing them with training on irrigation management, and (9) Reporting on the activities of the project office, ensuring proper functioning of the different sections in the project office with special emphasis on a timely budgeting and proper staffing, and providing productive working conditions for the project staff.

Assisting the Project Engineer over the wide project area were four water masters, each of whom supervised the distribution of water from the main canals to approximately 4,000-16,000 hectares, principally depending on the irrigation system layout, and key structures where discharges could be measured and regulated. They were to advise zonemen on the efficient use of irrigation water in the tertiary system and the handling of water users' groups especially when there were conflicts; to forward the zonemen's field data on cropping pattern, rainfall, field wetness, crop status, and discharge through key structures to the Water Management Branch; supervise the zonemen on surveys for maintenance and repair needs, inspect maintenance and repair works; and guide water users' groups on tertiary system maintenance.

Zonemen were to be responsible for water distribution and maintenance of irrigation infrastructure at tertiary level in approximately 1,600 hectares. They were to report to water masters and serve as the department's contact with the water users or water users' groups. Their duties include: Supervising pump operators, and gate, canal and drain tenders; operating terminal FTOs; collecting seasonal crop pattern data especially dry season crops, weekly field wetness and crop status, daily rainfall, water levels above check structures and FTOs; reporting on weekly water distribution; coordinating and guiding farmers on the tertiary operation and maintenance; attending water users' groups meetings; reporting on damage; keeping cleanliness; preventing encroachment; and informing water users of the project office's water allocation plan. Interviewed zonemen reported they were flexible about gate operation when farmers were in need of additional water. In upstream

areas, some farmers were allowed to control FTOs on belief of both farmers and water masters that such was a way of participation.

Interviewed irrigation staff reported problems of insufficient staff number and qualifications, low salary and high expenses, lacks of incentives to farmers and farmers' leaders to participate, insufficient and two-year delayed budget and tedious procedure for preparing budget requests, lack of equipments, lack of public relations, lack of trust from farmers, lack of coordination with other agencies, lack of communication among project staff especially between the top level and the lowest level, inability to catch up with technical advance or to fulfill policies, lack of long term plan, and less water inflow than planned.

The relationship between irrigation staff and water users was hierarchical as shown in Figure 5-5. The O&M team collected and compiled data, and made decisions on everything regarding water distribution, gate operation, maintenance and repair work. Water users' roles were limited to the tertiary level. To prevent the water conflicts between upstream and downstream farmers, low level field staff had to juggle in their way. There was no platform to find joint solutions to the conflicts.

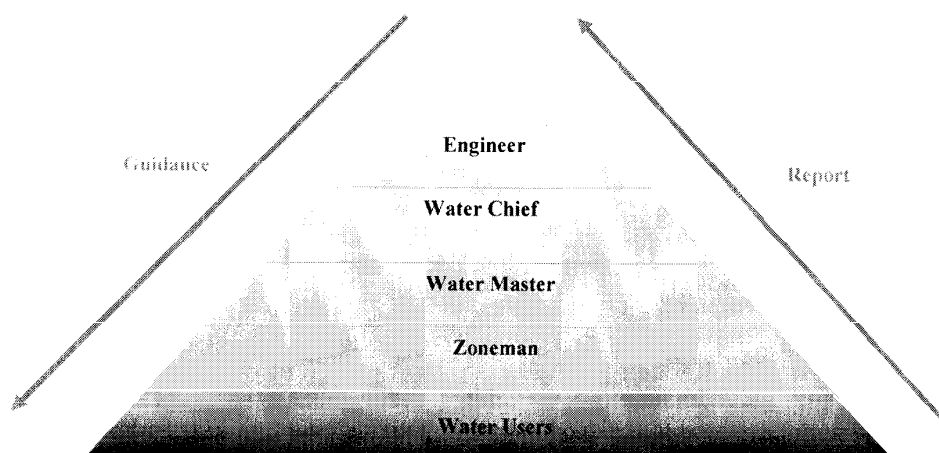


Figure 5-5: Relationships between the O&M Team and Water Users

Water distribution was decided and operated nearly completely by the project staff. Water Management Chief decided the discharge in the main system and each of the four sections. The decision was based mainly on previous years' plan, not on the crop survey data collected and reported by zonemen. Water Masters were to manage distribution within their responsible areas while there was no effective monitoring of the decided ratio. There were complaints that upstream zonemen took more water for their areas than the decided ratio.

Upstream farmers were eager to seek roles in deciding how water supply schedule should be set. Basically, prior to the irrigation seasons, a meeting was held to announce the starting of the water delivery. The communication on this meeting did not effectively reach all farmers. The format of the contents of the announcement included three components: (1) Irrigable area in each season, (2) Nursery, land preparation, and transplanting schedules and (3) Water supply time and volume for the waterworks. The setting of irrigable area in the dry season was so simple that there was no clear methods how the area could be controlled and how to find a fair ratio for individual farmers. Farming schedule was not strictly observed by farmers. As a result, water delivery schedule was frequently adjusted as special requests trickled in. Some of the requests were made because the applicants simply did not attend the pre-irrigation season meeting. The frequent adjustment subjected the downstream farmers to unpredictable water delivery. The communication on water schedule was done through village headmen and ditch leaders by means of personal interactions, meetings, or village wired radio system. Most users hardly met RID personnel in person. Zonemen in downstream areas met their farmers most often. Even so, upstream farmers still complained that irrigation schedule was not flexible enough to meet their farming schedule that should not be simultaneous with others so that they could find farm labor and obtain off-season high prices of products. These complaints revealed that farmers and water managers were using different criteria for water scheduling. Uniformity was what the irrigation managers looked for while flexibility was what the farmers looked for. When necessary, farmers pressured the water managers through their ditch leaders, village headmen and Tambon Administration Organization, or took direct action in opening the water gates outside their schedule by themselves. Irrigation managers viewed their complaints and actions as lacks of understanding and tended to think that the maximum gate opening levels must be marked and locked to prevent such behavior.

Downstream farmers were less satisfied with water delivery, saying water did not arrive at their field as scheduled. Downstream zonemen said only 50-80% of the schedules were kept. At critical times, farmers and zonemen patrolled in the night to prevent water stealing on an official car to prevent retaliation by the offenders. Where there were conflicts, farmers informed the village headmen, ditch leaders, irrigation staff, or a locally influential Pho Liang or tycoon. Seeking help from non-irrigation officers was perceived as political interferences by the irrigation staff. In general, downstream farmers got water when the upper water masters made it available to them. If not, they used sandbags to check up water level, damaged facilities or removed gates out of anger according to irrigation staff. The tail-enders did not bother much to compete for water as they knew they would only end up wasting their time to no avail. Conveyance losses through earth ditches, broken lined ditches and water conflicts convinced them not to rely on the Mae Kuang irrigation system only. They stored rainwater or pumped water into their farm ponds as spare stock, tapped groundwater or even surface water from other sources such as the Mae Tip reservoir. They complained that their problem could not be solved and there was no one to rely on. High-ranking officers gave only empty promises while lower ranking officers gave them a special supply when they could. Despite the complaint,

conflicts did not escalate thanks to kinship, respect to the power and reasons of the leaders.

Irrigation staff said water distribution could be improved as there were still some water conflicts. One of the strategies used in avoiding serious water shortages was to report lower water availability than the actual. Higher ranking officers insisted field staff solve the problems although it was admitted that some problems could not be simply solved. Top regional officer said technical problems could be solved but people problems could not because if they violated the rule, neither the department nor police could arrest them. The inability to solve the problems left the zonemen with tedious work such as repetitively closing some gates that would shortly be reopened after he left. The cat and mouse play and negotiations with ditch leaders who insisted his members be given more water or outside their schedule wracked the nerve of the hard-working zonemen. They often relied on village headmen in communicating with the farmers. Zonemen wished to see that water allocation strictly follow the plan.

There has been attempt to organize water users in large and medium scale systems to boost the irrigation efficiency. See the total number of water users' organizations in Thailand and Mae Kuang area as of 1 January 1998 in Table 5-1. It was believed that water users' groups could help to solve water sharing between head-enders and tail-enders and system maintenance problems (Duanduan, 1990). Interview data revealed that head-enders of tertiary canals were more willing to join water users' groups during the ditch and dike on-farm irrigation development project. Those who wanted to join later faced difficulty because existing members did not want them in to compete for access to a provided revolving fund. The exclusion of these late comers who received water from the same irrigation channels raised an important question as to how water could be effectively and efficiently managed. However, this might not be so relevant in this case because the groups seemed to be rather inactive about water management but very adamant just about the competition for funds.

Table 5-1: Number of Water Users' Organizations and Members
(as of 1 January 1998)

Number	Basic WUGs	Administrative Groups	Irrigation Water User Associations	Irrigation Water Users Cooperatives
<u>Organizations</u>				
• Nationwide	11,701	280	337	58
• Mae Kuang	152	10	0	0
<u>Members</u>				
• Nationwide	283,447	112,822	29,052	41,345
• Mae Kuang	2,073	11,184	0	0

(Source: Soongyai and Rujithip, 1997)

From the irrigation staff's perspective, water users' groups should be responsible for the distribution of water to all farmers in the groups according to the rotation schedule, the regular maintenance of tertiary canals and structures including farm roads and drains, and the election of the group leaders and assistants. The group leaders were expected to promote the equitable water distribution, to report water complaints and structural malfunctions and cropping patterns to the zonemen, to organize meetings and maintenance, and to keep financial accounts of the groups. Top regional officer had the opinion that the group formation and effective operation was difficult because the farmers' leaders were not paid for their service, making the work their burden and heavy social duty, and villagers nowadays did not have trust toward each other as in the past. Water masters raised the lacks of the sense of belonging to the same irrigation system and the limited opportunity to meet and discuss their problems especially those usually occurred in the dry season.

The department's guidelines (1997) prescribed that water users' group members cultivate on the agreed time schedules, take water only at their turns, and cooperate in water sharing and maintenance works. They were supposed to form 20-cm bunds around their paddy plots to prevent water loss, retain rainwater in the field as much as possible, and suppress the spread of predators such as rats and crabs. Upland crops cultivators were expected to excavate furrows from top field to down field for proper water distribution, excavate drains at down field, and maintain furrows in good condition.

To promote the formation of water users' organizations, the department organized an annual contest of outstanding organizations based on their initiations in raising cooperation among members for stable and better water allocation, their management performance in the aspects of planning, operation and maintenance, and administrative functions, the attendance of members in meetings, construction of tertiary canals, maintenance of irrigation structures, contribution of cost as well as conservation of the environment, society and public properties (Duanduan, 1995). Several complaints were heard across the country that the contest was not fulfilling its original purpose. Good groups that failed to win the contest for some reasons were discouraged.

The department took a gradual approach in forming the farmers' organizations from the bottom, i.e. first forming the tertiary canal groups and then integrating them into larger groups at the secondary and primary canal levels. This approach was thought as better than the formation of one organization for the entire irrigation system in a single shot because farmers could not understand the needs of a system-wide organization and officials had no experience in forming one. Actually in 1960s when the department started promoting the development of water users' organization, it aimed for the system-wide format. Some associations were established but they did not cover the entire irrigation system. The rush to establish the associations after one or two meetings did not help very much to create understanding for both farmers and officials. Following the opinions of some irrigation staff that the system-wide organization might not be suitable in some local

conditions, in 1989 the department decided to promote tertiary or basic water users' groups, believing that the group structure was less complex and over time, farmers would be able to create larger integrated organizations. Some detailed working procedure along this approach was established and include the following: (1) Clarification with farmers about the problems and the possible solutions in the area, the benefits and necessities of the water users' groups, the purposes of the group, the activities of the group, and the boundary of the groups based on a 1:4000 map; and (2) Having farmers identify their leaders who were subsequently enriched with some knowledge on modern irrigation operation, laws, management and occupations through orientations, farmer-to-farmer knowledge transfers, training and practices. It was then believed that farmers organization would stir the sense of ownership and lead to better maintenance. The irrigation staff was expected to operate the primary and secondary system effectively while the water users' organizations could operate the tertiary system effectively.

Two main forms of legalization are possible for water users' organizations but not limited only to irrigation activities, i.e. an association or a cooperative. An association can operate some business but profits from the businesses cannot be divided or shared among members. To register an association with the Ministry of Interior under the Civil and Commercial Code, the following procedure is prescribed.

1. Members meet to make decisions on registering the association, draft the association's purposes and regulations, and appoint at least three people as the initiators to process the registration.
2. The initiators fill in the association's registration form and submit it to the provincial administration office, attaching the minutes of the members' meeting, the proposed regulations, and the name list of the initiators.
3. The registrar or the provincial governor submits the form to the Ministry of Education. Once approved, the initiators are notified to process the registration and pay fee of about US\$ 43 (at the exchange rate of 35 Baht per one US dollar).
4. At the association's first general assembly, an executive committee is elected to run further activities. The committee must inform its existence with the registrar, attaching the minute of the general assembly, the name list of the committee members with certified bio-data and two-inch photos.
5. The president of the association must report to the registrar of the association's activities, e.g. annual activities, general assembly, and relocation of office, through the provincial administration office and the changes in the registration, e.g. changes in regulations, and changes of committee through the provincial educational office.
6. The dissolution of the association can be executed for the following reasons: Completion of the specified life, completion of the specified

activities, resolution of a meeting, bankruptcy, ousting by the registrar for its illegal purposes or operations.

To register a cooperative, limited and unlimited, with the Cooperatives Promotion Department according to the Cooperatives Act 1968, the procedure is as follows:

1. At least ten people who intend to join the cooperative can perform as the cooperative initiators in processing the registration with the cooperative registrar, i.e. the Permanent Secretary of Agriculture for a Bangkok cooperative and provincial governor for a provincial cooperative.
2. The boundary of the cooperative must follow the administrative boundary. Within an administrative boundary, there can be many cooperatives but they must serve different purposes.
3. A cooperative must have a specified capital and number of shares. A member must have at least one share but not more than one-fifth of the total capital.
4. The operation of the cooperative can be run by the elected executive committee with the committee president as its leader or an employed manager who works under the supervision of the executive committee.
5. Profits from the cooperatives' activities can be allocated as the operating budget, fee for the cooperative federation, and dividends for members.
6. A cooperative can be dissolved at the completion of its specified cause, at the order of the registrar after two years with no activities, and when the number of the members is less than 30 people.

The decision to divert energy to promote tertiary groups was flawed and has not produced substantial results so far. Many irrigation systems still have no system-wide organization and hence no forum for farmers-decided operation and negotiations on water management between upstream and downstream users. The vicious cycle continued.

Maintenance: Minimal Participation or Paid

Interview data revealed that the department did or sponsored almost all maintenance and repair work. Downstream farmers were more active than upstream farmers. In the upstream areas, only those farmers who received water from earth ditches said they set a date for cleaning or compacting their earth ditches. Those who used concrete lined ditches said they never had to clean them. Water masters said canal keepers were employed to weed the canal areas. During the spending period of the Miyazawa Fund, farmers were hired by the department to clean the main canals and even their own ditches. Some gatherings were also sponsored by the fund.

Downstream users inspected their situation and mobilized to dredge the canals as necessary.

Top regional officer said the project's maintenance budget was based on some calculation formula and the amount was basically based on the previous year's amount. The budget was inadequate as the zonemen reported that the operation of many gate wheels was difficult because of old cogs and several canals should be improved and lined to prevent water losses. The main system should be maintained and improved. They had the opinion that the tertiary system should be taken care of by farmers, the Tambon Administration Organizations or water users' groups. Upstream farmers knew that the water users in the traditional Phayaprom Weir in their locality set up a group fund and maintained their system together but they did not do the same.

Repair: No Participation and Delayed Repair

Both the officials and farmers confirmed that repairing serious damage was the responsibility of the department. Thus, there were reports that villagers enlarged breakages so that the department had to take charge. There were ideas to transfer some minor repair work to the Tambon Administration Organizations in some areas. Discussions with the TAO leaders found that the small Mae Pong TAO was not yet ready to take up the job while the larger Ban Klang TAO showed disinterest in the task. In some downstream areas, farmers mobilized themselves to do some too long delayed repair work.

Generally, farmers informed their ditch leaders or village headmen to inform the department about the repair need. Also, the department staff did the inventory of damage and reported their supervisors who decided the priority of repair spots. The budgeting system for repair work was such that the project must submit its request two years in advance. The Budget Bureau in Bangkok would allocate the budget lump sum to the department and the department set aside repair budget for each project. The zonemen noted that decisions on repair work were rested with water masters who attended the maintenance meetings. Some of the repair works were contracted out to the private sector.

Improvement : Vicious Cycle Continued

The construction of the irrigation system was completed in 1993 and over the first eight years the project office conducted many improvement projects. Some of the projects were stimulated by farmers who were affected by the system but others were on the discretion of the project office. Ideas for improvement among most irrigation staff and farmers were by means of constructing additional or modifying the facilities. The Water Masters believed long-term improvements could be done by provision of mid-canal tanks to solve problems of long length canals, improvement of natural streams in the areas and lining of canals. The zonemen saw that improvement relating to the elevation of FTO, stolen gates and misplaced checks

was extremely necessary. Upstream farmers needed concrete lining of their ditches. Downstream farmers needed knowledge in farm pond building. Despite their interest in having ditch lining, they pointed out that the department should first guard the canals and inspect if water had reached the destined plots or not.

Sense of Ownership: Readiness for Increased Participation

The interviewed farmers were reluctant to increase their participation. Upstream farmers had three streams of thinking. One-third of the respondents said the government built, operated and maintained the system, so it belonged to the government. Another one-third said it belonged to farmers because they benefited from the system and, living in the areas, they knew the local needs and problems. The last group said the government and farmers were co-owners. Working together, the government would know what the farmers needed. The dam was initiated by the King, the government had to take care of it.

Half of the downstream interviewees said the system belonged to the government. The other half was divided into three groups: Farmers and government shared the ownership, farmers owned the system, and no knowledge who the owner was. The fragmented and non-self-reliant attitudes were related to the free-riding attitude in the upstream area and the lack of confidence in receiving adequate water in the downstream area. Generally, farmers' sense of ownership became higher when they were talking about non-agricultural sectors, such as the Chiangmai waterworks.

The farmers had ideas how to keep the system if the state government had no more budget to take care of the system. Upstream farmers said, in the short run, they could do minor works to keep the system functioning by themselves. In the longer run, there were three choices. First, they could form a group and gather contributions from the members to keep the system. Training on administration, technical knowledge and accounting would be needed. Second, they could gather contributions and hire professionals to run the system under some rules and regulations. Third, the work should be transferred to the Tambon Administration Organizations (TAO). Downstream farmers insisted the government continue to take care of the system because it had knowledge about the system and tax money to hire staff. They saw higher risks of free-riding by farmers in advantageous positions if farmers were to keep the system themselves. The idea to transfer the management to TAOs or water cooperatives was welcomed by downstream farmers because the TAOs and cooperatives could collect some fees to pay for the management costs. If neither was possible, they preferred keeping the system by themselves with their own labor and little money to having a private company to take charge because they were afraid they would not receive sympathy from the company.

Discussions

Participation Situation and Lack of Participation Framework

The level of participation in irrigation management in the Mae Kuang Irrigation System was low and there was no systematic framework for free and fair participation. All project processes were centralized as shown in Figure 5-6. The project initiation came in informal actions of irrigation officers, some farmers, local politicians and some influential people. Each of them took some roles but there was no common understanding how to check the scrupulousness of the initiation. Public hearing on project impacts involved stakeholders in a too late stage. In the subsequent stages of project planning, design and construction, participation of farmers became very minimal. The processes were very much monopolized by bureaucrats especially those in Bangkok offices. The planning and budget processes were conducted without involving project beneficiaries or even local governments. Time constraints of the externally-funded project made it difficult to integrate the existing with the new irrigation systems. The circumvention of the new canal alignment to avoid direct linkages with the existing irrigation canals and the “no touch” on the existing irrigation areas were examples of the integration failure. The social capital that existed in the form of people’s or smaller irrigation water users groups was not incorporated. The system design did not correspond well with the social control of the system use, allowing upstream farmers to unscrupulously divert water and subjecting downstream farmers to lower canal water levels than they can easily divert water into their field. Self-styled modification or damage of structures indicated the gap between the design and the people.

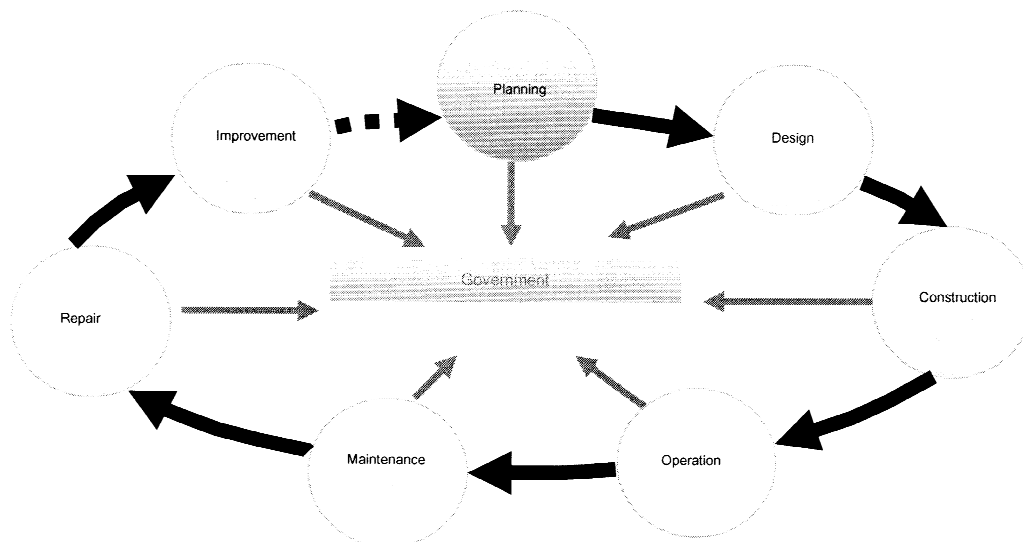


Figure 5-6: Centralized Institutional Setting of National Irrigation Project Process

The construction of the system was not participatory. While the government secured Yen loans for the investment cost, there were no mechanisms to commit farmers and officials to work to the fullest efficiency possible to generate the expected returns and pay back for the loans. Except for minimal land for their own on-farm facilities, other costs for structures as well as land purchase were all shouldered by the tax-payers who were committed to pay back to the Japanese lender.

The operation of the irrigation system was run nearly completely by the irrigation staff whose salaries and career advancement depended on their supervisors. Thus, their accountability to the water users was somewhat questionable even though their expressed ideals were the satisfaction of users, highest benefits to users, good water distribution to and good relationship with users. Almost all the decisions relating to water distribution was made by the staff who simply announced the start of the irrigation seasons based on the experience of previous years, not the collected field data. Water supply schedule was not transparent and was not obtainable during field visits. The intermittent distribution in the main and secondary canals required constant reporting from lower level staff or directly from farmers to the higher level staff who would adjust the distribution operation as they considered appropriate. These frequent adjustments, most of which done at requests of upstream farmers, subjected downstream farmers to the unpredictability of water supply schedule and low-level staff to ever-confrontation with downstream farmers. Lacks of a real forum for farmers and operational staff to discuss how much and when water should be irrigated resulted in incomplete water control. The design that allowed several upstream farm turnouts to bifurcate directly from the main canal and the official permission for farmers to control them on own further undermined the inter-group control.

Most of the maintenance, repair and improvement works were in the hand of the irrigation staff. Farmers tended to recount the time when they were paid to maintain and repair their primary, secondary or even tertiary irrigation canals more than the time when they had to perform these works on own. The government policy in creating jobs, some unnecessary, under the Miyazawa project appeared very spoiling. Farmers reported no fee collection for either their group or the government. The maintenance, repair, and improvement costs were entirely borne by the government. Zonemen who work most closely with water users made an interesting notion that, though not so cooperative, water users knew the system very well and if they were to manage the system, the situation would certainly improve.

Policy Considerations

A transparent procedure is needed to allow qualified and responsible entities to initiate a project at the agreement of those concerned and ensure fair distribution of project benefits to users in all regions; otherwise the system cannot be effectively and efficiently used. The design of irrigation system must be agreeable to the majority of users and it must be clear to the users at the design stage how the

system will be operated and who are responsible for which water control points. The division of responsibility between users and the irrigation agency does not necessarily follow the spatial terminologies like the "main", "secondary" and "tertiary" canals. Where there exist some irrigation systems, integration of the old and new design and operation plan should be made. Expected cropping pattern and intensity must be based on careful consideration of inflow adequacy and farmers' farming plans. Meaningful commitments must be obtained from users prior to the construction stage to assure that the government investment will generate the expected returns. The formats of commitment can be financial contribution, loan repayment, deposit of fund for future construction or other social mechanisms. To obtain the commitment, farmers must gain confidence in water availability and service, and the magnitude of their obligation must be in a good proportion to their benefits.

A system-wide and legal water users' organization is indispensable for participation in irrigation management. Preferably, it must be formed since the project initiation stage to provide a forum for discussions, commitment, decision-making and punishment. The format of the organization must be agreeable to the majority of water users. In case of a large organization, it should be tiered according to the social boundary for administration purposes and the hydrological boundary for the hydraulic management. Examples of the social boundary are villages and tambon. Examples of the hydrological boundary are smaller catchments, nodes of canal coverage, or nodes of coverage under one specific water control point. The organization should have access to technical support.

The relationship between the irrigation staff and farmers must be complimentary, not hierarchical. They should share the operation implementation work with a clear division of work. Farmers should be decision-makers in water distribution planning and bear the operational cost. Irrigation staff must be accountable to farmers and neutral. Their working system must be transparent. Such integrity of irrigation staff would enable participatory preparation of an effective water distribution plan, based on real field data from farmers and irrigation staff, respected by all concerned, and allowing for no unjustified modifications. Dry season cropping limit must be controllable, flat percentage of cut on everyone, or cut-out of downstream or distant areas, or rotational basis depending on local water conditions and equal benefits. Clear operation monitoring and evaluation measures must be determined. Transparency of water data and system capacity would make monitoring and evaluation more effective and clear to all.

Conclusions

Irrigation management in the study case was heavily centralized by state bureaucrats. Farmers participated only as information providers at the development stage and as benefit recipients in the following stages. Information about project beneficiaries was unclear. State bureaucrats managed water based on their views, which were not always compatible with farmers' plans that they did not know,

resulting in inequitable water distribution and low irrigation efficiency and agricultural productivity. There is a need for a more systematic participation framework in all project stages, of which significance should be placed on the early stages because actions in one stage can either pave ways for effective management in the subsequent stages or a vicious cycle that leads to one problem after another. The hierarchical relationship between farmers and bureaucrats must change and new roles should be created. Farmers should be organized into a system-wide group to assume the role of decision-makers on water management because their decision will be respected and monitored by themselves.

CHAPTER 6

INSTITUTIONALIZING PARTICIPATION IN IRRIGATION MANAGEMENT: THE CASE OF MANNO-IKE

Introduction

Japan is one of a few countries in the modern world that has institutionalized participatory irrigation management throughout the country. The roots of the Japanese participatory irrigation management were in the social compliance, an indigenous value of the Japanese island culture. The value evolved through several government systems from the Central State derived from China, to the subsequent feudalism, and the democratization introduced after the World War II. The enactment of several laws through the urge and force of the outsiders, the issuance of several policies for rural development and the extensive adoption of new farming technology have supported the effectiveness of the institutionalization. Even though the Japanese agricultural and irrigation sectors are now faced with many dilemmas, tempting the Japanese society to abandon the participatory irrigation management, the Japanese experience in institutionalizing participatory irrigation management is worth consideration. This chapter presents the results of a study on the Manno-ike Irrigation System conducted in 2001 concurrently with the Mae Kuang case study with the purpose to enhance understanding in the latter case study as explained in Chapter 5.

Profile of the Manno-ike Irrigation System

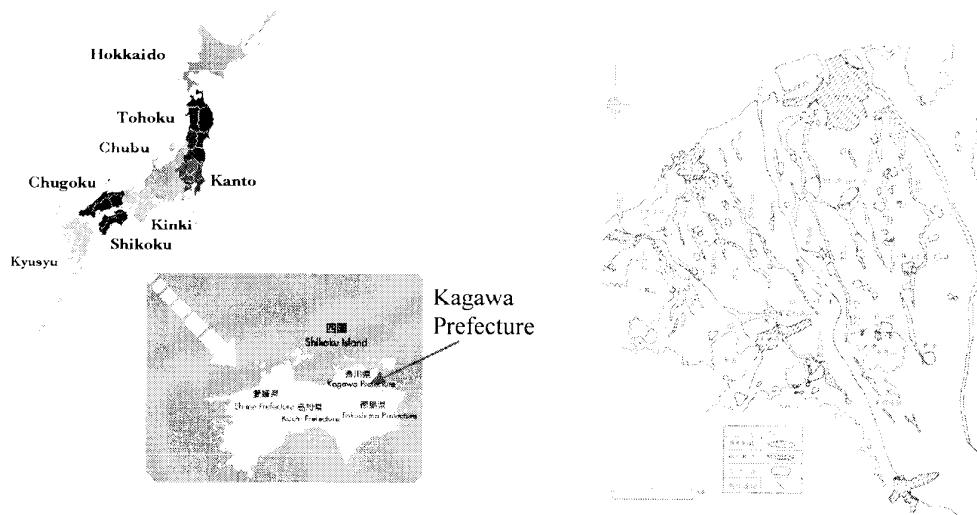
The Manno-ike Irrigation System featured a network of ponds along the flood routes where paddy cultivation was practiced in Kagawa Prefecture on the Shikoku Island as shown in Figure 6-1. These ponds were necessary for cultivation in the areas because, even though Kagawa had very high ratio of cultivatable flatland, its 1,200 mm annual rainfall was inadequate in terms of quantity and time. With 1,400 ponds, this smallest prefecture of Japan has the third largest number of ponds and the highest density of ponds in Japan.

Findings

Historical Development of the Manno-ike Irrigation System

State-Managed Irrigation System

The first phase of its development came with the introduction of Buddhism from the continental Asia to Japan in 552 AD that brought along many advanced cultures such as improved rice farming systems and the consolidation of state. The Taika Reform in 645 AD spread the principles of public land, public citizen and public water that were derived from the legal codes of the Tang dynasty of China. When the Japanese Central State was established, a series of the State



Source: Kagawa, 1952 in Manno-ike LID, 2001

Figure 6-1: Ponds along the Flood Routes in Manno-ike Irrigation System

programs for paddy irrigation management expanded widely. One of the duties of the Public Affairs Division (*Minbukyo*) was the management of canals, ponds, mountains, rivers, bushes, and swamps; and its local agents (*Gunshi*) had the duty to manage local irrigation facilities. Engineers were dispatched by the State to handle pond construction (*Zochishi*), canal construction (*Gekoshi*) and arbitration of water disputes (*Kenkoshi*).

The Manno-ike Pond was constructed as the biggest of the 60 ponds in the Sanuki District during the Eighth Century. During that time, the construction and expansion of paddy field and large scale irrigation systems were implemented mainly by the State. However, the political *Rituryo* codes did not last for a long time due to lack of river engineering technology to cope with wild rivers. The pond of the Manno town itself on several occasions was damaged by floods. Rural villagers in collaboration with local governments tried to repair and rehabilitate them. The most memorable rehabilitation was in the year 821 AD, when the Buddhist Priest Kukai was dispatched as a special envoy to rehabilitate it. However, the pond was still damaged several times and once, it was abandoned for 450 years with local people moving to resettle inside it.

After the State authorized the privatization of paddy field reclamation in 743 AD, many small water management systems were gradually developed by masters of manor (*Shoenshu*) and powerful families (*Gozoku*) in their territories. In the Middle Age (from the 9th-15th Centuries), the political power was shifted to the feudal governments and the control of farmland and irrigation facilities were

decentralized into the hand of the ruling classes. Farmland expanded and farmers discovered that cooperation within and across communities were necessary. An orderly water management at the terminal end of irrigation networks was developed. Such methods like *Senkoumizu* were used to measure the irrigation rotation time at each diversion weir in the Manno-ike areas. The person chosen to take charge of burning an incense stick or *Senko* was the one who mastered wide respect from irrigators.

Feudal Taxation and Irrigation Cooperation

The taxation system imposed by the ruling classes during the feudal period unintentionally shaped up the participatory irrigation management tradition because they used *mura*, not an individual, as the basic unit for taxation. *Mura*, a cluster of 30-50 families with three to four generations, was led by a leader who had the duty to collect tax in kind of paddy for the *han* ruler. A well-balanced paddy production among *mura* members equally dissipated the tax burden on each of them. Thus, a loose irrigation management during the normal times would become very strict during the scarcity periods which lasted about 2-4 weeks through the use of regulations and even force to ensure that the *mura* and nearby *mura* could collect comparable tax.

Mura was a central organization of many kinds of social activities including the maintenance of canals and the dissemination of news and information. They imposed some “charity donations” at a specified rate on members for their common activities. Members were required to send a family representative to participate in canal and road maintenance. *Muras* had their rules regarding their activities (irrigation management included). Violators would be punished in some cases. *Muras*’ decision making was made at the meetings attended by representatives of every family. This hidden customary unit may have been declining due to the urbanized lifestyle to some extent. *Mura* events cannot draw as many followers as they did in the past. The majority of the *mura* supporters are aged people. But still this social unit has had a strong influence on the development of the Japanese participatory irrigation management.

River Engineering and the Expansion of Irrigation System Scale

The advancement of river engineering and the promulgation of the River Law in 1896 enabled more effective flood control. Relatively larger irrigation systems were developed. The model of equal water sharing and orderly irrigation management became more widespread. Paddy could be grown in diluvium, upper river terraces, hilly areas and eventually in all areas where water could reach. The Manno-ike Pond itself was rehabilitated several times with better technology, expanding its irrigation area to cover 44 villages in three districts and increasing its production rate to 2,150 tons or 17% of the total prefecture’s production. New water technologies were adopted; wooden intake pipes replaced the stone ones and the inclining perforated intake pipes were improved several times. However, the

embankments of the Manno-ike Pond still could not withstand the force of nature, earthquake. Serious food shortages forced farmers to try incessantly to revive the irrigation system. In 1914, the intake tower was constructed and the storage capacity was enlarged to more than five million cubic meters. The Manno-ike system was integrated with smaller systems with itself serving as “a mother pond” to feed water to its numerous “daughter ponds” in the lower reach through the natural streams and man-made canals. The major part of the indigenous irrigation systems were still intact after being integrated.

Democratization and Legal Framework for People’s Participation

The post-war Japan underwent rigorous changes with several policies being issued to promote democratic system, agricultural land reform, water users’ organizations modeling after the American water districts, and the development in the agricultural sector. These changes, coupled with the existing social compliance value, led to highly participatory irrigation management. The agricultural land reform in 1946 redistributed the land through government purchase and resale to tenant farmers. The reform reduced the number of tenant farmers from about 50% down to less than 10% of the total farmers. The introduction of the Land Improvement Law in 1949 when the reform was almost complete was of good timing. New farmland owners who started to take direct charge of their farming and irrigation could join forces to form a Land Improvement District (LID) to seek government support in improving their land and irrigation and drainage systems. These policies were first geared to increase domestic rice self-sufficiency and, later on with the enactment of the Agricultural Basic Law in 1961, to equalize income in the agricultural sector and rural living to be on par with other sectors and urban areas.

During this period, the Manno-ike LID was established. The storage of the Manno-ike Pond was expanded to 15.4 MCM and the distribution canals were improved to serve 4,600 hectares. With a 1,280-hectare catchment area, the pond had not enough water to serve all areas. Since late 1970s, additional water has been transferred from the Yoshino River in Tokushima Prefecture through three intake points: Kanakura River, Marugame Main Canal and Hoshochi Main Canal as shown in Figure 6-2. The 289 MCM Samuera Reservoir improved the water status of the Manno-ike Irrigation System and its retention status was publicized in local newspapers alongside with weather forecasts as shown in Figure 6-3.

Manno-ike Land Improvement District: Organized Participation

The Manno-ike LID has been established under the Land Improvement Law of 1949. It possesses the characteristics of a legal entity whose activities are for the public good and is thus similar to a local government for specific purposes. As of 1998, there were 7,297 LIDs in Japan, covering 3.08 million hectares. The average size of an LID was 422 hectares with 608 members. About 2,000 LIDs covered less than 50 hectares (MAFF, 2000). The Manno-ike LID, with the service area of 4,600 hectares and 8,000 members, is considered as a rather large LID.

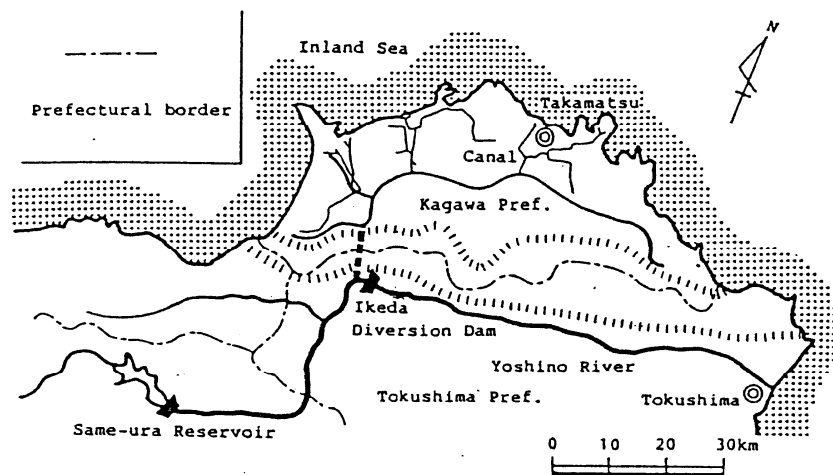
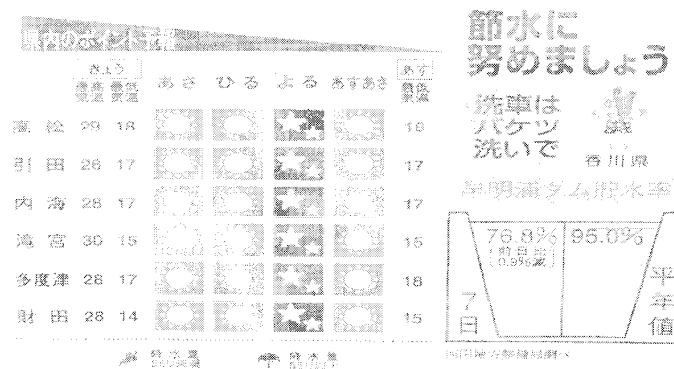


Figure 6-2: Inter-basin Water Transfer



Source: Shikoku Shimbun Newspaper of 8 June 2001

Figure 6-3: Retention Status of Water in Samuera Reservoir as Publicized in a Local Newspaper

Land Improvement Law and Institutional Framework for Participation

The Land Improvement Law of 1949, under which the Manno-ike LID was established, has a paramount role in providing a legal framework for the Japanese participatory irrigation management. The purposes in issuing the law were to restructure the agricultural sector through land improvement works such as construction, improvement, operation, maintenance, and management of irrigation and drainage facilities and agricultural roads as well as land consolidation. The law prescribes specific procedure for participatory initiation, design, construction, operation, maintenance, repair and improvement. For the operation and maintenance, it encompasses the facilities newly built under a land improvement project, or the

facilities trusted or transferred to LIDs from the national or local governments or even the facilities that exist before the LID establishment. LID is also authorized to take charge of projects related to their facilities such as rural sewerage, electric generation, fish farm projects and conservation of watershed forests.

The law provides the procedure for the establishment and operation of an LID as follows.

- An initiation to establish an LID must come from at least 15 cultivators who have a common wish regarding the construction, operation, maintenance, and improvement of irrigation and drainage facilities. These initiators are not necessarily land owners; tenants or any other kinds of land use right holders are eligible to take the initiative move. This flexibility was because some tenant farmers had not yet obtained farmland under the agricultural land reform when the law was enacted. State functionaries are not allowed to directly initiate a project, even if they see physical potential and have financial availability.
- A detailed project plan, indicating a clear extent of land improvement benefits, main facilities, activities and set of regulations must be prepared and publicized.
- The project plan must gain agreement from more than two-thirds of cultivators within the specified boundary before being submitted to the executing agency such as the state or local governments, who will seek professional opinions on the plan.
- After being certified, the plan will be announced again to give the people who might be affected by the plan an opportunity to voice their objection.
- If there is no objection, all cultivators in the area shall become LID members, even though some of them might have had earlier disagreed to the establishment of the LID. Majority rule is applied. Generally, 90% of popular agreement was sought before further project progress because it would be inefficient to exclude cultivators in the boundary. To obtain agreements, several meetings were held in *muras*. Project outline or design was revised on several occasions and aspects to satisfy the most farmers possible. This was the time when tail-enders could negotiate to fill up their spatial disadvantages because the head-enders needed their concurrence to the project plan.
- The members are required to share some of the project costs, donate parts of their land for construction of common facilities, and bear the

full operational costs. These financial issues must be discussed and agreed based on the majority rule.

- The establishment of the LID must be approved by the prefectural governor.
- After being accepted by the majority of the cultivators, the final plan and agreements must be submitted to the Ministry of Construction or the prefectural government or local government as the case may be. Generally, the national government takes up larger or more technically complex or trans-prefectural projects; the local governments and cultivators take up projects of a lesser scale.
- Further consultation and public notification continue until the definitive plan is issued.
- The ensuing construction of irrigation and drainage systems can be implemented by the state government, local governments (prefecture, city, town and village) or LIDs depending on the boundary of the LID, the scale and the complexity of the facilities. The operation, maintenance and management can be assigned to the national government, local governments or LIDs as appropriate in each case.

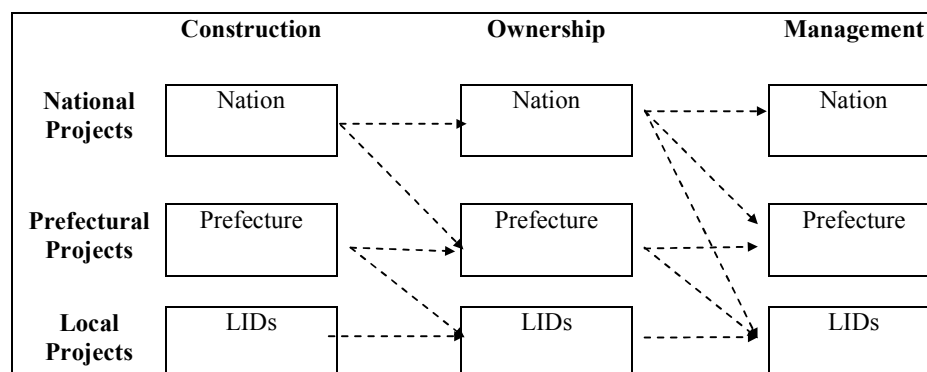
By 1997, there were 1,200 main irrigation facilities constructed under national land improvement projects. About 80% of these facilities were managed by LIDs either by trust between the national/local governments and LIDs or through transfer of facilities ownership to LIDs. 18% were managed by municipalities or prefectures. Management of the remaining large and important facilities for flood control or involving coordination between agricultural and non-agricultural sectors was the responsibility of the national government because LIDs had inadequate technical capability or the capacity to accept the liability for flawed management. See Table 6-1 for scale of national LID, prefectural LID and LID projects and Figure 6-4 for work relations between national government, local government and LIDs in project construction, ownership and management. The Manno-ike irrigation system was improved under an LID project with financial assistance from the prefectural government. LID members are the owners and managers of the system under the organizational structure as shall be discussed later.

Manno-ike LID was not the only water organization in its geographical areas. It was observed during field observation that in the upstream areas, there were subordinate organizations called *suiri gumiya* or irrigation associations, organized at the discretion of farmers. Many of them evolved to their present forms over many years. The scope and land area of their management differed depending on the region, but in general a unit covered approximately 50 hectares and was composed of 50-60 farmers. These organizations operated according to their independent rules

Table 6-1: Comparison of National LID, Prefectural LID and Farmers' LID Projects

	National LID Projects	Prefectural LID Projects	Farmers' LID Projects
Beneficial Areas	Over 3,000 ha.	Over 200 ha.	Over 20 ha.
End Cover Areas	Over 500 ha.	Over 100 ha.	Over 5 ha.
National Subsidy	2/3	½	Upto 45%

Source: Nishimura, 1997



Source: Nishimura 1997

Figure 6-4: Relationship between Project Implementers, Owners and Managers

and undertook operation, maintenance and management at the lower distribution systems that diverged from the LID control points. These organizations were well-structured and very similar to the LID structure. Association members paid small fee, like US\$ 55 per hectare per year at Ikeshitamura, for minor repair, repaint and basic maintenance. At times, the Manno-ike LID provided some incentives for their collective activities like snacks and drinks on the cleaning days. In areas close to urban centers, there were also “city LIDs”. In downstream areas where daughter ponds were numerous, there were also “pond LIDs”, most of which were trying to consolidate themselves to gain greater negotiation power with larger membership, except Marugame. The reason for Marugame’s inaction on merger could be the unwillingness of the farmers receiving water directly from the main canals to share the burden with farmers receiving water from the ponds or the aspiration of big landlords to maintain control over the area or the lack of leadership in consolidating the land that may soon go out of the agricultural sector.

Manno-ike LID Organizational Structure

The Manno-ike LID has 8,000 household members. With more than 2,000 members, it is allowed by the Land Improvement Law of 1949 to employ a representation system as shown in Figure 6-5. This representation system is helpful because most Japanese farmers are part-time or weekend farmers who are busy working during the week days in the manufacturing sector. Members in each of the 16 electoral districts or *ku* as shown in Figure 6-6 elected their delegates or *Sodai* to sit in the LID General Assembly for a four-year term. At the time of field observation in 2001, the Manno-ike LID had 113 delegates. Other three incumbents passed away and their replacements were not yet elected. These delegates vote for executive directors who elect their president and vice president. Even though the LID is established for water-related purposes, the *ku* division is based on the administrative boundary of traditional *mura*, not the hydraulic boundary.

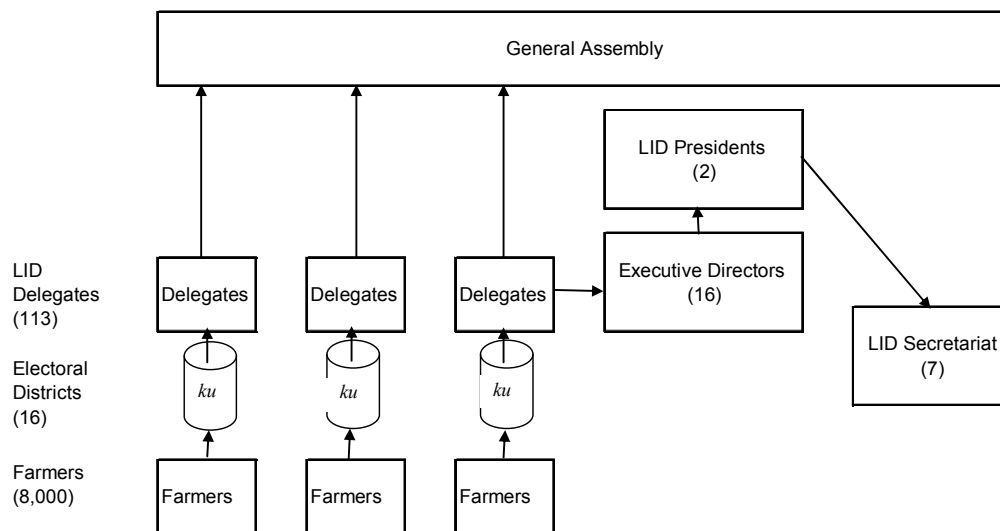
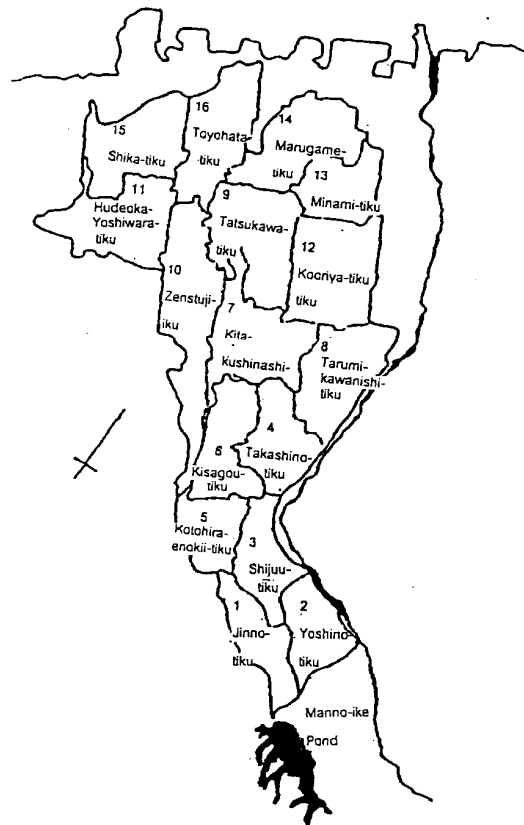


Figure 6-5: Election System of the Manno-ike LID

The *mura*-based representation system lent considerable cooperative spirit to the Manno-ike LID because *mura* members were already accustomed with working for their communities and contributing in cash and in kind for collective works. For example, Ikeshita-*mura* members contributed US\$ 20 just for their shrine activities. *Mura* members readily accepted duties in doing accounting, auditing, religious or shrine activities, representing their *muras* in the agricultural committee, tax committee, agricultural cooperative or water distribution committee. The Ministry of Agriculture, Forestry and Fisheries (MAFF), and city and prefectural governments supported *mura* activities such as subsidizing 85-90% of *mura* meeting hall construction cost. In Kishinoue, only 3 out of 15 *muras* did not have such halls. These halls were used for several purposes ranging from meetings on important issues to karaoke parties and *miso* or soybean paste making.



Source: Manno-ike LID, 2001

Figure 6-6: *Ku* Electoral Districts in the Manno-ike LID

Decision-Making Body

The decision-making body of the Manno-ike LID is the General Assembly that convenes in March. The assembly must be attended by at least 50% of the delegates and an approval on any issue must obtain 50% of votes from the attendees. For important issues, at least two-thirds of delegates must be in attendance and an approval must garner at least two-thirds of the attendees. All important matters such as fee rate, budget allocation, improvement planning, changes in regulations, and the dissolution or merger of the LIDs must be discussed, decided and recorded in writing.

At interviews, the *Sodai* delegates stressed that their main duty was to get water to their areas, especially during the crop critical flowering stage. In performing this task, they had to listen to their voters to get local information, to

negotiate with other delegates, and to coordinate with the LID Secretariat (to be introduced in the section on Daily Chores below) to practically get the irrigation water. They appeared highly accountable to their voters and considered information flow as a very important basis of their action. Based on interviews of the electoral, major qualifications of *Sodai* were their being good farmers, their and their parents' activeness in social works such as disaster prevention or other cooperative activities, their age, and their communication skill. High formal education was not a key qualification. These delegates were paid a small honorarium by the LID to cover part of their meeting expenses.

Implementing Body

The implementing body of the LID is the 16 elected executive directors, led by the President and Vice President, who give daily operation instructions to the LID Secretariat staff. These directors meet every other month starting from February. They established four committees to take charge of general affairs, construction affairs, operation and maintenance and water distribution control as shown in Figure 6-7. The election of the president, vice president and committee chairmen considered representation across the LID up and downstream regions. Three out of the 113 *Sodai* delegates were elected in principle to perform financial, physical and performance auditing but not in practice.

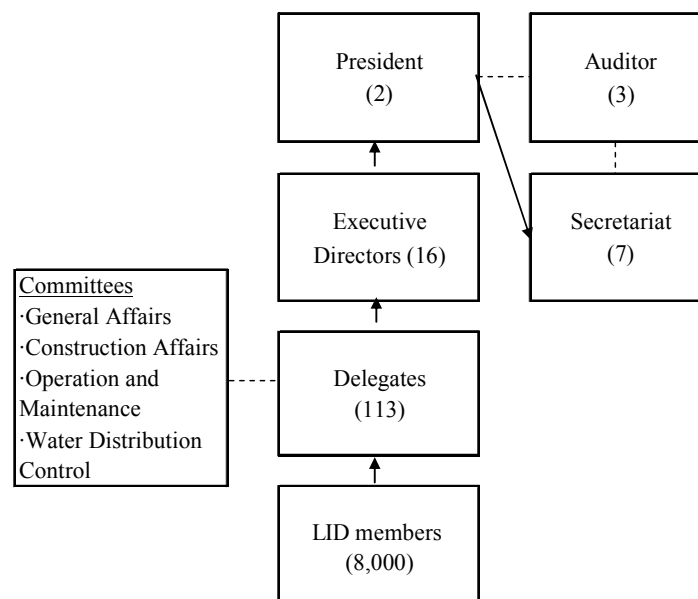


Figure 6-7: Organization Chart of a Land Improvement District

Daily Chores: LID Secretariat

Both the Manno-ike LID members and their executive directors are farmers and do not have time to take care of day-to-day work of the LID. So, they employ seven full-time staff to implement the directives issued by the board of directors. This number is higher than the average of LIDs. 93% of LIDs have five or fewer full time employees. 42% of LIDs have no permanent staff. These staff do not have autonomous power to make any decision. Basically, three are charged with general affairs, two with construction work and two others with water distribution. However, during the water delivery season, all male staffs assist the water distribution staff to cope with the work load that can start as early as 04.00 a.m. The staff members are selected by the LID president and none of them are graduated in irrigation engineering. Three received high school education and four received bachelor's degree in social sciences. These staff members come from the local area. Their salaries come from the LID and thus their accountability to the LID is high. The Secretariat also designates and pays some local farmers to operate certain control structures which are non-LID control points (to be discussed in the section on Water Distribution).

As participation or negotiation is high under this institutional framework, the staff leader noted that he needed to maintain neutrality when dealing with highly opinionated LID delegates at all times. During droughts, like the one occurred in 1994, it was very difficult for him to handle both the delegates and the farmers.

Financial Management

The costs of the Manno-ike activities came from the LID members and the national and/or local governments. In small scale LID investment projects, the LID collected 100% of the cost from members. In large ones, the national government generally granted subsidies of about 45% of the cost and local governments granted 20%. In case of a prefectural project, the LID shared 25% of the cost with 50% from the prefecture and 25% from the municipality. For the part that LID members had to pay, if immediate total collection was difficult, the LID could borrow from the state-run Agriculture, Forestry and Fisheries Finance Corporation and repay within 25 years with 10-year-grace period. The interest rate for prefectural projects in 1997 was 2.85%, and for LID projects was 2.70%. In case of a very large scale project such as for building a reservoir, subsidy could be as high as 75-80% of the cost with the remainder coming from the government loan at the interest rates of 4-5% per year. These financial arrangements made it possible for the farmers to implement the necessary projects. In case a project will expand the irrigation service area, to maintain satisfaction for all, the existing areas will be guaranteed with more water at the government expense.

For the operational cost, the Manno-ike LID collected dues from its members at the rate of US\$ 350 per hectare per year by debiting their accounts at the JA agricultural cooperative banks. The rate was lower than the LID average rate

of US\$ 500 per hectare per year because the Manno-ike LID could collect fee from outside users such as cities that bought water from it or cities that use their irrigation canals as sewers. From water sale alone, the LID earned US\$ 0.6 million per year. The rate of collection of any kinds of fee was very high because farmers had confidence in the LID complete water control with distribution system throughout the consolidated areas. The financial report of 1999 indicated that the Manno-ike LID income was US\$ 3.08 million and expense was US\$ 2.58 million. Expenses included those on LID personnel, honoraria for *Sodai* delegates to the meetings, administration of elections and meetings, maintenance of canals and gates, loan repayment, construction work, fee to other LIDs where additional water or service was obtained. Income included irrigation dues, sale of LID land, subsidies from municipalities, bank interests, right of way fees, and administration charges from the Kagawa Yosui LID.

Technical Support

The Manno-ike LID is a member of the Kagawa Land Improvement Association and the National LID Federation. These connections gave the LID additional resources and technical supports. Construction projects could not have succeeded without technological and administrative support from the national and prefectural governments because LID members and Secretariat staff did not possess specialized knowledge for highly technical design and construction techniques (Sato, 1990).

Dissolution and Merger of LIDs

LIDs can be dissolved or merged after being considered at the General Assembly and subsequently approved by the prefectural governor. If found performing illegal operation or mismanaging especially regarding its financial accounts, the LID can be dissolved by the prefectural governor. The Ministry of Agriculture, Forestry and Fisheries and the related prefectural governors are authorized to audit the LID's accounts and conduct on-site inspections. With a high rate of urbanization that is affecting rural life, merger of LIDs, especially smaller ones, were occurring extensively in the Manno-ike irrigation system, especially in the downstream areas.

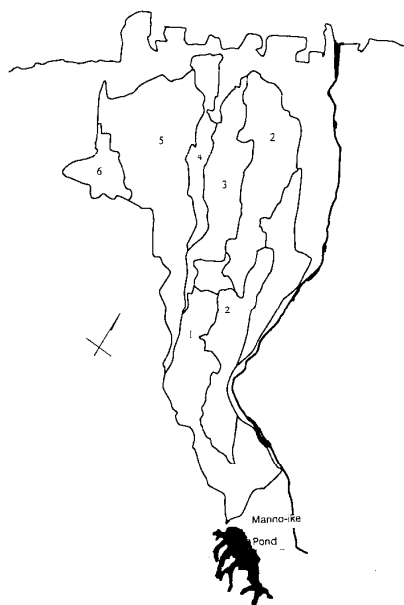
Water Distribution: Respect to the Agreed Plan

Water distribution in the Manno-ike Irrigation System was controlled by the Water Distribution Control Committee of which set-up is shown in Figure 6-8. The committee held meetings twice a year in June and October. Their duties included planning, monitoring and evaluating the water distribution. The LID service area was divided based on the hydraulic consideration into six regions as shown in Figure 6-9. Each water control committee member or *Tozein* was assigned to assure that the water supply plan was respected by their regional members. The water distribution plan was developed by aggregating farmers's water requests compiled at their sub-

LID President						
Hydro-region	1	2	3	4	5	6
Catchment	Chuosen	Chuosen	Kanakura Kawa Right bank	Kanakura Kawa L-bank Konsoji weir	Kanakura Kawa West/L-bank	Hirota Kawa L-bank lateral
No. of electoral units	4	2	2	2	5	2
No. of committeemen	8	6	3	2	4	1
No. of assistants	1	5	1	4	8	3

Figure 6-8: Water Distribution Control Committee of the Manno-ike LID

group meetings and forwarded to the Water Distribution Committee to consider and finally approved at the General Assembly under the principle of fairness to all regions. Monitoring and evaluation of previous year's water distribution helped the assembly to prevent ineffective distribution from recurring. However, as this irrigation system has long been established, generally there was no major deviation from previous years' plans. Except for slight adjustment due to rainfall conditions, basically all farmers were expected to follow the plan. It was stressed that the committee must maintain constant communication with members to exact water control. Special requests from anyone that may negatively impact others could not be considered.



Source: Manno-ike LID, 2001

Figure 6-9: Hydrological Regions in the Manno-ike LID

Water retention in the Manno-ike Pond started in December. Supply availability in general included 15.4 MCM from the Manno-ike Pond plus 11.7 MCM from the inter-basin water transfer scheme. The LID Secretariat staff took direct charge of water control at only eight points and paid some farmers to take care of some additional control points. In 2001, the General Assembly approved the water distribution plan for the LID control points as shown in Table 6-2. The Secretariat staff commented that the plan was very similar to that of the previous years. For those who used water from the Kagawa Yosui Irrigation System, their water demand had to be submitted to the Kagawa Yosui Office to coordinate with the Water Resources Development Corporation who operated the reservoir. See Table 6-3 for water distribution plan from the Kagawa Yosui Intakes. The Assembly decided when to start irrigation season or the *Hatsu Yuruniki*. Shinto and Buddhist religious ceremonies were organized by farmers and attended by officials and members of the local society to underscore the importance of the gate opening.

Table 6-2: Water Distribution Plan of Manno-ike Pond

Date	Duration	Discharge	Time
13 June	1 week	5 cusec (432,000 cubic meters per day at the Main Canal)	04.00a.m.-07.00 p.m.(land preparation and transplanting)
21 June	1 week	2 cusec	04.00a.m.-07.00 p.m.
12 July		2 cusec	05.00a.m.-07.00 p.m.
11 August		3 cusec	(flowering time)
21 August		2 cusec	

Source: Manno-ike LID, 2001

Prior to the irrigation season, the storage status of all 59 daughter ponds, with combined storage capacity of 5.3 MCM, was inspected and recorded for a coordinated operation. In 2001, the storage was at 97.7% of their total capacity. Generally, users of daughter ponds such as Kaidai-ike followed the same standard water distribution plan of the Manno-ike pond. After the first week of water supply for transplanting, the LID refilled these ponds to their full storage. Field observation revealed that some subordinate groups below the LID control points discussed to modify local water distribution to suit the need of part-time farmers who worked only on weekend without impacting the main operation plan. For example, Uma-ike water users started their local water supply for transplanting purpose earlier than recommended by the Manno-ike LID. By the time water from Manno-ike arrived

Table 6-3: Water Distribution Plan from Kagawa Yosui Intakes

Duration	Intakes	Discharge	Time
11-21 June	All three	1.10 cusec	10.00 a.m
21 June – 11 July	Marugame and Hochoji	0.445 cusec	10.00a.m.
11 July - 16 September		1.432 cusec	
16 September - 21 September		0.185 cusec	
21 September - 1 October		0.235 cusec	
1 October - 11 October		0.450 cusec	

Source: Manno-ike LID, 2001

their areas, five days after *Hatsu Yuruniki*, they could fill their pond during the night time.

Water was supplied from the Manno-ike Pond in a continuous flow. Water sharing was equal and based on the visible designed discharge capacity. Members were obviously strict about equal water sharing. For example, at a division point, two branching canals must have, say the same bed elevation, same canal width and same crest-length weirs. During field observation, for some reasons, the width of a newly built gate in Figure 6-10 was longer than its sister branch. Members demanded modifications to make them equal by increasing the lining of its side-walls to reduce the width. They believed that by so doing, the *Dokein* (leader of irrigation association *suirigumiya*) could easily maintain members' satisfaction in water distribution in normal time. More complex rectification such as changes in the operation rule for the two gates to supply equal discharge would not give confidence to related farmers as much as the visible physical modifications.

The classic tale of tail-enders' war-of-attrition was also true in the Manno-ike LID. Tail-enders worked harder and paid more to obtain water but they accepted this situation, recognizing their inferior water right. In the upper reach, water was diverted directly from the canals. In the lower reach, water distribution in many areas was via daughter ponds. Extra efforts and costs were necessary. For example, farmers using water from daughter pond Sendai-ike found that they could not divert water from the main canal during the severe drought in 1994. Low discharge was left after the water traveled through 18 gates due to illegal water pumping in upstream areas, even though it was earlier agreed that 24-hour water

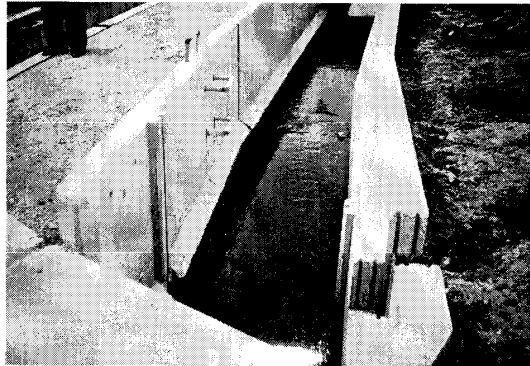


Figure 6-10: Modification of Structures for Equal Water Sharing

would be delivered to them. Sendai-ike farmers resorted to divert water from a canal on the east instead. In several other areas, additional groundwater and side flow had to be utilized. In attempt to solve water scarcity, Tadotsucho-jo in the lowest reach constructed a water reuse system under which used water was treated and pumped back to paddy field and city landscape spots. Garbage and wastewater from the upper reach also partly led to water pollution in the lower reach.

Maintenance, Repair and Improvement: Looming Decline of Participation

Maintenance, repair and improvement work were the areas where it became clear that the participatory irrigation management in the Manno-ike LID might have reached its peak and took a slide on its decline. Based on the general agreement, LID members were required to send one family member to clean the water channels, and ponds around May. Failures carried some penalties, such as Yoshino-Nakamura imposed US\$ 50 penalty. However, there were rising concerns that the tradition of collective maintenance would be difficult to maintain. Presently farmers who turned up on the cleaning days were avoidably those of above 60 years of age from a household with the average size of only three. Actually, the number of the participants also decreased as land rent to neighboring farmers and land idling were on the increase because of younger generation's disinterest in farming. The rent rate was determined by the municipal agricultural committee in the Manno-ike LID at US\$ 1,500 per hectare per year for a 3-6 year contract. Farming was mainly for meeting the household consumption only. Even though growing vegetable crops could give high income, its labor intensive requirements were not attractive to farmers. The remaining farmers had to take the heavier burden of maintenance, repair and improvement costs. LID Secretariat staff said the 80-km canals as well as their irrigation and drainage facilities needed improvement or rehabilitation but the executive directors did not make any move because farmers had to share 25% of cost while they had no idea for how long they would continue farming.

Urbanization sprawled into farm areas, with more weekend farmers and non-farmers moving in. Strong communities' ties were on a decline. Local people

complained the new immigrants disrupted the local social system. For example, in Marugame, the new immigrants used water for non-agricultural purpose but did not come to maintain the irrigation system. With inadequate immediate maintenance, the future management cost would become higher. Urbanization also caused several other problems such as more wastewater, silts and trashes in canals and drainage channels. The cost for cleaning became high because laws forbade that this debris could be burnt at site to pre-empt fire danger. There were also concerns about accidents in LID areas because of the narrowness of farm roads and open channel road-side drains. The non-agricultural sector wanted the safety management to be strengthened. LID staff noted they had to exert more effort in performing their work than earlier because *muras* could not adequately operate and maintain systems like in the past. As labor wage became higher and lacking, changes in the management style such as the introduction of computerization or pipe irrigation would be necessary.

Conclusions

The historical development of the Manno-ike Irrigation System continuously involved farmers in one way or another under the central state regime, feudalism and post-war democratization. The introduction of advanced technology to ensure water security was carefully done without breaking down the existing management systems in its sub-regions. Complicated invisible water distribution technology was not favorable to farmers because the invisibility made them unsure of fair water sharing. Efforts to conserve the participatory spirit strongly supported the land improvement projects which were introduced as policy instruments to scope for the proper role of the public sector in the process of agricultural restructuring to improve farm productivity. The clear strength of the land improvement district concept was the requirement for the majority of land improvement project beneficiaries to identify themselves. The remaining few who did not were required to accept the status of project beneficiaries for the common good. The self-identification of beneficiaries greatly contributed to the maximization of returns from the government support as the beneficiaries accepted part of the investment cost and full operational costs. Their acceptance of such commitment in turn became a guarantee of their benefits or equal water right in the long run. To fairly distribute the costs and benefits, land improvement district management took its form based on the social system of *muras* as its terminal administrative units for decision-making on the overall irrigation management. The social system was also considered in establishing hydraulic management in all levels by ensuring that there were delegates from all regions sitting in the water distribution committee. The land improvement concept was flexible in allowing small communities to choose with which larger community units, city, prefecture, or national, they wanted to associate. These multiple alternative linkages enabled the government investment to bridge the benefits of individuals to the society as suitable to the local conditions and the bureaucratic system was also responsive to this multiplicity.

CHAPTER 7

PARTICIPATION IN ON-FARM IRRIGATION DEVELOPMENT AND MANAGEMENT: THE CASE OF KHLONG THADI

Introduction

What is the value of developing an irrigation system if irrigation water does not reach farms targeted in the original development plan? This is an urgent question in the case of Thai national irrigation systems. From the First National Development Plan issued in 1963 until 2004, 3.64 million ha of area has been included in national irrigation system development plans as irrigation area (Royal Irrigation Department, 2005a); however, the overall statistics of on-farm irrigation facility coverage is still 69% (Table 7-1) even after the state irrigation agency's infringement of the Ditch and Dike Act of 1962 in providing the facility nearly free of charge to farmers. Farmers outside the on-farm irrigation development projects have to resort to non-structural on-farm irrigation water management such as flooding irrigation, water reuse (Satoh and Goto, 1999), and plot-to-plot water transfer (Watanabe, 1999), which can fill the gap to the extent the local conditions allow. As most of the national irrigation systems are of the open-channel gravity type that serve a large number of small paddy farmers, joint management in a group-based system is necessary (Meinzen-Dick, 1999 and Van der Schans and Lemperiere, 2006) to ensure effective on-farm water distribution over the area included in the original development plans that provided the project's economic justification. The agency's efforts in promoting the organization of irrigation water users since 1963 seems to be perpetually running into chronic problems. As shown in Table 7-2, the organizational coverage in 2004 was only 27% of the total irrigation area (Royal Irrigation Department, 2005a). An audit report (Kottak, 1985) has expressly pointed out that, due to the inadequate consideration of social, cultural and local economic factors in design and implementation, the organizations existed mainly on paper, rendering water distribution inequitable. The agency has a plan to transfer on-farm water distribution plus 50% of sub-lateral canal water management and maintenance to local governments by 2007 (Royal Irrigation Department, 2002). By 2009, it aims to transfer 100% of the work plus 50% of lateral work while establishing water users organizations in over 43% of the total irrigation area (Royal Irrigation Department, 2004a). The slow progress in on-farm irrigation development and management and water users organization over the past four decades has raised concerns about the effectiveness of national irrigation systems and the national investment, and about the sustainability of the irrigation areas in the national systems, especially those located far from irrigation sources, which have perceptibly been converted continuously for non-farming purposes.

Table 7-1: On-farm Irrigation Development in Thailand as of 1988 and 2004

Category	1988			2004		
	Area (ha)	% of irrigation area	% of on-farm area	Area (ha)	% of irrigation area	% of on-farm area
Total irrigation area	3,179,617			3,644,962		
Total on-farm area	1,569,218	49		2,525,733	69	
• land consolidation	270,557	9	17	323,869	9	13
* intensive	92,895	3	6	94,715	3	4
* extensive	177,662	6	11	229,154	6	9
• ditch and dike	1,298,661	41	83	2,201,864	60	87
* straight ditch	1,029,733	32	66	1,613,703	44	64
* meandering ditch	268,928	8	17	588,161	16	23

Source: Royal Irrigation Department, 1988e and 2005a

Table 7- 2: Irrigation Water Users Organizations as of 2004

Types of organization	No. of organizations	No. of members	Area of organizations		
			Area (ha)	% of irrigation area	% of on-farm area
Basic water users' group (FTO group)	14,930	358,846	810,992	22	32
Integrated water management group (lateral group)	410	234,203	414,678	11	16
Association	40	17,575	74,556	2	3
Cooperative	83	53,158	113,906	3	5
Total	15,053	429,579	999,455	27	40

Source: Royal Irrigation Department, 2005a and 2005b

To gain a better understanding of the present problems in on-farm irrigation development and management in the national systems, there is a need to follow a regular working process to define the context of these efforts, institutional changes and participant incentives (Johnson, 1991). Based on a study *cum* implementation case, this chapter has as its purposes: (1) to analyze the socio-economic conditions of local farmers in attempting to organize themselves; (2) to analyze the conventional processes and practices of on-farm irrigation development and management with special input of concepts for maintaining the original area coverage of the national investment; and (3) to scope for an alternative approach for the water users organization.

Research Methodology

To understand the present processes and practices in on-farm irrigation development and management in national irrigation systems, an action research approach was undertaken under a three-year study *cum* implementation project between 2003-2006. The approach was selected because of its strength in integrating the theoretical and practical traditions, i.e., reaching the final goal in improving the project participants' life and simultaneously gaining knowledge (McTaggard, 1989 and Packham, 2001). The approach provided opportunities to understand the complex context of the study case from the political, legal, economic, social, cultural and physical perspectives (Bandaragoda, 2001) and to expand their knowledge through trying to answer specific questions at hand (Cernea, 1996). The researcher engaged in the project cycles by collecting related data, feeding it back to project participants, and providing technical ideas which the audience had absolute liberty to follow or not to follow. Principally, the project participants, including farmers, their community leaders, state irrigation and local administration officers, maintained control of the processes and outcomes (Tandon, 1988). A series of action was taken at different stages of the three-year study including field observations, structured interviews, focus group interviews, questionnaires, document reviews, and formal meetings with farmers, their leaders, state irrigation officers and administrative officers. There were five main activities that are covered in this chapter. First, a survey on the social context of all paddy farmers specifically related to the study site was conducted to understand their socio-economic system, needs and constraints in on-farm irrigation development and management. Second, an analysis of their plot-to-plot on-farm water management tradition was conducted to understand its characteristics, strengths and weaknesses, and the status of their on-farm irrigation management. Third, a set of ideas for on-farm irrigation system design and management was delivered to project participants. The actual outcomes were followed up and amendment action was taken, where feasible. Fourth, a monitoring of the farmers' perceptions and their farming behavioral changes (White, 1987) were made to evaluate the status and problems in their technical adoption. Finally, major problems encountered in the present on-farm irrigation development and management process were analyzed, and an alternative approach to on-farm irrigation development and management was synthesized and presented to project participants to test their receptivity.

Profile of the Study Site

The study site is the planned irrigable area of farm turnout (FTO) numbers 4, 6 and 8 of the 1L-4R-LMC sub-lateral canal in the Khlong Thadi Weir Irrigation System, Nakhon Si Thammarat Province, on the eastern plain of peninsular Thailand (Figure 7- 1). As the development of on-farm infrastructure in FTO-6 and - 8 was not realized, this chapter will touch on them only when related issues arise. Basically, only FTO-4 will be the focus. For convenience of discussion, the term “FTO-4 area” will generally cover the service areas of both FTO-4 and FTO-4A, which has been added under the project; the exception is in the report on farmers’ recognition of their actual water sources and on-farm irrigation operation systems.

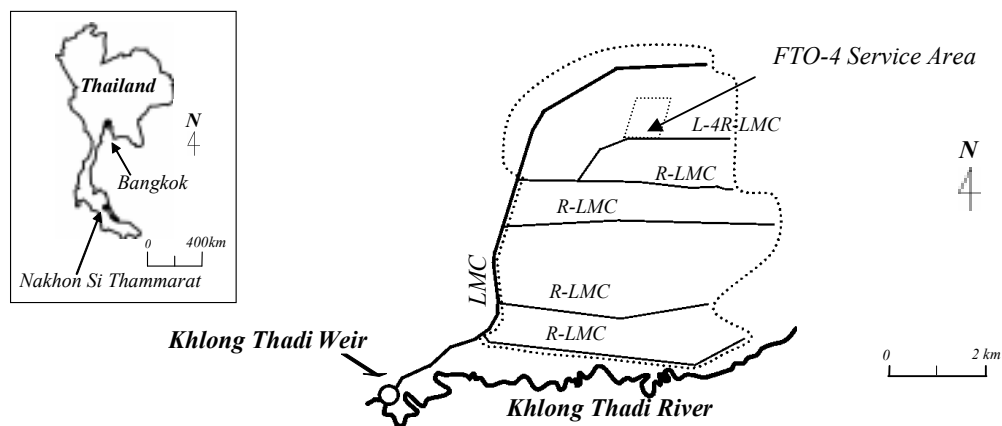
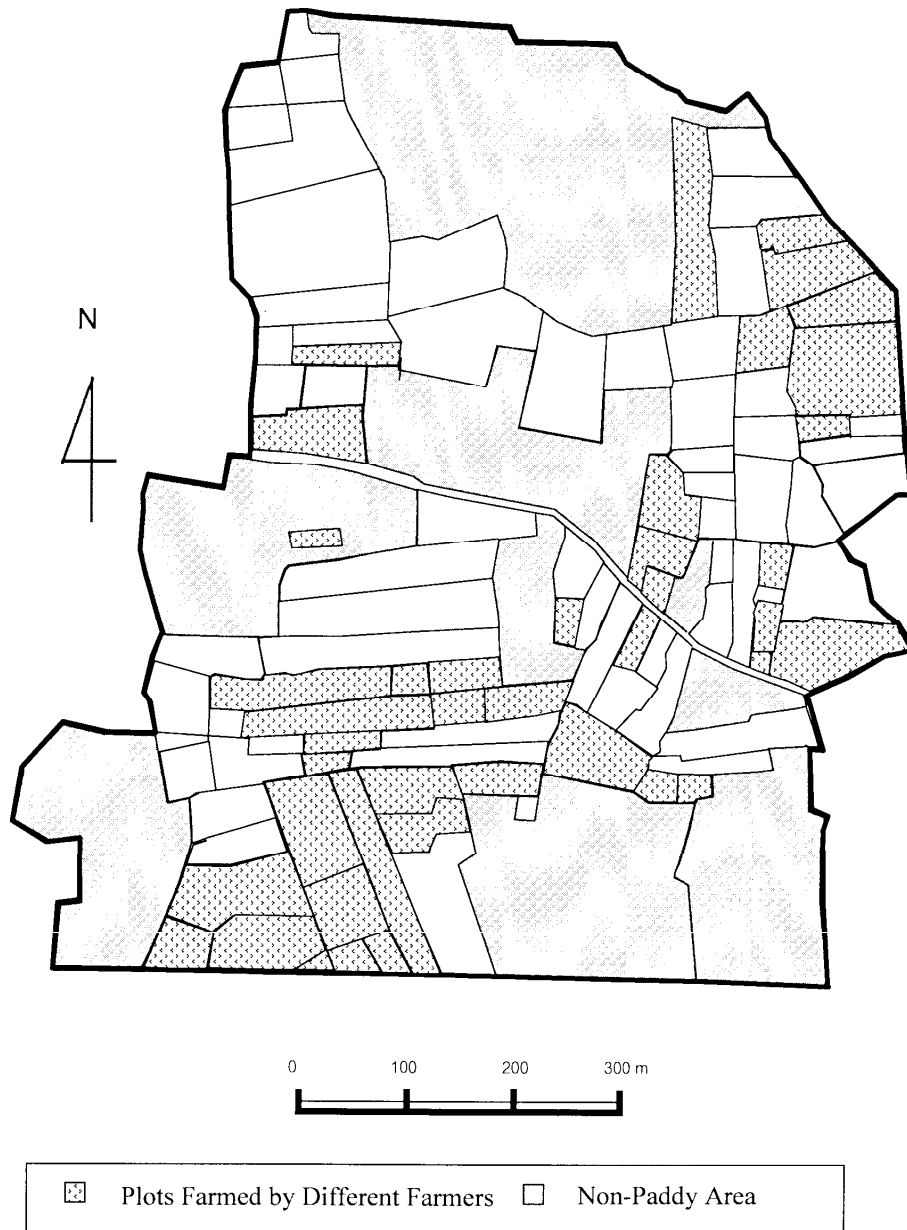


Figure 7-1: Location of FTO-4 in the 1L-4R-LMC Sub-lateral Canal of Khlong Thadi Weir Irrigation System

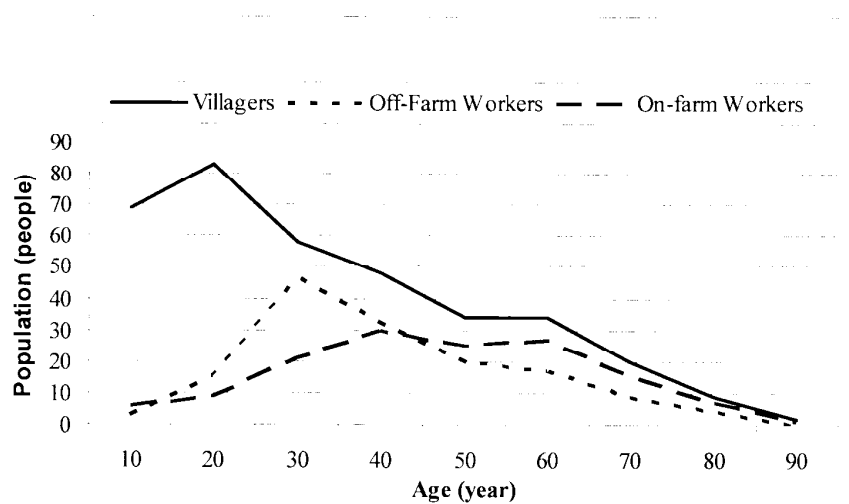
With monsoons and tropical storms passing through, the FTO-4 area is considered a rather wet zone of the country. It is planted with a variety of crops, ranging from paddies to tree crops and upland and vegetable crops. The study focuses on only the paddy area including 99 paddy plots in a total of 31,552 ha. These plots vary widely in shape and size. The average plot size is 0.31 ha with the smallest being 0.032 ha and the largest 1.44 ha. Fifty-seven of these plots are farmed by non-land owners whose land use contracts are unstable, forcing cultivators to move from one plot one year to another the next (Figure 7-2). Paddy is grown in the Southwest Monsoon months, not the wetter Northeast Monsoon paddy season, in order to avoid flood inundation problems in the area. The variety grown is the traditional *Hom*, which gives a yield of 1,944 - 2,994 kg per ha (Nakhon Si Thammarat O&M Office, 2002).



Source: Ounvichit and Srisa-ard, 2005b

Figure 7-2: Plots Farmed by Different Cultivators in 2003 and 2005

Based on a baseline socio-economic survey in 2003, 76 households cultivate these paddy plots. All of them are Muslim households with an average size of 5.12 persons. They produce paddy mainly for household consumption. Their major source of income (95%) is from wages. The average household income is US\$ 361, equal to 52% of the provincial average or 64% of those not farming paddy in the same villages. Job opportunities for household members in the working age of 19 - 70 years are limited by their educational level, as 78% have only up to elementary education. The ratio of on-farm and off-farm job opportunities is nearly 1:1 when workers have only elementary education. But for villagers with higher education, the ratio of off-farm job opportunities rises three times above the on-farm jobs. Seasonal unemployment is common as most of the jobs involve physical-labour-oriented and seasonal construction work, rubber tapping and general help. Off-farm job opportunities decline as age progresses, causing more of the older population to return to the farm sector (Figure 7-3). Local standards of living are modest, with fewer than half of the households possessing amenities like refrigerators, gas stoves, etc.



Source: Ounvichit and Srisa-ard, 2003

Figure 7-3: Relationship between Age and Job Opportunities in the Study Area

The FTO-4 planned service area traverses Village Nos. 1 and 2 of Tambon Nakhian, Muang District. The Muang District has 13 tambons, four of which are served by the Khlong Thadi Weir System. The 1L-4R-LMC sub-lateral canal, which is the water source of FTO-4, serves Tambon Nakhian exclusively, as shown in Figure 7-4. The administrative structure of the tambon follows the transitional administrative reform of Thailand. It has eight (at the start of the study period) village headmen who are in charge of household registration and act as community contact points for various purposes. These village headmen operate from their own residences. The Tambon Nakhian Administrative Organization serves as a local government with a legislative council, administrative committee and 20 local

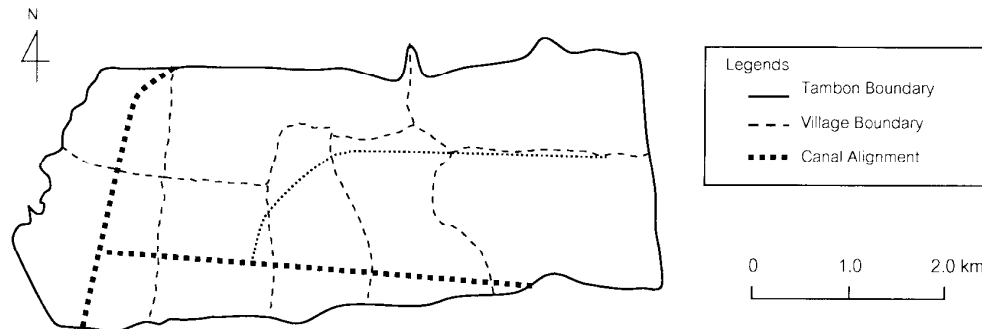


Figure 7-4: Tambon Nakhian Boundary and the 1L-4R-LMC Sub-lateral Canal

staff members. The legislative council and the administrative committee comprise elected village representatives, two from each village. The organization has a stable and expanding office. Their staffs include technicians and community development workers. According to the Decentralization Plan and Procedure Act of 1999, the Tambon Administrative Organizations (TAOs) shall prepare their own regional development plan, provide and maintain streams and drains, promote occupational development. Source: Tambon Nakhian Administrative Organization, 2003 conserve natural resources. The new organizations seem to be learning to handle these tasks better than they did in the initial period, when many received criticism for their efforts (Rujanaseri, 2004 and Kokphol, 2003). The organizations are allocated a budget from the central government and can collect local taxes, part of which can be kept for local concerns. The Ministry of Interior classifies Tambon Nakhian, according to its development level, in the most modest class of local governments.

Findings

Traditional On-farm Water Management: Plot-to-Plot Water Transfer

After the state irrigation agency installed the main Khlong Thadi irrigation system in 1988, FTO-4 farmers did not develop any additional on-farm water distribution facilities. They continued to use the traditional on-farm water distribution method developed since their farms were first established. In this method, they transferred irrigation and/or rain water from plots to plots, from those close to the sub-lateral irrigation canal, which is located at a relatively high elevation, to those further from it. Each of the ownership plots is surrounded by earth bunds of 30 cm in average height and 55 cm in average width. These dimensions are related to the desired water retention depth, and to convenience in walking passage and the piling-up of harvest. A plot with varying elevations is partitioned with similar earth bunds for better water management. The same is applied to the dividing-up of an ownership plot for farming by different cultivators. The crest of water transfer channels in the bunds are adjusted in the range of 15-30 cm in width and 10-30 cm in

height, depending on the temporal water and drainage requirements, the water level in the upper plots, the water current velocity, and the plant height in the lower plots. The number of water channels per plot is more than two units for irrigation and drainage purposes. The highest number is five units per plot, reflecting the rather high variation in the elevation of the natural landform plots.

Ninety per cent of the 69 FTO-4 farmers who were interviewed evaluated the plot-to-plot on-farm water distribution method as having both strengths and weaknesses. Its strengths were related to its low conveyance loss as water could be reused along its passage by subsequent farmers, and its low labor requirement in water level checking and water channel adjusting. Its weaknesses were related to the necessity for farmers to coordinate their farming and watering schedules so that water re-use was possible, and to the conveyance capacity which was limited over distance. When the FTO-4 farmers switched from the traditional Northeast Monsoon cropping season to the Southwest Monsoon season after the Khlong Thadi Weir System construction, they could not develop an effective expansive coordination system despite their inter-relationship as kinsmen and long-time neighbours. Only fifty per cent of the interviewed farmers reported ever discussing water sharing with their neighboring farmers. Seven per cent of them admitted playing cat-and-mouse with their neighbors in adjusting the water channels. As a result, the paddy farming period in 2003 covered nine months, with a three-month lag time between the first farmer starting and the last farmer starting. Half of the respondents reported nursery preparation outside the study area, and half of the respondents reported an inability to follow through on their transplanting plans due to water shortages. The transplanting time, when water demand was the highest, started in May, peaked in June and ended in August. Eleven per cent of the interviewed farmers reported using water from nearby drainage channels. Without irrigation coordination, downstream farmers were faced with the risk of water shortage and untimely irrigation supply as, customarily, they could take water only when upper farmers had retained what they wanted. A spatial analysis of farmers who requested water from the state irrigation operators shows these farmers concentrated mainly in the areas near the sub-lateral canal. The state irrigation agency was open to accept water requests from any entity. It has also been supporting the formation of water users groups based on the farm turnout boundary before bundling them up with others into a sub-lateral or lateral group and above under the concept as shown in Figure 7-5. Field staff reported in 2004 that seven tertiary water users groups were being formed but only two seemed to be functioning to a limited extent. There was no sub-lateral group. Only 27% of interviewees in FTO-4, mostly concentrated near the sub-lateral canal, identified themselves as group members. More promisingly, 74% of FTO-4 farmers participated in the seasonal canal maintenance.

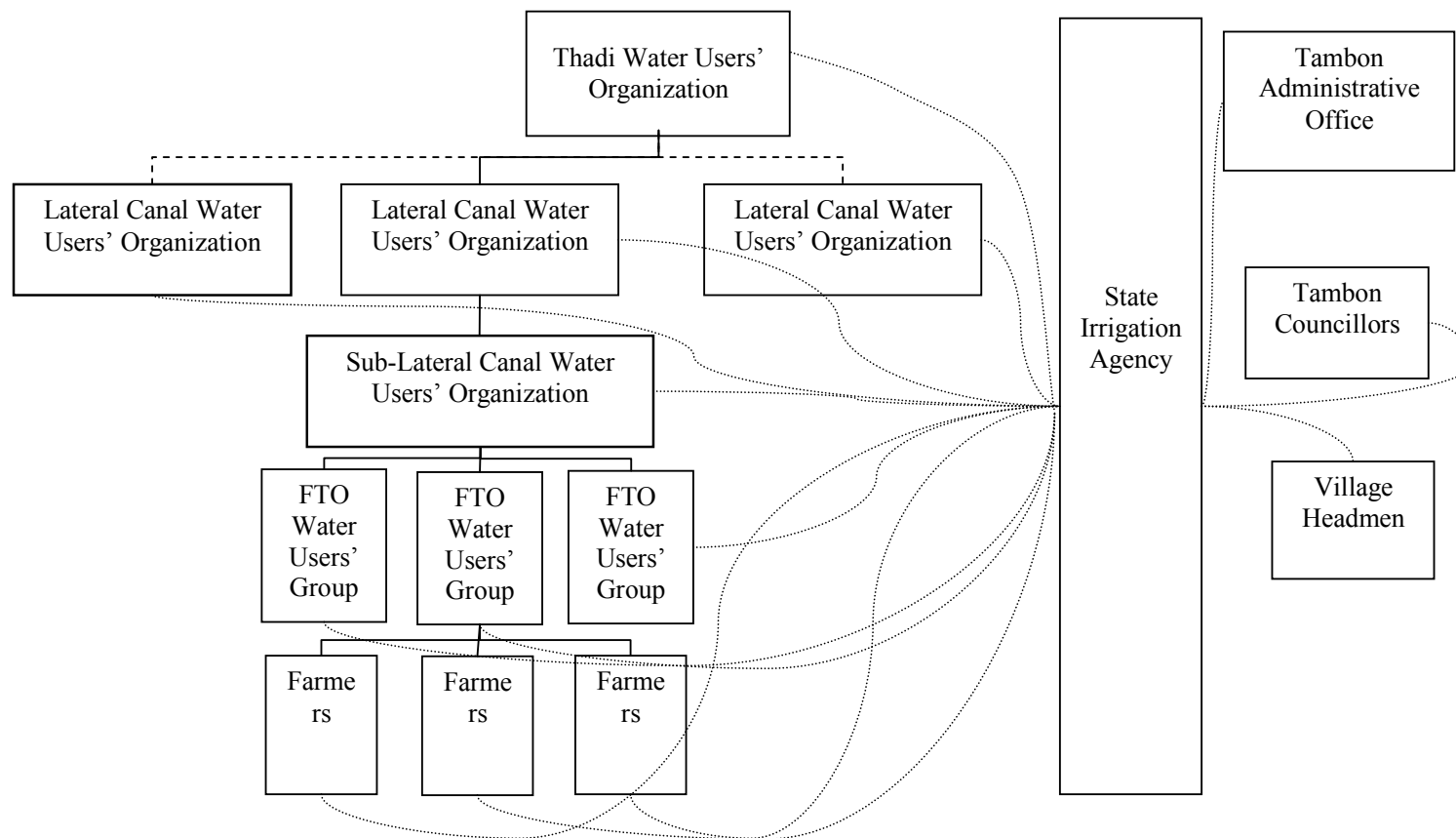
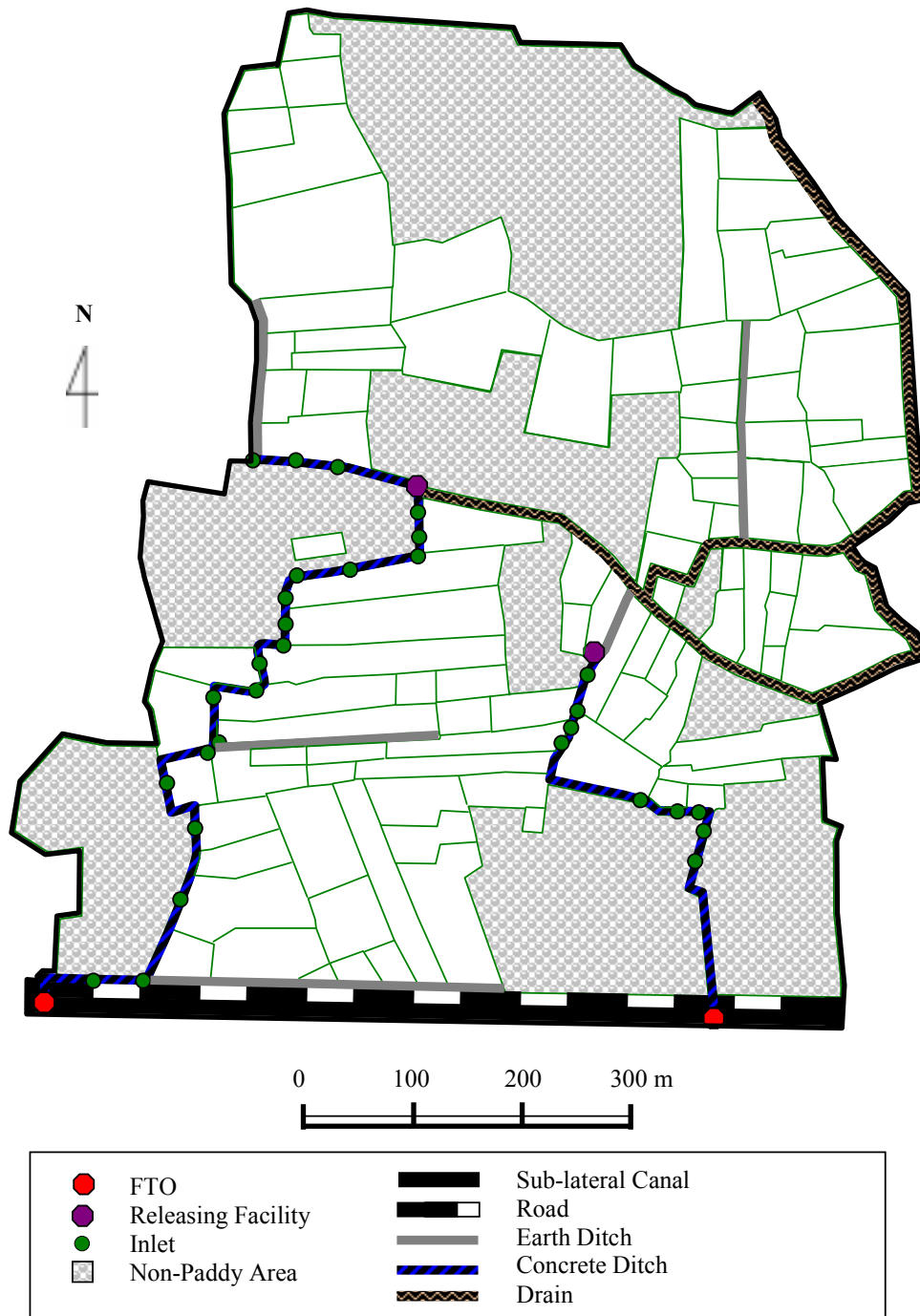


Figure 7-5: Conceptual Flow of the Agency-centred On-farm Irrigation Development and Management Based on the Hydraulic Relationship

On-farm Irrigation Development and Local Constraints

Through a series of meetings and discussions with farmers at the village mosque, on the field and at their houses, it was concluded that farmers needed additional facilities to improve their on-farm water distribution and to hasten on-farm drainage in December to make way for additional cropping. Despite the legal framework of the Land Consolidation and Ditch and Dike laws, which provide for farmers to develop on-farm irrigation systems at their own cost, in practice, the state irrigation agency has been providing the systems. It has several units working on on-farm irrigation development under this study. The Nakhon Si Thammarat Operation and Maintenance Project Office is responsible for the operation and maintenance of the Khlong Thadi Weir System. The office has been trying to promote the formation of water users groups based on FTOs with assistance from the Regional Irrigation Office 15. Being in charge of the area, the office initially participated in the study as active coordinator with farmers' leaders. A topographical survey unit travelled 30 km from the Regional Irrigation Office 15 in Pak Phanang District to collect and send basic data for on-farm irrigation system design to the On-farm Irrigation System Design Group VI who drew up the blueprint and its revisions in Bangkok (780 km from Nakhon Si Thammarat). The Ditch and Dike Construction Unit 15 sent a construction team from Surat Thani Province (103 km) to build the system.

At several meetings, including six formal farmers' meetings, ideas for on-farm irrigation development, stressing the coverage of the system over the entire planned service area of FTO-4 and the provision of direct irrigation and drainage access to every farmer, were offered to local farmers and officers. In practice, the principles ran into local constraints, i.e. land acquisition problems and a limited national construction budget. Basically, the national irrigation agency has a precedent of not buying land for on-farm irrigation development. Land consolidation and straight-ditch development were not favorable choices for the FTO-4 farmers because the former restricted land use for only agriculture and required partial cost repayment, and both involved reallocation of land plots, which is unacceptable to the farmers who obtained full land ownership just five years ago. Farm size, less than half a hectare on average, and farm shapes in a wide range of polygons made it hard for the farmers to conclude how land contributions could be made fair and where the ditch alignment should run. Eventually, two alignments for concrete ditches along the plot boundary were agreed upon by related land owners as shown in Figure 7-6.



Source: RID, 2004b

Figure 7-6: On-Farm Irrigation Plan for FTO-4 Area

With funds from the national budget, the state irrigation agency in 2004 constructed two pre-cast concrete ditches with the discharge capacity of 30 l/s for a total length of 270 m. Ideas on how to expand the irrigation coverage and access through several measures were offered. The first was to install the concrete sections below the natural ground level to enable them to perform as drains, as land contributions for drainage could not be obtained. The second was to improve an existing drainage channel that was a customary water source for some farmers to provide a larger capacity. The third was for the FTO-4 farmers to manage the construction of four additional earth ditches. The first three earth ditches in the lower west end and mid-FTO field were constructed with assistance from the state agency. Farmers in the lower eastern end eventually constructed an earth ditch only after two releasing structures were added to facilitate their access to water from the irrigation system. Through efforts to promote the widest coverage of irrigation, the overall ditch density rose to 55.21 m per ha, slightly exceeding the agency's average as shown in Table 7-3. However, in this plot boundary ditch system, more than half of the farmers still have to access water through the plots of others, even though the average number of intervening plots has been reduced.

Table 7-3: Density of Ditches in FTO-4 Area

FTO No.	Service area (ha)	Concrete ditch		Earth ditch		Overall density of ditch (m/ha) ²
		Length (m)	Density (m per ha)	Length (m)	Density (m/ha)	
4	31.68	950	29.99	550	17.36	47.35
4A ¹	11.52	485	42.10	400	34.72	76.82
Total	43.20	1435	33.22	950	21.99	55.21

¹ An additional farm turnout to serve the original FTO-4 area

² The agency's conventional average is at 38 - 56 m per ha for intensive land consolidation, 31 - 38 m per ha for extensive land consolidation, 22 - 25 m per ha for straight ditch and 31 - 44 m per ha for plot boundary ditch.

Source: Royal Irrigation Department, 2004b

On-farm Irrigation Management Principles and Practices

A series of explanations on the importance of on-farm irrigation management and functions of water users groups were delivered to FTO-4, -6 and -8 farmers. In brief, they were encouraged to consider the following.

- the Khlong Thadi Weir System exists for the common good, and a system for its management is needed to distribute water benefits to all in an efficient and sustainable way;
- coordination for efficient and even on-farm water distribution is needed;
- collective maintenance activities for efficient water distribution and prevention of facilities degradation are necessary;
- coordination and negotiation with upper FTO groups for sufficient supply is

necessary and cannot be neglected especially after on-farm irrigation is developed in upper areas;

- systematic access to information on water availability at the headwork, and a water delivery schedule in the sub-lateral canal is needed for practical on-farm water management;
- group management is necessary and all members should have equal rights and duties in water sharing, voicing their concerns and being heard, voting on important matters, using facilities in consideration of others, maintaining facilities, modifying facilities with agreement from others, and recognizing special contributions from individuals such as group leaders.

Under the leadership of Village No. 1 and 2 tambon councillors, the farmers decided to merge the three existing water users groups in FTO-4, -6, and -8 into one group and elected a president, vice president, treasurer and a ditch-riding team for each FTO. Monitoring results show that voluntary ditch riding and maintenance were the only two collective activities that the group performed. No formal group meeting, other than those supported by the state irrigation agency, was autonomously organized by the group. The group leaders and ditch riders established procedures and gave announcements via person-to-person meetings or through the mosque audio system, neither of which could reach all members.

Monitoring of Technical Adoption

Post-construction monitoring of the actual FTO facility and farm inlet operation as summarized in Table 7-4 showed that the FTO-4 farmers' awareness of the operation varied widely and clearly according to farm reaches. Their awareness of FTO facility operation by the ditch riders declined along the irrigation reaches from 100% in the head end to 50% in the mid reach and 40% in the tail end. Their awareness of the inlet operation, which was lower, also declined from 45, to 25 and 20% along the reaches. Farmers cultivating plots with access to concrete and earth ditches were more aware of FTO operation than those farming plots receiving water through other plots. The awareness of inlet operation was low among farmers working in plots not directly related to inlets. Overall, an imperfect awareness of the operational system for the FTO and their relevant farm inlets indicates that a common operation system has yet to be installed.

A comparison of the 2003 and 2005 farming schedules shows that temporally the FTO-4 farmers could narrow down the transplanting period from four months to two months. *In situ* nursery preparation increased from 29% of plots in 2003 to 51% of plots in 2005. Spatially, the progress of land preparation activities was still scattered without a clear distribution pattern. The progress of transplanting started upstream and moved downstream. Midstream and downstream farmers reported using supplementary irrigation from return flow accumulated in earth ditches for transplanting. Eighty per cent of downstream farmers reported an ability to follow through on their transplanting plans, followed by midstream farmers at 67% and upstream farmers at 9%.

Table 7-4: Operational System Awareness of Farmers Classified by Plot Reaches and Plot Types

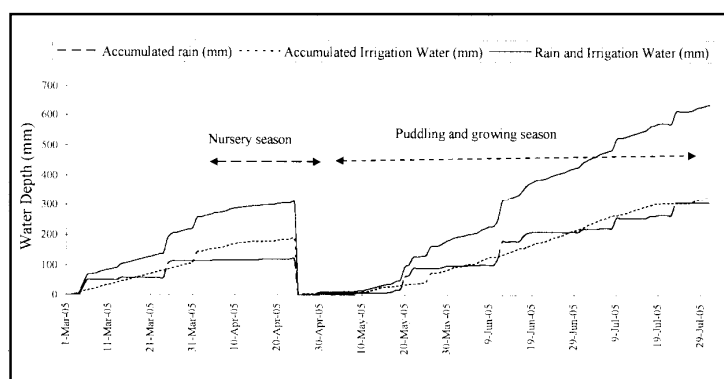
Awareness of operational system ¹	Plot reach ²			Plot type		
	Upper (%)	Mid (%)	Lower (%)	Concrete ditch access (%)	Earth ditch access (%)	No direct access (%)
FTO	100	50	40	78	71	50
Farm inlet	45	25	20	45	28	25

¹ Twenty-four respondents were interviewed through simple random selection.

² Division of reaches: Upper reach extends from FTO to inlet No. 1-4; Mid-reach extends from inlet No. 5-18.

Source: Ounvichit and Srisa-ard, 2005a

Eighty per cent of the FTO-4 farmers perceived that they still relied on rain water for land preparation, transplanting and crop growth, a presumption that is negatively proved by an analysis of the actual 2005 availability of rain water as against irrigation water for nursery preparation, land preparation and transplanting. As shown in Figure 7-7, while there were periods with little or no rain, irrigation was continuously supplied, making the ratio of actually available rain and irrigation water over the cropping time nearly 1:1. Farmers' failure to recognize their use of irrigation water had an impact on their water management, which still remained in the rain-fed tradition as opposed to the irrigation model. The irrigated agriculture technology did not diffuse in the study site despite the installation of the irrigation infrastructure for more than two decades due to the influence of local culture and farming tradition on their perceptions. However, a group of farmers in the study site accepted the challenge to hone their water management skills for the dry season crop in 2006/2007. In a meeting to feed the information gathered on their practices and awareness back to them, the FTO-4 farmers agreed to set up four sub-groups and elected the leadership teams to take charge of water coordination.



Source: Ounvichit and Satoh, 2006

Figure 7-7: Actual Rain and Irrigation Water Availability for Farming in 2005 in FTO-4 Area

Discussions

Missing the Opportunity for Sustainable WUO Formation

The best opportunity for the sustainable water users organization is the time when water users are accessing the irrigation system. Accessing the system is the highest incentive that can make them commit themselves to the related rights and duties. However, rushing the irrigation system development in Thailand, as in the Khlong Thadi Weir case, does not give farmers enough time nor a clear framework for them to establish procedures and get organized based on their new hydraulic relationship introduced by the national irrigation systems (Ounvichit and Klaymon, 2001). The merits of the Land Consolidation and Ditch and Dike acts in requiring farmers to organize themselves to develop an on-farm irrigation system were not seriously translated into practical support from state officers for farmers' organizing. Allusion to and application of the Civil Code and the Cooperatives Act for the formation of water users associations and cooperatives could not address irrigation matters squarely, allowing the organizations to embrace purposes other than irrigation, such as agricultural credit, etc. Without substantial development in irrigated agriculture, the benefit that the farmers in the study area gained in the form of more stable subsistence paddy production was not substantial enough for them to consider investing more energy than necessary. As a result, the FTO-4 farmers did not pay much attention to forming a water users group although most of them turned up to do the cooperative pre-irrigation-season canal maintenance activities. At the Thadi development time, the local administrative arms had a limited capacity and also focused on peace and order rather than on the economic progress of the communities. Because of time and contextual constraints, on-farm irrigation development and management has been left far behind the water resource and irrigation development, which was taken on directly by the state irrigation agency.

Sensitivity to Equality in On-farm Irrigation Development

As illustrated by the study case, plot boundary ditches are preferable to other on-farm irrigation development types because farmers want to avoid problems of land contribution, plot reallocation, land use control and construction cost repayment. Their trend of preference is confirmed by the statistics in Table 7-1 showing that the plot boundary ditch type development has increased from 17% of the on-farm irrigation development area in 1988 to 23% in 2004 while other types declined or diminished. If this trend continues, it will become more common to be faced with a wide variety of local hydraulic conditions that call for higher sensitivity in treating farmers' equal water rights than a single set of engineering conventions can accommodate. The oft-cited national budgetary constraints should not lead to a simplistic provision of a limited-length ditch and the naïve expectation for downstream farmers to extend it on their own. These farmers have previous experience of inferior rights in the plot-to-plot on-farm water distribution and would not automatically extend the ditch. A failure to include them in the new on-farm irrigation system for "practical" considerations is tantamount to leaving out their

lands and alienating downstream water users from the start. Such omission will decrease the possibility of sustaining the planned irrigable area as well as sabotage efforts to unify the farmers in the establishment of a sustainable water users group.

Several measures were tried in the action research to address the farmers' constraints and preferences with the end goal of covering the entire planned area and providing the most farmers possible with direct irrigation supply and drain access. Among the measures, which included the consideration of a dual-purpose ditch to lessen the land requirement, the improvement of an existing drainage channel that serves as the return flow source for downstream farmers, and the encouragement of farmers at the pre-construction stage to add earth ditches to increase the irrigation access to the most farmers possible, the implementation of the last measure was noted with the eastern downstream farmers agreeing to add an earth ditch only after being advised of the function of a specially provided division box from where they could take water to their field via the drainage channel. This confirms that, if farmers realize that they are being treated as part of the system, they will be more willing to contribute. These measures are some of the possible ways to treat land acquisition problems, to use the local conditions to supplement a limited budget for irrigation facilities, and to solicit farmers' contribution in an effort to cover the entire planned service area and provide irrigation and drainage access to every farmer.

Designing a plot boundary ditch requires more detailed field information and higher sensitivity to farmers' equal water rights than other types of on-farm irrigation systems. The design is a very crucial stage because it is also when the future water management is taking its form, and operational capacities are being considered and accepted by related people. A shortfall at this stage would render water management difficult and the system would face a high risk of deterioration with all its related social and economic effects (Depeweg, 1999). State irrigation officers who work from a distance have difficulty accessing local information. Despite respectable professional engineering capability, they have no effective system for integrating the social dimensions into their work, which is split among many working units. This state-agency centred institutional approach cannot respond to the basic problem of on-farm irrigation development. Therefore, it is expedient to consider whether the agency's professional strength can be more effectively used in neutrally confirming the efficiency of the development plan, rather than actually developing it. Local organizations may have better access to local information and be more sensitive to the equality of the water users.

Problems of Farmers' Self-Organizing

Hydraulic Relationship: Imbalanced, Unstable and Paddy-Oriented

The low recognition of the FTO and farm inlet operation systems by the FTO-4 farmers reflects that a common operational system has not yet been properly installed. The prime and chronic impediment to its installation is the imbalanced hydraulic relationship developed since the erection of the nationally provided system,

by which upstream farmers do not require the cooperation of downstream farmers. This is in contrast to the interdependent relationship between upstream and downstream farmers in self-reliant people's irrigation systems where upstream farmers require downstream farmers to share the headwork cost while the latter get "paid back" when the former share the ditch cost, making them able to make an agreement on equal water rights and operational rules before investment is practically made and the systems are realized (Ounvichit, *et al.*, 2006).

In the study case, despite increased communication in the post-construction period, the downstream farmers and the farmers without direct irrigation access could not gain any more leverage in negotiating with their more advantaged fellows. Neither could they make their presence and need felt by performing seasonal maintenance activities and contributing their labour to extend the earth ditches. The commonly discussed social capitals, such as tradition, culture and religious beliefs, were not identified in the action research process as an effective capital to mobilize cooperation from the advantaged farmers. Only kinship was effective, but even that only to an extremely limited extent. Added to the problem of the imbalanced hydraulic relationship, the unstable tenancy and high mobility of tenants leads to unstable hydraulic relationships and the question of who is to develop a long-term on-farm irrigation operation system. Being imbalanced and unstable, the hydraulic relationship, in this case, cannot be a firm basis for establishing a common operational rule and a sustainable water users organization (Figure7-5) as envisaged by the state irrigation agency.

The basic state idea also tends to consider only the hydraulic relationship of paddy farmers tapping water from the same farm turnout, leaving out farmers of other crops. Even though irrigated agriculture has not been developed in a wide scale in the study area, many other kinds of crops are grown in the vicinity. Upland and vegetable crop farmers periodically use irrigation water to fill up their water stock, and tree crop farmers use irrigation water mainly during the dry season. The hydraulic relationship of non-paddy farmers is not squarely defined and included in the basic state idea for water users organization.

Lack of Incentives for Greater Irrigation Participation and Organizational Development

Explicit economic returns from irrigated agriculture would be a strong incentive for farmers to form a water users organization (Mizutani and Mase, 1999). In the study case, however, irrigated agriculture development did not happen in the study site in a wide scale. The irrigated crop is still mainly the subsistence paddy crop. Unless the benefits from irrigation are clearer to the farmers, especially through irrigated agricultural development, they are unlikely to increase their participation. As a special extension of the research project, activities to promote irrigated agriculture are being conducted.

Apart from irrigated agricultural development, subsidies for on-farm irrigation development that have already been put in place by the state irrigation agency can be modified into incentives for developing water users organizations in the existing national irrigation system. The government incentives for on-farm irrigation development that balance the cost and benefit of the upstream farmers will win their consensus to the development plan (Shinzawa, 1955). This can be done by, for example, using some parts of the government incentives, as agreed by all beneficiaries, to buy the land required for construction purposes from upstream farmers (Sakuma, *et al.*, 2001). Presently, the Thai state irrigation agency has already superseded the ditch and dike law to develop on-farm irrigation systems for the farmers. Alternatively, a new institutional framework for farmers to apply for national funds for on-farm irrigation development can be publicly enacted to require farmers to participate in the development planning, designing and budget use, stressing equal treatment for every farmer and a target of covering the entire planned service area. This incentive would encourage farmers to get organized.

Water User-Society Relations

Judging from the study case, the organizational development cannot be based solely on the hydraulic relations of water users. The idea of using the competition for water among the FTO groups to organize them through establishing the FTO groups simultaneously with a sub-lateral canal group, an idea which is based on their hydraulic relations (Onimaru, *et al.*, 2003), is not suitable for this case. Neither is a reliance on the social relations among individual farmers as relatives and long-time neighbours. A higher level of social relatedness, i.e. the relation between individual water users and their societies including their village, tambon, province and/or country, is a strong candidate for supporting organizational development. Saying this does not mean that irrigation operational groups are not necessary. They are still necessary, but they should not be based solely on hydraulic relations. They might be based on crop types, community boundaries, or other factors that can unite group-based irrigation operation. Social relations between the individual and his/her community can complement the irrigation organizational development by providing a scaffold for its development as proposed in Figure 7-8.

Compared to the past period, the present time provides a more favourable condition for farmers' participation in national irrigation systems. The presently ongoing administrative reform in Thailand is transforming the purpose of local administration from maintaining the democratic ideology to the managing of public services with people directly participating in community matters, not through representatives as in state administration. This transformation increases the power of the local administration on local issues, including the issuance and enforcement of local regulations. According to the decentralization plan, 245 work items being charged to state agencies will be transferred to local administrations together with 35% of the state budget in 2006 (Decentralization Plan and Procedure Act 1999). Throughout the action research process, tambon councillors from Village Nos. 1 and 2, where the study site was located, demonstrated enthusiasm for improving irrigated

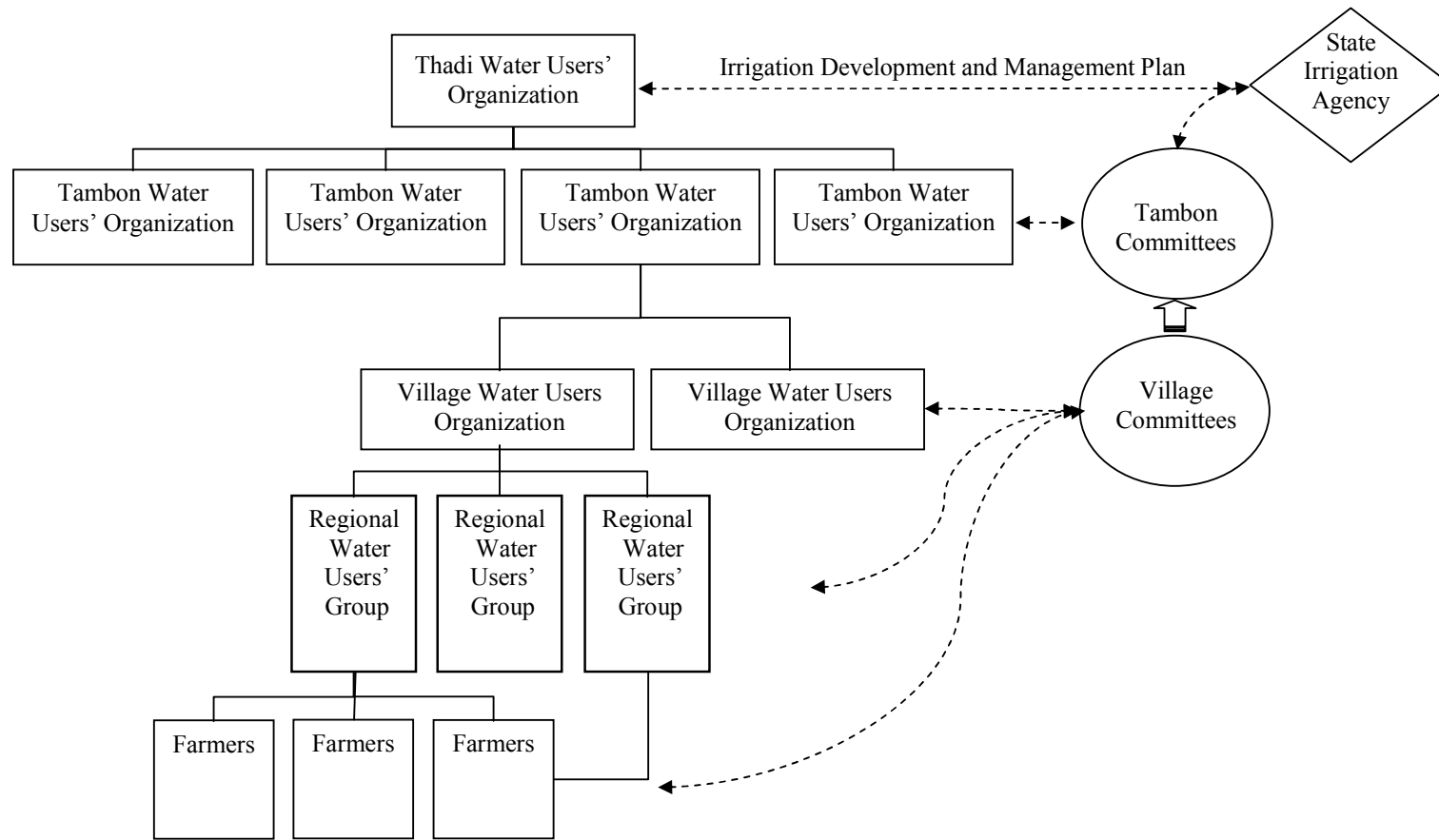


Figure 7-8: Organizing Irrigation Water Users through a Social System

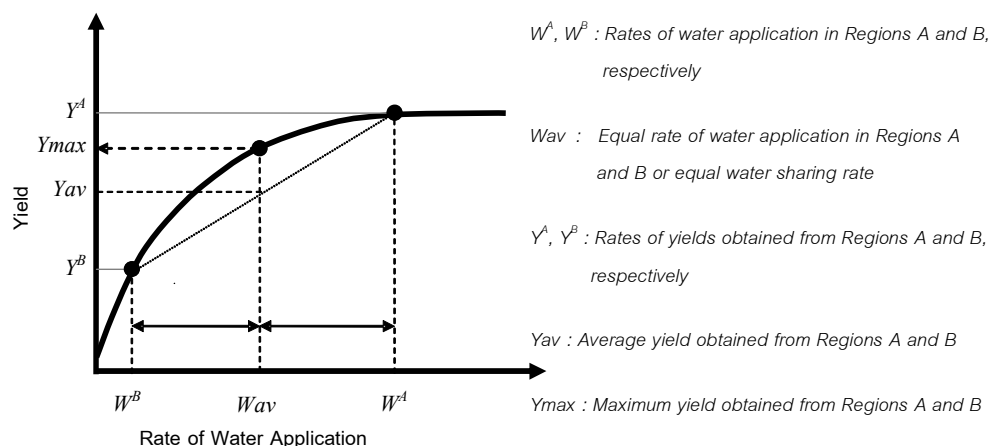
agriculture in their villages to improve the people's livelihood. Although these councillors acted on an individual basis, their action points to the possibility of expanding their efforts to the institutional level by providing their villages and tambon office an important role in irrigation development and management. Villages are often used as a gateway for sector development projects and have the potential to integrate irrigation management with agricultural development, a gap that state agencies have not been able to substantially overcome in attempting to boost irrigated agricultural development as proposed in the original national irrigated agricultural development plans.

As a stable, legally established entity, the tambon office shares the national aim of distributing benefits to society as a whole. With high local accountability and close proximity to the villagers' monitoring, the tambon office, which has been authorized to collect local taxes, has an incentive and a clear background to stimulate local progress and social harmony. In the action research process, the office has demonstrated its willingness to support the development of irrigation water users organizations and to adopt the Equal Water Sharing Principle as shown in Figure 7-9 (Sato, 2003) as the guideline for tambon water sharing. This figure is conceptual in nature; hence, no specific units or conditions are given except for the condition of limited availability of irrigation water. The underlying concept, derived from the economic law of diminishing returns, suggests that application of specific units of irrigation water to a region will increase the yield, but after more and more units are applied, at one point, the yield increase will diminish until it eventually reaches zero. Under the condition of limited availability of irrigation water, the principle stresses the superiority of the equal water sharing scenario over the unequal one. In the unequal scenario, the advantaged Region A is applying irrigation water at the rate of W^A in the diminishing return or plateau region while the disadvantaged Region B is applying irrigation water at the rate of W^B in the region lower than Region A; as a result, the average yield of these two regions is Y_{av} , which is lower than Y_{max} , which is obtained when both regions apply irrigation water at the equal rate of W_{av} .

Holding to this Equal Water Sharing Principle and stressing the relations between individuals and their societies should give irrigation water users organizations, tambon offices and villages a springboard for making equal water rights normative in the communities where an orderly irrigation water management has not been installed, instituting a pattern of cooperation and generating the maximum returns from limited irrigation resources.

Re-Alignment of State Irrigation Agency

To support the irrigation institution as proposed in Figure 7-8, an understanding of the state irrigation agency as well as the necessity of a change in its role is indispensable. Presently, the agency is taking the lead in on-farm irrigation development and accepting irrigation water requests from all kinds of entities. To make the proposed institution effective, the agency can take a more vital role in the



Source: Satoh, 2003

Figure 7-9: Equal Water Sharing for Maximum Yield

transitional decentralizing period by supporting WUOs, tambon organizations and villages with needed incentives, technical and water information and capacity building so that the WUOs are ultimately the committed development and management decision makers. Only by allowing these local entities to play in a wider sphere can the agency achieve the national goal that was envisioned at the outset of the irrigation project.

In the action research process, it is observable that the people's side is developing a new attitude and structure for participation. However, it is still a major question whether the century-old agency possesses the will to embark on this vital change in its role. This concern became evident in the wrap-up session and opinion exchange of the November 2006 study tour on irrigation management and agricultural occupational development, organized for one hundred farmers and local leaders in Tambon Nakhian. At one point, the participants were on the verge of establishing a tambon irrigation committee when they were stopped by field level irrigation staff who reported that the agency had already made it a plan to establish a hydraulic-based water users organization in the sub-lateral canal by the end of 2006. In January 2007, the agency began promoting the establishment of the organization by integrating the terminal hydraulic-based groups in Tambon Nakhian and Tambon Nasai, another tambon in the Thadi system tail reach. This movement appeared as a positive sign of its receptivity to the proposed idea of using user-society relations as a joint basis for water users organizational development. The success still depends on whether the agency has been thorough in envisioning how the two tambons can cooperate and on whether the agency can re-align its institutional procedure to support the water users organizations, tambon organizations and villages, and allow the organized water users to become the decision makers.

Conclusions

The present agency-centred approach for on-farm irrigation development and management is not sufficiently sensitive to the equality of irrigation water users, especially where non-uniform and unequal facilities like plot boundary ditches are favored by small farmers. Local socio-economic conditions, including unstable tenancy and mixed cropping patterns, negate the agency's sole criteria of the hydraulic relationship and its "paddy myopia" for organizing water users. Irrigated agriculture has not been widely developed, making the benefit of irrigation not substantial in the view of farmers, hence their reluctance to increase participation. The user-society relations are an alternative basis for scaffolding a sustainable organization for irrigation decision-making, especially for system design and development of operation rules. Villages and tambon offices have the orientation to aspire to irrigation development and to distribute irrigation benefits to all for the maximum returns. The entire irrigation development and management institution, including the levels above the on-farm level, needs to be realigned to place the water users who are organized through social or other locally suitable systems at the centre of the development process.

CHAPTER 8

SUSTAINABILITY FACTORS OF SMALL SCALE PEOPLE'S IRRIGATION SYSTEM MANAGEMENT: THE CASE OF PONGSAK

Introduction

Prior to the state-led modern irrigation era, irrigation systems were managed by users or local communities. Domestic knowledge has been accumulated and practiced. The most acclaimed and studied are the Muang Fai irrigation systems built in the mountainous northern region. Weirs and ditches were constructed to divert water to paddy fields by the farmers themselves. As the investment of the weir was beyond the capacity of an individual farmer, communal cooperation was necessary and subsequent orderly water uses had to be disciplined by some rules and regulations. The so-called Sanya Muang Fai were promulgated in many localities and in their top form the rules were developed into the Mangrai Satre of the Lanna Kingdom. Today, there are still some remnants of the Muang Fai system, some of which are still maintained by users, some are improved by government agencies and some are incorporated into the service areas of larger scale irrigation systems.

Previous *Muang Fai* research has been conducted on the description of their structural arrangement and management (Moerman, 1968; Calavan, 1974; Potter, 1976; and Sirivongse, 1983) and their historical development and management in search for the most efficient means of water management for agricultural development (Surarerks, 1986). The *Muang Fai* cooperation mechanisms are appreciated in the studies on their customary rules and regulations (Surarerks, 1991), the ecological relations and technological basis of *Muang Fai* systems (Tanabe, 1994), the factors influencing cooperation among *Muang Fai* members (Nimmanhaeminda, 1989), and resources mobilization in upland and lowland *Muang Fai* systems (Tan-Kim-Yong, 1995a). Transformation of *Muang Fai* in new environment is one of the Muang Fai issues that gains high interest as reflected in the studies on the necessity to integrate *Muang Fai* with national irrigation systems (Surarerks, 1991), the adaptation of *Muang Fai* organization to public intervention and necessity to amend the People's Irrigation Law to suit local culture and present day situation (Atharn, 1995), and alternative approaches for *Muang Fai* adaptation amid social changes including *Muang Fai* networking, self-determination or joint management with agencies, and the role of local organizations in monitoring government action on *Muang Fai* (Tan-Kim-Yong, 1995b, c, and d). Most of the studies touched on cost sharing and sustainability while a few touched on the irrigation water management. None of them has squarely treated the relationship between water management and cost sharing in *Muang Fai* systems. This chapter focuses on how members of a small-scale *Muang Fai* system manage their irrigation water and structure their cost sharing method, and what relationships they have with the sustainability of the system.

Research Methodology

A compact *Muang Fai* irrigation system of Pongsak in the Pai River Basin, northern Thailand is selected as a study case in view of its being representative of small-scale wooden *Muang Fai* systems of which *Muang Fai* leaders are in direct contact with their members, which are common in intermontane valleys in Mae Hong Son Province. Field observations, questionnaires to all members, and interviews of some selected members were conducted to understand the *Muang Fai* physical structures, water distribution practices, farm size distribution, cropping pattern, water cost and farming profitability, and farmers' experience in sharing costs. The relationships between cost sharing with water management and system sustainability were analyzed.

Profile of the Pongsak Irrigation System

The Pongsak *Muang Fai* Irrigation System is situated in a rugged terrain in the north of Pai District, Mae Hong Son Province which is 130 km northwest of Chiangmai City as shown in Figure 8-1. The system relies on the flow of the Pai River, a tributary of the international Salween River which originates in the mountains to the east of Mae Hong Son Province and runs westerly through narrow valleys into Myanmar territory before draining into the Andaman Sea at Moulmein. The arable land of the 3,119 km² river basin is very limited, with only one major patch each in the north of Muang and Pai districts. Distinctly, farms are scattered in numerous small fan valleys; hence the importance of this kind of small scale *Muang Fai* systems in the basin.

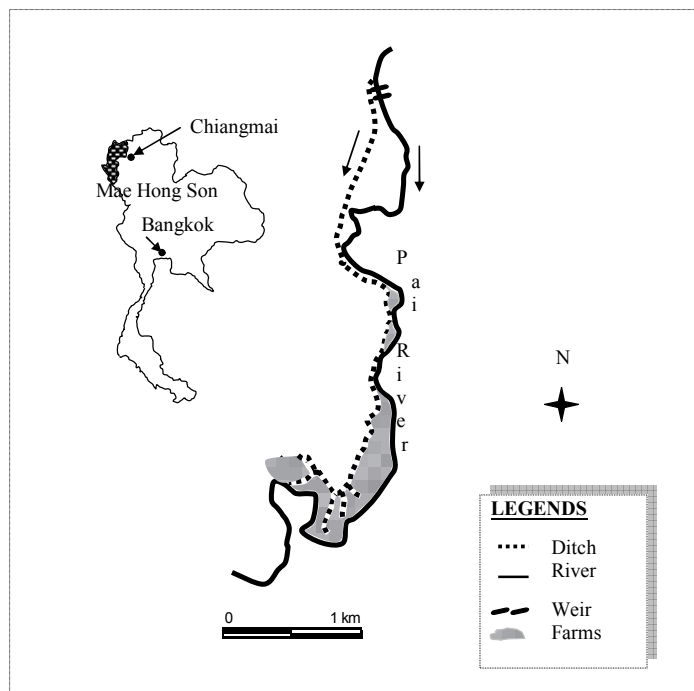


Figure 8-1: Pongsak *Muang Fai* Irrigation System

Physically, the system includes a weir, a main supply ditch, three branch ditches, and a wasteway. The Pongsak Weir comprises two 37-m rows of boulders framed by teakwood crosses, which are located 51 m apart along the river. The inlet to the ditch is 45 m upstream of the upper row. This so-called *Fai Khokmoo* (literally pig sty weir) or crib weir is fabricated with locally available materials, i.e. boulders in the river and trees in the nearby forests, in a rather straight rock-banked river section to pre-empt fast river bank erosion that is common in earth-banked weirs. The weir that stands 3-4 meters tall checks up water head for diversion to all farms. In case of water insufficiency in the dry season, a simple 45 cm tall bamboo barrier is built to intercept river flow into the ditch. The crib weir is relatively sturdier than other types of weir, but its maintenance still involves annual replacement or reinforcement of the wooden frames and boulders.

The ditch carries water along a 2.5 km feeder on the right bank and continues onto the main supply ditch. The ditch gradient control clearly required hard work at the construction and maintenance time as elevation dropped by 10 m, drastically in the middle section that is walled on one side with cliffs and on the other side with only a narrow ditch embankment which can easily collapse during high flow. A wasteway is installed to lessen the surplus flow at needed time. The width of the ditch tapers on average from 1.5 m in the head-end to one meter in the tail-end before draining into a small natural stream that drains back into the Pai River. The ditch cross section is not totally uniform and is clearly constrained by difficulty in construction in the rocky areas. Each of the 24 *Muang Fai* members is provided with a farm intake, including three members who receive water from branch ditches. At the construction time, it was estimated that a 20 cm wide intake could supply an area of 0.55 ha (4 *rai*). However, members could decide their intake width, depending on their water need assessment that may take into account, *inter alia*, the quality of soil, the availability of alternative water sources, and the possibility of getting return flow for recycling use. There are three intake width choices in the system, i.e. 20, 15, and 10 cm. The *Muang Fai* group is committed to build the main ditch with adequate capacity to satisfy every member's expressed needs.

The catchment of the Pongsak weir is 338 km², which is more than 2,000 times of the service area. According to the member farmers, the river flow itself is abundant in every season although no record of flow rate is available. With no river flow limitation, the system diverts and distributes water to farms on a continuous and simultaneous supply basis. With a fixed width of intake, every member is susceptible rather equally to the fluctuations of the river and ditch water levels since checking up of water in the main ditch to divert water to a particular paddy farm is forbidden. If water is not adequate for anyone, actions will be taken to fill the weir gaps, if any, to increase the weir crest, or to set up a small bamboo barrier to intercept water into the ditch, as necessary. Every member farmer has a role in monitoring water distribution and seeking solutions. It is very rare that the group faces a critical water condition and in that case, members would discuss and with the coordination of their elected group leader, develop a rotation schedule starting from

upstream to downstream. In case of water conflicts, the so-called *Kae Fai*, or the leader of *Muang Fai* system, is given the power to decide.

Farming areas in the system covers 15.84 ha comprising 24 ownership plots ranging from 0.3-1 ha in size. Each plot is divided into 15-65 cultivating plots for better water control in the high-slope area. Farmers are landowners who are related as relatives or village neighbors. Their household sizes ranged from 2-6 members, with the average of 3.4 per household. They professed that their occupation was only farming. The cropping schedule as shown in Figure 8-2 reflects that the cropping pattern in the area depends on the water condition and the season. The wet season paddy is grown in permissible areas or relatively lower elevation from May to November. Farmers use irrigation supplement for six months from May to October, particularly in June-July when water is needed everyday for land preparation. Originally, the wet season paddy was for household consumption but presently farmers have some surplus for sale. Farmers grow soybean in slightly higher elevation with difficult water diversion in the wet and dry seasons. Garlic is grown in the dry season from December to March and farmers use irrigation water around 5-10 days per month, especially the period before harvesting in early March. Soybean and garlic production is for commercial purpose. The annual cropping intensity of the system is remarkable at 200% of the farm area, with 93%, 93% and 14% for paddy, garlic and soybean, respectively.

Findings

Cost Classification and Distribution

Members of the Pongsak System, all of whom are land owners, gather at the house of their group leader annually to discuss the magnitude of irrigation management work, estimate costs and make an agreement on cost sharing. The group classifies costs into three categories, namely costs of weir maintenance, ditch maintenance and remuneration to the *Kae Fai*. Nearly all of these costs are distributed based on the intake capacity of each member expressed in relative terms, i.e. 20, 15, and 10 cm intakes are treated as 100%, 75% and 50%, respectively. The number of members in each percentage group is 6, 6, and 11, respectively, as shown in Table 8-1. One member whose farm is situated above the ditch elevation and needs to lift water to his farm is specially treated as 25%.

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Average Rainfall* (mm)	50	180	185	213	252	199	115	37	15	8	2	5
Number of Rainy Days*	4	13	18	20	22	16	10	3	1	1	0	1
Cropping Schedule												
Rice	1	2	3				4					
Soybean	3						4					
Garlic						5		3		4		

* Source Hong Kong Observatory 1961-1990 rainfall data

1 = Nursery Preparation

4 = Harvesting

2 = Paddy Field Land Preparation

5 = Preparation of Garlic Bulbs

3 = Crop Growing Stage

Figure 8-2: Rainfall Pattern and Cropping Schedule in Pongsak System

Table 8-1: Distribution of Annual Cost in Pongsak *Muang Fai* System in 2005

Farm Intake (%)	No. of Members	Weir Maintenance				Labour (man-day)	Cash (US\$)	Ditch Maintenance	Remuneration to <i>Kae Fai</i>
		Wood Stake Length (pieces)			Labour (man-day)			Cash (US\$)	Labour (man-day)
		2 m	1.5 m	0.5 m					
100	6	40 x 1.0 x 6	80 x 1.0 x 6	100 x 1.0 x 6	10 x 1.0 x 6	12.5 x 1.00 x 6	10 x 1.00x 6	5 x 1.00 x 6	
75	6	40 x 0.75 x 6	80 x 0.75 x 6	100 x 0.75 x 6	10 x .75 x 6	12.5 x 0.75 x 6	10 x 0.75 x 6	5 x 0.75 x 6	
50	11	40 x 0.5 x 11	80 x 0.5 x 11	100 x 0.5 x 11	10 x .5 x 11	12.5 x 0.50 x 11	10 x 0.50 x 11	5 x 0.50 x 11	
25	1	40 x 0.25 x 1	80 x 0.25 x 1	100 x 0.25 x 1	10 x .25 x 1	12.5 x 0.25 x 1	10 x 0.25 x 1	5 x 0.25 x 1	
Total	24	650	1,300	1,625	163	203.13	163	81.25	
Cost in monetary terms (US\$)		113.75	227.50	284.38	1,015.63	203.13			
						1,844.38	1,015.63	81.25	

Remarks: Rates applied: penalty rates of 0.175 US\$ per wood stake and labour wage of 6.25 US\$ per day.

Weir Maintenance

The *Kae Fai* organizes weir maintenance activities in April when the river flow is the lowest. He schedules each session by avoiding conflicts with important farming schedules. An initial assessment of costs is based on the previous years' costs and the water condition in the past year, e.g. heavy floods in the past year means a need for intensive maintenance, hence higher costs. The group members discuss and conclude the cost for the year in the categories of wood, labor, cash and tools.

1. Wood contribution is based on the intake percentages. Each year, the members discuss and decide the cost for a 100% intake. In the 2005 weir maintenance, the following was agreed.

Wood cost for a 100% intake = 40 pieces of 15 cm x 2 m stake,
80 pieces of 7.5 cm x 1.5 m stake, and
100 pieces of 5 cm x 0.5 m stake

Based on such agreement, a total of 3,575 stakes in three sizes were mobilized by the members for the weir maintenance as shown in Table 8-1. In some years, when there was a need to add sleeping foundation logs, they went to the forest to cut them together.

2. Labor contribution for weir maintenance is also based on the intake percentages. In 2005, like in the past, the labor cost for a 100% intake was set at 10 days, thus 162.5 man-days were available for the purpose as shown in Table 8-1. On average, there are three weir maintenance sessions and each session uses approximately 54 man-days. About 18 members are scheduled to work on the same day. The *Kae Fai* leader adjusts the man-day according to the type and magnitude of work, and keeps a working roster as shown in Table 8-2. It is not necessary that all members come to work together everyday.

3. Cash contribution for weir maintenance is estimated based on the necessity of expenses and the scale of maintenance work such as purchase of additional construction materials like cement, rock breaking tools, transportation and expenses for organizing a simple ritual ceremony to pay respect to the land spirit. The total cost is distributed to members based on their intake percentages. In 2005, the members agreed to fix the rate for a 100% intake width at US\$ 12.5 per year and they collected US\$ 203.13.

4. Tools for weir maintenance including axes, hammers, hoes, and shovels are usually brought on the weir maintenance days. There is no fixed type and number of tools that the members have to bring, but there is a common understanding that some people would bring some kinds of tool.

Table 8-2: An Example of the Man-Day Management Records for Weir Maintenance

Percentage	Name	Day 1	Day 2	Day 3
100%	Mr. A	√	√	√
	Mr. B	√	√	√
75%	Mr. C	√		√
	Mr. D		√	√
50%	Mr. E	√		
	Mr. F		√	
Total Daily Manpower		4	4	4

Ditch Maintenance

Ditch maintenance is scheduled twice a year in mid March (before weir maintenance) and mid November. The ditch maintenance costs include labor and tools.

1. Labor contribution for ditch maintenance is based on the farm intake percentages. The members fixed labor contributions for a 100% intake at 10 days in 2005, hence the availability of 162.5 man-days for ditch maintenance activities as shown in Table 8-1. Generally, there are two major ditch maintenance sessions in a year. The March session takes a bit longer time (3-5 days) than the November session (2-4 days). There may be additional sessions as necessary. The working schedule and roster is finalized by the *Kae Fai* and informed to members 1-2 days prior to the appointment dates. Attendance is strictly checked by the *Kae Fai*.

In maintaining the main ditch, the members are organized into 3-4 teams. Each team, with 5-6 members, work on an assigned section of 8 m in the first block until completion and move to work in their section in the second block as shown in Figure 8-3. The difficult terrains in the head-end section of the ditch makes the group allocates ditch-related work in such way. Both the length of the ditch and the difficulty of the work are evenly distributed to the members. The opportunity to work in all reaches makes it possible for every member to monitor the farm intake width and elevation of others as well as the capacity of the main ditch in the entire length. The maintenance of branch ditches is the responsibility of related users and there is no common schedule for those who share the branch ditches.

2. Tools including knife, hoes, shovels and sacks were usually brought on the working days.

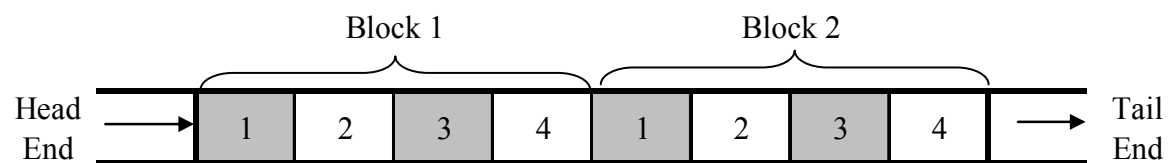


Figure 8-3: Movement of Ditch Maintenance Teams

Remuneration for the Kae Fai Leader

The *Kae Fai* group leader is elected for an unspecified term. In this compact size system, he can work directly with member farmers; hence no assistant is appointed. The group has no written rules or committees, so agreements and all collective activities are transacted verbally at their annual meetings or field encounters. The *Kae Fai* has a vital role as the focal point. He informs members when to maintain the system, keeps working records of members and manages the group fund. He contributes money, labor, construction materials and equipment for maintenance activities like other members. He was remunerated based on the farm intake percentages. In 2005, the members agreed to pay the *Kae Fai* after paddy harvesting time at the rate of US\$ 5 for a 100% intake width. The *Kae Fai* is not remunerated after the dry season crop harvest even though it is for commercial purpose. It means that the remuneration covers his activities both in the rainy and dry seasons because all member farmers grow dry season crop and the *Kae Fai* takes action for irrigation even in the dry season when necessary.

Water Cost

Investment Cost and Right to Use Water

The Pongsak System was initiated approximately 30 years ago by lowland farmers who wished to change from rain-fed upland crops to wet season paddy for household consumption. Each of the 11 Pongsak pioneers paid an equivalence of US\$ 100-125 as cash investment cost. Late comers were required to pay approximately US\$ 450 for a 100% intake percentage to join the system. The total investment cost for the irrigation system is estimated at US\$ 7,300, assuming that the joining fee accounts for both cash and labor investments.

Presently the service area of the system cannot be expanded further due to topographical constraint of the small valley. When an ownership plot is split through familial inheritance, tenancy or purchase, the original agreement on the farm intake width and the rate for cost-sharing for the two new ownership plots is maintained.

Annual Cost and Profitability

To get an image of the annual cost and profit in the Pongsak system, rough estimation is made as shown in Table 8-3 by applying interview data and penalty rates in 2005. Results indicate the annual maintenance activities cost the member farmers approximately US\$ 2,965, or 41% of the investment cost. From the wet season cultivation, which is the original reason for their system development, they earn a profit of US\$ 42.87 and -108 per ha from paddy and soybean, respectively. They also earn additional profit of US\$ 5,330 and 79 per ha of garlic and soybean in the dry season. Annually, they earn more than US\$ 5,200 profit.

Table 8-3: Costs and Profits of Irrigation and Cultivation

	<u>Unit</u>	<u>Unit Rate</u>	<u>Total (US\$)</u>
ANNUAL WATER COST			
<i>Weir Maintenance</i>			
Wood	3,575 pieces	0.18 \$ per piece*	625.63
Labour	163 man-day	6.25 \$ per day*	1,015.63
Cash	1,625 per cent	12.50 \$ per 100%	203.13
Tool	24 pieces	0.50 \$ per piece*	12.00
<i>Ditch Maintenance</i>			
Labour	163 man-day	6.25 \$ per day*	1,015.63
Tool	24 pieces	0.50 \$ per piece*	12.00
<i>Remuneration</i>	1,625 per cent	5.00 \$ per 100%	81.25
Annual Water Cost	15.84 ha	187.20 \$ per ha	2,965.25
RICE CULTIVATION COST & PROFIT PER HA			
Land Preparation	3.13 man-day	8.75 \$ per man-day	27.34
Seed	43.75 kg	0.35 \$ per kg	15.31
Transplanting	6.25 man-day	3.00 \$ per day	18.75
Fertilizer	1.56 sack	12.50 \$ per sack	19.53
Harvesting, hauling, thrashing	43.75 man-day	2.50 \$ per day	109.38
Cultivation Cost			190.31
Yield Price	3,406 kg per ha	0.13 \$ per kg	425.78
Profit Per Ha (After deducting annual water cost)			48.27
GARLIC CULTIVATION COST & PROFIT PER HA			
Land Preparation	1 ha	585.94 \$ per ha	3,662
Furrow Making	6.25 man-day	3.00 \$ per day	19
Hay purchase	5,625 bunch	0.03 \$ per bunch	141
Bulb Preparation	187.50 kg	0.10 \$ per kg	19
Planting Labour	56.25 bins of bulb	3.00 \$ per bin	169
Weed Control Solution	6.25 unit	93.75 \$ per unit	586
Weed Control Labour	62.50 times	3.75 \$ per time	234
Fertilizer	12.50 sacks	13.75 \$ per sack	172
Harvesting	62.50 man-day	3.00 \$ per day	188
Cultivation Cost			5,189
Yield Price	23,375 kg per ha	0.45 \$ per kg	10,519
Profit Per Ha (Without deducting water cost)			5,330
SOYBEAN CULTIVATION COST & PROFIT PER HA			
Seed	50.00 kg	0.28 \$ per kg	13.75
Planting	18.75 man-day	2.50 \$ per day	46.88
Fertilizer	6.25 unit	3.13 \$ per unit	19.53
Harvesting	18.75 man-day	2.50 \$ per day	46.88
Shelling	750 bin of 15 kg	0.25 \$ per 15 bin	187.50
Production Cost Per Ha			315
Yield Price	1,125 kg per ha	0.35 \$ per kg	394
Profit Per Ha in Wet Season (After deducting annual water cost)			- 108
Profit Per Ha in Dry Season (Without deducting water cost)			79
Annual Profit Per Ha Per Year (Paddy and Garlic)			5,378
Annual Profit Per Ha Per Year (Soybean and Garlic)			5,222

Remarks: * Penalty rates are applied.

Conversion rate: 40 Thai baht/US\$, 6.25 rai/ha

Discussions

Intake-Based Cost Sharing, a Reasonable Method in the Given Condition

The major costs of the *Muang Fai* group come from weir and ditch maintenance. These reflect two major problems that the group has to solve, i.e. how to get water and how to distribute water. To get the water, the group members must decide how high and firm, or less permeable, the weir should be maintained and they need to know the total water requirement, which they get through summation of self-expressed water needs of each member farmer. Under the given condition, i.e. abundant river water availability, water shortage problem occurs mainly and only by insufficient facility capacity, not by water scarcity in the river. Thus, when it occurs, the group leader organizes additional maintenance activities on the weir, not trying to adjust water distribution among member farmers, which may open the group to internal water conflicts.

To distribute water, the group needs to know the water requirement of each member and the total water requirement. This information gives them a clue how wide and deep the ditch must be dredged and how wide the farm intake should be. In cognizance that the farm condition varies a great deal, they leave it to the farm owner's discretion in deciding his own water requirement and farm intake width and they supply water on continuous basis and allow no water check-up. The cost sharing based on relative intake capacity, not on the area, or on the total volume of applied water is directly related to the water condition and water management method of the Pongsak system. The relative intake based cost sharing renders results different from other methods as illustrated in Figure 8-4. If the Pongsak system decided the cost sharing and water requirement based on farm area, the result would turn out with seven members sharing cost in different proportions or requiring different water requirements.

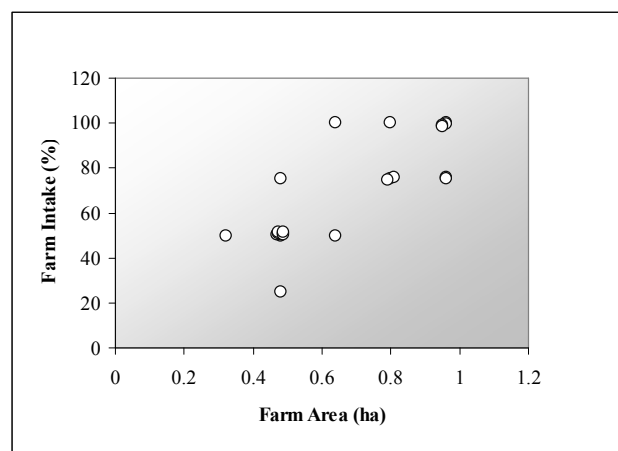


Figure 8- 4: Intake Percentage-Based Cost-Sharing as Reconsidered on the Area Basis

High Cost Necessitates Sizeable Membership

The Pongsak *Muang Fai* Irrigation System is constructed with locally available primitive technology. It degrades fast and its maintenance scale every year is nearly an equivalence of a reconstruction. To sustain the system creates a larger burden than a beneficiary can take individually. To construct the weir across the 37-meter wide river channel with fast flow and high slope like the Pai, farmers invested a total of US\$ 7,300 and paid the annual maintenance cost of US\$ 2,965 (based on 2005). Considering that the weir and the main ditch may have been gradually enlarged and strengthened in the yearly maintenance activity for the new comers, the accumulated investment on the irrigation system should be more than US\$ 7,300. There is a need to spread cost to a larger number of beneficiaries. To attract prospective members, the scale of burden to each individual should be affordable. For sustainability of the system, the group cannot take the risk of letting any member leaving the system. If the membership declines, remaining members must absorb higher cost and such cost may exceed their capacity, resulting in the collapse of the system.

Recognizing such fact, the group makes it clear that not only the weir but also the ditch is their common facility. It is very easy to accept that the burden of weir maintenance should be shared by all members based on their intake percentages. However, head-enders use only a short section of the ditch. The needed ditch capacity downstream of a point in the ditch is not related to the water requirement in the head-end. An addition of users at the tail-end necessitates an increase in the capacity of the whole length of the ditch. However, should the tail-enders be left to take the burden by themselves, they would not be able to afford it and decide not to take part in the system, hampering the possibility to actualize the system (Shinzawa, 1975). Thus, the head-enders have to accept the entire length of ditch as a common facility and by being able to clearly demarcate the boundary of the common facility the group can be robust (Ostrom, 1990).

Equal Treatment Maintains Sizeable Membership: Water sharing, public commitment in understood terms, and de-aggregated book-keeping

Efforts have been made to maintain the membership in the water and cost sharing aspects by heeding the principle that every member shall be treated equally and attempts must be made to pre-empt any suspicion of unfair treatment by ways of treating everything as public commitment in common terms and keeping a clear account. The *Kae Fai* of the Pongsak system is very clear about this and he strictly practices the principle.

For water sharing, the group guarantees every member with water supply at needed time and such commitment has been strictly kept. When any member does not get enough water at needed time, the group has promptly taken action to rectify the situation by augmenting the diversion, or clearing the conveyance channel. The group arranges for a continuous and simultaneous water distribution system in which every member is equally treated under the run-of-the-river irrigation system that is

sensitive to fluctuations in the river water level. This arrangement is done by members deciding and the group endorsing the size of their farm intakes and constructing the main ditch in the size that can satisfy every member of water supply in needed time. With this arrangement, every member is ensured of equality in accessing and utilizing the water.

Cost sharing agreements of the group are made as a public commitment in their own rhetoric. In their own way and own words, they divide necessary work into three categories, namely the weir maintenance, ditch maintenance and remuneration to the *Kae Fai*. Such division is slightly different from modern division of irrigation work in which construction, operation, maintenance and management are often treated as major divisions. Their expression also reflects that the weir maintenance task in the Pongsak system actually covers construction, operation and maintenance divisions. It is a construction work in the sense that the annual maintenance of wooden-rock crib weir is nearly a reconstruction because the wooden weir degrades rapidly, and without maintenance they would soon lose the weir totally. It is an operation work in the sense that when water diversion is not adequate, the members prefer to take actions to divert more by filling up weir gaps, augmenting weir crest, or setting up an intercepting bamboo weir during low flow, instead of changing their water distribution unless there is extreme necessity. Thus such maintenance is in itself an operation work. Likewise, the ditch maintenance covers the construction, operation and maintenance. It is a construction and operation work in the sense that the ditch capacity must be adjusted to be able to serve every *Muang Fai* member. The remuneration to the *Kae Fai* is a treatment of the system management as the *Kae Fai*'s role is accountable for the management work for the group including book-keeping, roster keeping, logistics, coordination, monitoring and policing of the system. Regardless of the rhetoric, Pongsak members understand what work they are referring to, what scope they cover, how much necessary they are, and what cost they require and they are willing to make a public agreement in the words that they understand.

The book-keeping of the group de-aggregates costs of each work category in a clear way. For weir maintenance, the classification includes labor, wood, tools and cash. For ditch maintenance, it includes labor and tools. For *Kae Fai* remuneration, it includes cash only. After classifying them, the members distribute them categorically to each member. Each category or sub-category of costs is handled in a clear-cut way, e.g. the cost of wood stakes in different sizes is distributed categorically. A re-allocation across one cost category or sub-category to another is not allowed because of the difficulty in setting up acceptable exchange ratios, and the risk of failure in mobilizing adequate costs in each category. Affordability is also a sensitive issue for this group. In contrast to other modern systems in which users just pay money and a management team will take care of the work, the Pongsak system is situated in a remote region where costs are more affordable in kind. Acquisition of local materials and contribution of own labor and time makes it possible to realize this system. Difficulty of work is well considered in work distribution, as clearly illustrated by their division of ditch maintenance work under which each ditch team is given a portion of work with various difficulty levels

instead of just any portion of work, and the joint effort to acquire foundation wood logs which member farmers cannot contribute individually. In brief, the Pongsak members participate in a cross section of work and cost categories. With this clearly de-aggregated cost-sharing book-keeping system, the members are more willing to take part than in a single combined rate which might raise fear of unfair transfer of burden.

Conclusions

The cost of the Pongsak *Muang Fai* irrigation system, especially cost of weir and ditch, varies according to the scale of work needed to supply water to every farm intake. Hence, the members share cost based on the relative scale of the farm intakes that they respectively choose. This is a rational cost sharing structure of a run-of-the river system where river flow is not a limitation, water distribution is on a continuous and simultaneous basis, and an increase in the system capacity, not a time-based water distribution rotation, is preferable in water scarcity time. An agreement on cost estimation and sharing is a public process that uses understood terminologies for cost classifications and kinds, making it clear to cost-sharers the purpose of the costs. The acceptance to share the cost of the entire length of the main ditch, not only the section that is relevant to specific users, is meant to gather a sizeable membership so that the system can be realized. The transparent handling of fair cost distribution by de-aggregating every cost classification and kind without tolerating re-allocation across classifications and kinds strongly supports the sustainability of the system.

CHAPTER 9

MANAGEMENT STRUCTURE OF LARGE SCALE PEOPLE'S IRRIGATION SYSTEM: THE CASE OF SOPRONG

Introduction

It is commonly believed that farmers can effectively organize themselves to manage irrigation systems only when the systems are small in scale, and thus that farmers can organize themselves only to manage the lower level of, and smaller parts of, large-scale modern public irrigation systems such as the on-farm irrigation level. This chapter aims to investigate whether this is always true. In the mountainous northern region of Thailand, there are many irrigation systems based on the traditional Muang Fai or weir and ditch systems. No exact statistics are available on their total number, location and coverage. It has been debated whether these systems should be considered as using only primitive technology or highly advanced technologies that incorporate insights on achieving efficiency of human and environmental techniques in utilizing limited resources (Falvey, 2001; and Tanabe, 1994). To settle these debates, proofs are needed, but they are outside the scope of this chapter. This chapter focuses on the undeniable fact that these systems have effectively served their users for centuries (Sirivongse, 1983; Surarerks, 1986, 1991; Tan-Kim-Yong, 1995b; and Vichienkhieu, 2003), and amazingly, some of them are relatively large and traverse many villages and tambons.

Making available a study into how these large systems are managed by the people, not hydraulic bureaucrats as in large-scale modern public irrigation systems, would give governments, especially those who are considering or adopting a participatory irrigation management approach, confidence in the capacity of the people to not only manage, but also distribute benefits to all irrigation members, a target that large-scale public modern irrigation systems are groping for ways to achieve. An accumulation of field knowledge and experience will build a body of knowledge and provide a more thorough understanding on the framework of participatory irrigation management. This chapter is a continuation of a study on the small-scale Pongsak Muang Fai irrigation system in Mae Hong Son province. In that study case, as presented in Chapter 8, the system is sustainable because the sizeable membership is maintained through strict and transparent treatment of the equality of Muang Fai members in their intake-based water sharing and maintenance activities. This chapter focuses on the large-scale Muang Fai management structure, and on identifying what makes it effective.

Research Methodology

In this study, large scale Muang Fai irrigation systems are defined as systems in which the top leader of the systems cannot afford the time and money to directly contact the system members because there are so many members, and because the irrigation service areas are vast and/or widely dispersed. The Soprong

Muang Fai System in western Chiangmai Province was selected as a study case for its potential to reveal a fairly systematic people's management structure. The authors conducted field surveys to understand the system's physical conditions, structures, and water distribution and maintenance practices. Information on its management structure, including its historical development, organizational and management structure, irrigation operation and monitoring and maintenance arrangements, was obtained from the Muang Fai management team, including former and present Muang Fai leaders and six village irrigation organizers. An analysis was made to identify the basis and principles of the management structure and its effectiveness factors. The earlier study plan to cover the sustainability factors of large-scale self-reliant irrigation systems was transformed after the results of the reconnaissance survey of large-scale Muang Fai systems revealed that all of them are influenced by state and local government interventions in the form of projects for the physical improvement of facilities. The Soprong Muang Fai group itself has also accepted several such projects, but on the condition that they maintain their own management. Thus, the interventions are viewed as reflections of a new societal context for this irrigation system.

Profile of the Soprong Irrigation System

The Soprong Muang Fai Irrigation System comprises a rock-filled weir located in Soprong Village Moo 5 in the Nongtong Municipality of Amphoe Hangdong, west of Chiangmai Province. The weir height varies from 1.5-2.8 meters. Its length is 80 meters spanning the Ping river. Two traditional wooden weirs, the Soprong and Ronkruakham weirs, which had been in existence at least 300-400 years, were merged 29 years ago to form this rock-filled weir. The merger and strengthening of the weir was implemented under a state project on the condition given by the members of the wooden weirs that the state not assuming the management of the system. As will be discussed later, this merger has an influence on the management of system maintenance.

The service area of the Soprong system is located in Sanpatong District in the south of Hangdong District. Most of the area is in Tambon Maeka, with the remaining area in nearby tambons. In the area, the natural rainfall is insufficient for agricultural purposes. The 49-year rainfall statistics show that the average monthly rainfall in the Sanpatong District is very limited (Table 9-1), with only August and September having an average rainfall above the average monthly evaporation rate of 135.16 mm. However, the catchment areas upstream of the weir collect and provide rather abundant river flow to the area, with the annual discharge at the weir calculated at 760 MCM (Chiangmai Provincial Irrigation Office, 1999). Prior to construction of the Mae Ngat reservoir, located upstream of the Soprong system, this area was highly flood-prone because of the Ping river flow as well as the side flow from the mountains to the west. Farmers then practiced farming after the floods receded. The Mae Ngat dam lessens flood problems and stabilizes water availability, making it possible to farm during both the wet and dry seasons.

Table 9-1: Average Monthly Rainfall in Sanpatong District

Rainfall	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	Total
Maximum (mm)	158.2	306.8	204.9	290.4	352.9	514.0	272.8	338.1	119.4	84.2	43.9	136.0	2821.6
Average (mm)	37.2	119.4	83.5	123.1	146.9	178.3	102.1	40.5	9.7	6.8	4.3	8.5	860.2
Minimum (mm)	0.0	0.0	0.0	13.5	20.6	47.4	8.5	0.0	0.0	0.0	0.0	0.0	526.1

Remarks: 49 year average (1952-2004)

Source: Upper North Hydrological and Water Management Center, 2004

The Soprong system serves irrigation water to 936.48 ha on the right bank of the Ping river. Tambon Maeka communities expanded extensively after residents of Ban Nongtong in Hangdong District, where the weir is located, migrated and settled permanently in the farming area in 1948 and built the first community temple in 1949. Farming is the major occupation in the area, with 89% of farmers being land owners with an average land holding of .74 ha (Chiangmai Provincial Irrigation Office, 1999).

The Soprong irrigation system distributes water through its 7.8 km-long main ditch that traverses 12 villages in Tambon Maeka, Tambon Thungtom, Tambon Makhamluang and Tambon Makhunwan of Sanpatong District, Chiangmai Province. See Table 9-2 for village names, irrigation areas and membership. The main ditch branches out into nine lateral ditches, each of which serves one or more villages. Local farmers are very careful to provide sufficient drainage capacity in this former flood-prone area. There are a number of waste ways to drain both the excess flow in the main ditch and side flows from the western mountains down to the Ping River in the upper reach area to prevent damage to the irrigation system.

In low farmland, paddy can be cultivated twice a year. Crops are being extensively diversified into longan, mango, papaya, and many kinds of upland and vegetable crops over approximately 35% of the service area (Chiang Mai Provincial Irrigation Office, 1999). The extensive crop diversification reduces irrigation water demand and introduces the furrow irrigation method in many areas, allowing farmers to keep water stock in their furrows and lessening irrigation time conflicts among users. Because the system has high water surplus, farmers in the former service areas of Soprong in the tail reach, such as Ban Rongwua, who left the Soprong system in 1981 have expressed their interest in re-joining the system in the dry season to supplement their irrigation water from the public Mae Taeng irrigation system of which irrigation rotation schedule is not well publicized and realized in the area located 50 km from its headwork.

Findings

Management Structure

Organizationally, the management of the Soprong irrigation system is led by the Muang Fai leader who is directly elected by irrigation system members. The management team working with the leader includes 12 village irrigation organizers who are nominated by respective village irrigation users and endorsed by their respective village headmen. Where the number of irrigation water users in a village is not substantial, an entrusting system is employed in which the irrigation organizer of a nearby village is entrusted to take care of those users. The Muang Fai leader can appoint an assistant and the group have employed a villager residing near the weir to tend it. The official term of the management team is indefinite, because once the team members are in place they are expected to continue throughout their lifetime or until resigning for personal reasons.

Table 9-2: Villages Names, Irrigation Areas and Membership of Soprong Muang Fai Irrigation System

No.	Village	Tambon	Village Area (ha) ¹	Irrigation Area (ha) ²	Irrigation Members (persons) ²
1	Sanpong	Maeka	73	45	42
2	Saimul	Maeka	119	41	49
3	Sankhokchang	Maeka	112	49	55
4	Mae Khongtai	Maeka	253	287	158
5	Mae Khongklang	Maeka	73	87	77
6	Rongkhut	Maeka	106	39	54
7	Mae Khongnua	Maeka	48	78	40
8	Maeka	Maeka	140	40	24
9	Pakluay	Maeka	107	82	77
10	Mae Kungnoi	Thungtom	103	40	37
11	Dong Khilek	Makhamluang	118	68	57
12	Dong Pasang	Makhunwan	184	81	70
	Total		1,436	937	740

Source: ¹ Tambon Maeka Administrative Organization, 2007

² Chiangmai Provincial Irrigation Office, 1999

A crucial duty of the Muang Fai leader is to convene an annual meeting on the inter-village irrigation management planning. Because it is difficult for the leader to obtain information on village irrigation conditions and needs, this meeting is a critical management instrument. Only through information exchange, negotiation, mediation, and consultation with village irrigation organizers can the information be pieced together and information asymmetry among the organizers reduced to create a common information ground for formulating a joint irrigation management plan and cost distribution. The Muang Fai leader declares the consensus of the meeting to be the final agreement, which every village irrigation group has to abide by. This agreement is announced at the general assemblies, which are held once or twice a year, in January or January and June, at the residence of the Muang Fai leader or at a temple in the village where the leader resides. In the assemblies, the water and irrigation facilities conditions assessment report, annual working schedule and group fund status are delivered to the members, and the water distribution method confirmed. Ideas, if any, are exchanged on how the system can be improved. However, as the water allocation and resources mobilization plans have become stabilized over the years, an increasing number of members prefer to leave the matters to their village irrigation organizers to handle. This has resulted in a decline in the number of persons attending the assemblies. The members obtain

information on the contents of the agreement through their village irrigation organizers, and on the days they congregate at the weir to perform maintenance activities.

Financially, the management team is authorized by the members to collect irrigation assessments from members at the rate of US\$ 0.72 at the exchange rate of 35 Thai baht per US\$ per 0.16 ha. This rate has been increased periodically from US\$ 0.43 per 0.16 ha to US\$ 0.57 in 2005, and US\$ 0.72 in 2006 to cover maintenance necessities and improvement plans. The assessments are collected by the village irrigation organizers and brought to the Muang Fai leader, who allocates the amount in the following way.

- US\$ 0.17 for the Muang Fai group fund to be used for maintenance of common facilities including lateral ditches
- US\$ 0.20 for the Muang Fai leader
- US\$ 0.20 for the village irrigation organizer
- US\$ 0.12 for the assistant to the Muang Fai leader
- US\$ 0.03 for the weir tender

The assessment has a nominal importance because its payment signifies the membership of the payer and guarantees his right to share irrigation water from the Soprong Muang Fai irrigation system. As crop diversification is generating higher income, there have been discussions between paddy farmers and high value crop farmers on whether the assessment is too low or too high.

Irrigation Operation and Monitoring

As a weir does not require intensive operation, the Soprong Muang Fai group employs a nearby resident to tend it and report any problems to the Muang Fai leader. Normally irrigation water is supplied continuously. Members are not allowed to check up the water level in the main ditch. When there is water scarcity, the Muang Fai leader decides, after consulting with village irrigation organizers, on a fixed rotation schedule which starts from the tail reach villages and moves upwards. The village irrigation organizers monitor whether the rotation is practically and strictly followed in the field. Violations of agreements on water management are handled publicly by the Muang Fai leader himself with the highest penalty being US\$ 57.

In the secondary ditch level, some of the lateral ditches are shared by two or more villages. When water is scarce, related village irrigation organizers negotiate a weekly rotation, which is confirmed by the Muang Fai leader. For example, the Mae Khongtai and Mae Khongklang villages, which share a lateral ditch, agreed that the former would use the irrigation water from Tuesday to Friday while the latter would use it on other days. Normally, no member is allowed to check up the water level in the lateral ditch. However, when the flow is extremely low, members are permitted to check up the water level in a lateral ditch to divert

water into their field after the related village irrigation organizer has confirmed that they need to do so due to geographical constraints. The special permission is normally granted for a one-night water check-up from 5.00 p.m. to 5.00 a.m. The presently extensive crop diversification and furrow irrigation method have changed the irrigation water demand pattern and reduced the necessity for irrigation rotation. Because tree crops are more profitable, some farmers are using ground water which they can access nearly everywhere in the area to cope with a short period of water deficit.

At the tertiary level, farm owners determine the size of irrigation inlets to paddy farms. Normally, they are four to six inches, a size which was originally determined by using a traditional match box as the measuring instrument. Larger sizes are not usually chosen, even if the irrigation cost is not related to the farm inlet size as in the Pongsak small scale Muang Fai irrigation system (Ounvichit et al, 2006). The Soprong system has fewer constraints in terms of water availability and irrigation system capacity; larger size farm inlets would only result in the necessity for frequent inlet adjustments. Paddy farm inlets are in the form of simple cuts in the earth bunds. Inlets in other kinds of farms are in the form of pipe inlets.

Maintenance Arrangements

For the rights to use the irrigation water from the Soprong Muang Fai system, every Muang Fai member must pay an irrigation assessment fee and contribute labor to maintain the weir, main ditch, and common lateral ditches. The village irrigation organizers are in charge of organizing and fulfilling the commitments of their village irrigation group. Members who fail to contribute labor for maintenance purposes are subject to a US\$ 5.71 per man-day penalty. The village irrigation organizers can use these penalties to employ other labor for the Muang Fai group maintenance activities and for the internal village irrigation activities. The Soprong group has the advantage of economy of scale, unlike in the small-scale Pongsak system, in which practically every member must participate in the maintenance activities. The Soprong group requires the village irrigation organizers to send one laborer for every 1.6 ha (or ten rai)-service area to participate in the maintenance activities.

Members who have less than 1.6 ha are allowed to combine their acreage with other members through personal arrangements to form a unit and can send one laborer on their behalf. Members sometimes make agreements with more than one fellow member. These arrangements must be reported to the respective village irrigation organizers. However, some members do not or cannot make any agreement with other fellow members. In this case, the number of laborers will be higher than required from the village, and village irrigation organizers may consider setting the extra labor aside for other internal village maintenance occasions. The acreage-combining arrangements in effect promote social cohesion among the village irrigation members.

The weir maintenance work is normally scheduled in April, when the river flow is at its lowest. The appointment is communicated through the village irrigation organizers with support from the village headmen. The weir maintenance work is allocated to each village irrigation group in proportion to the service area in their village and the scale of damage to sections of the weir. In the past, members were required to contribute two wooden stakes and two sand-filled bags per 0.16 ha (one rai), but nowadays the work does not require any additional materials. Only equipments to pull the fallen rocks back to the weir are needed. The problem of how to decide which village should perform work on the most difficult part, the mid-section of the weir, is solved by distributing work sections by drawing lots.

The ditch maintenance is conducted twice yearly in January and May, before the start of the cropping season. The maintenance work on the 7.8-km long 2-3-m wide main ditch is allocated to each village in the upper reach down to the lower reach based on a one meter per 0.16 ha irrigation area. Once Muang Fai members finish the allocated work up till the end of their village boundaries, they do not have to continue work on the remaining ditch section. Members in the lower reach villages must continue the work until the end of their village boundaries. The ditch maintenance work allocation is illustrated in Figure 9-1. This arrangement is different from the small-scale Pongsak system, in which all members work together throughout the entire length of the ditch. This arrangement is partially influenced by the historical merger of the two traditional wooden weirs, which served villages in different reaches, with a different number of farmers and acreages of irrigation areas. The number of days each village irrigation member works on the ditch maintenance varies according to his village location, but generally all the ditch maintenance work can be finished within 1-2 days. Maintenance work is mainly weeding and requires only knives and rock-pulling equipment.

The maintenance of secondary ditches in each village varies according to the agreement within the village irrigation group. For example, the Pa Kluay village irrigation members are allocated to maintain two meters of ditches or drains per 0.16 ha until their farm inlets. For the supply ditch they work from the head-end to the tail-end, but for the drain ditch they work from the tail-end upwards to the head-end. The supply and drain ditches are of comparable lengths. Therefore, this arrangement is fair to the members because it ensures that the sections of supply and drain ditches they depend on have been properly tended. This arrangement is not the same as that of the Mae Khongtai village irrigation group. In this village, the members clean their village lateral ditch together, without allocating work portions to individuals or smaller groups. For the lateral ditch that this village shares with another village, the two villages allocate a 30-m section to each village up until the end of Mae Khongtai village.

Presently, the Muang Fai group is facing the problem of reduced labor contribution for maintenance activities. The problem stems from the method for calculating the labor requirement which allows for a rounding-off of land units below

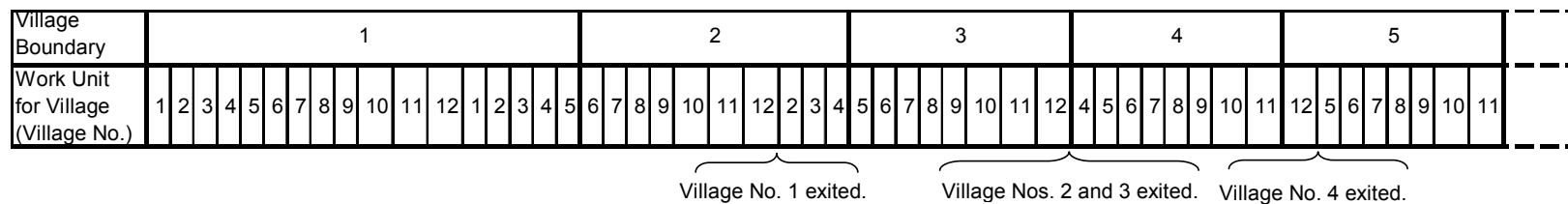


Figure 9-1: Illustration of Ditch Maintenance Work Allocation

one rai (0.16 ha). Because land inheritance is fragmenting land into smaller pieces, more rounding-offs are occurring. As in other areas, the problems of urbanization and the changing context of agricultural development have spurred farmers to seek more state and local government support for system repair and improvement. Every 3-4 years, the Soprong Muang Fai group has obtained assistance from the Tambon Maeka Administrative Organization for major maintenance and repair. Some Tambon Administrative Organization leaders have felt that the Soprong Muang Fai system ought to be managed by the Tambon organization, but faced resistance from the present Soprong management team, who believe the organization does not have the capacity to thoroughly manage the irrigation system, as many tedious tasks are required. Their opinion coincides with comments that irrigation service contracts may not work because the contractor cannot afford the staff to successfully solicit farmers' cooperation, as in the Muang Fai systems (Natsupha and Lertvicha, 1994). However, a former Tambon organization executive has now been elected the Muang Fai leader.

Discussions

Participatory Management to Realize the Principle of Equality in a Large System

Even though irrigation management in the Soprong irrigation system has become less intensive due to changes in the cropping patterns and higher water security, it is still possible to identify the underlying principle of the large-scale Muang Fai participatory irrigation management system. The equal water sharing principle and transparency approach that are used in the small-scale Pongsak system are also applied in the decision-making process of this large-scale system. The major difference is how the Muang Fai leader of this large-scale system realizes the principle. In the small-scale system, all of the members can see whether or not the principle is being practically applied. However, in a large-scale system, the leader cannot directly demonstrate to every member that he is neutrally realizing the principle. In addition, it is also difficult for him to obtain accurate information about the members and their farms, as well as the time and place information needed for irrigation water management. In a large-scale irrigation system, the probability of information asymmetry among members is very high and can easily lead to distrust among members. To convince members that the equality principle is being strictly heeded and to handle the problem of information asymmetry, the Soprong group has members of each village nominate their own representatives to work with the Muang Fai leader. These representatives or village irrigation organizers convey all local information to the Muang Fai leader. However, as the first duty of the village irrigation organizers is to defend the water rights of irrigation members in their village, the Muang Fai leader is faced with the problem of whose information is to be used when they are in conflict. To solve this problem, the Muang Fai leader requests all village irrigation organizers to meet and exchange information, a process under which checks and balances are also done, in order to reach public consensus about how the Soprong can be managed (Figure 9-2). The consensus building process of this Muang Fai system is different from a state irrigation public hearing or

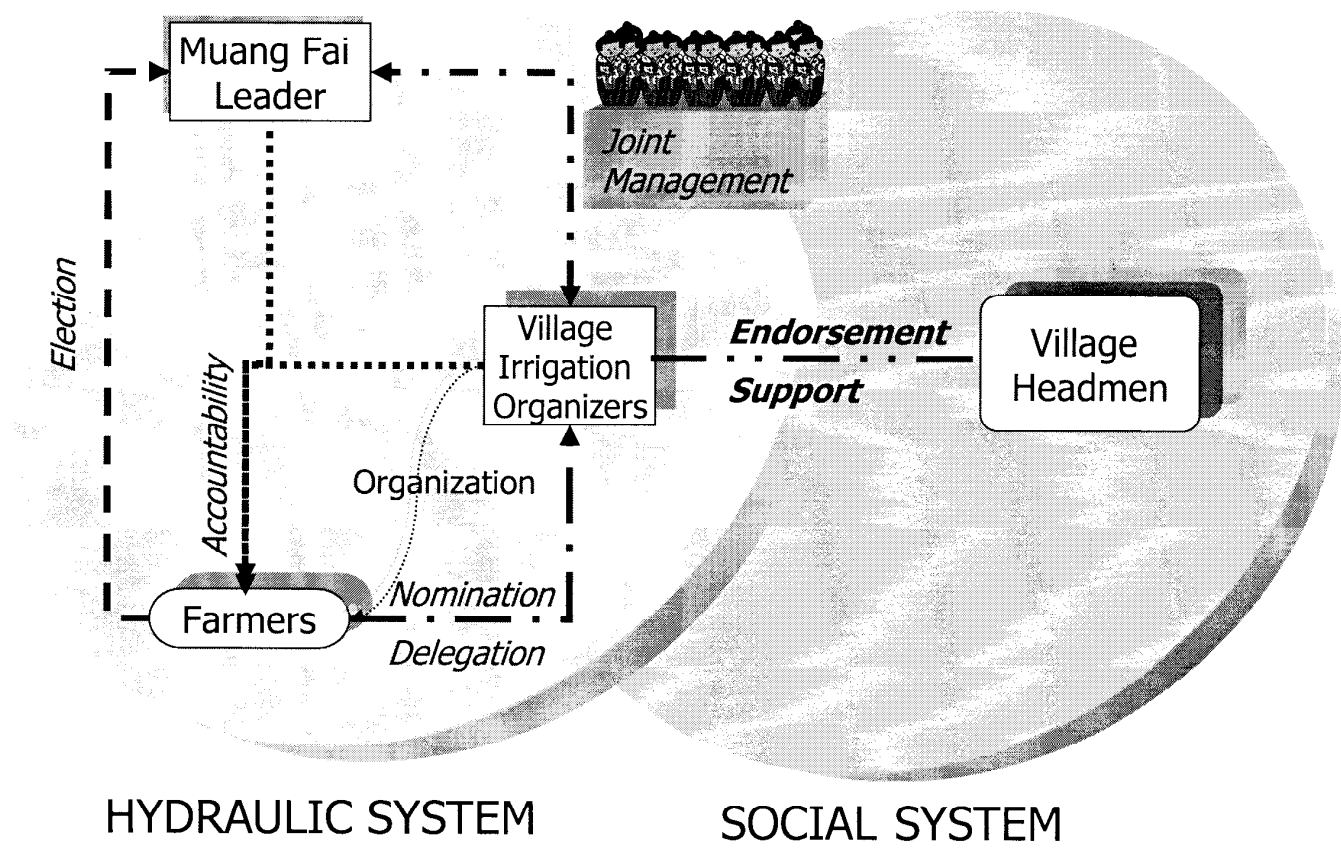


Figure 9-2: Participatory Management Structure of Soprong

announcement by the state irrigation agency of its water management plan because it is a process of joint decision-making, not a decision announcement or public relations. The trust that the Muang Fai leader has gained from their members through the direct election will increase his accountability to every member regardless of their villages and pre-empt the possibility of conflicts (Bell, 2001 and Vattanasap, 2001). He is mandated to declare the final agreements for all members, giving the Muang Fai group a common goal and plans. Through this method, the management system can meet the needs of all members in the Soprong system through synchronized management of the village irrigation groups.

Influence of Economy of Scale, History, and Local Situation on Maintenance Agreement

Despite the Muang Fai leader's principle of equality for all irrigation members regardless of their villages, the arrangement for the maintenance of the Soprong Muang Fai irrigation system is not strictly analogous to the arrangement in the small-scale Pongsak Muang Fai irrigation system. In principle, at the individual level, every member is required to work for the maintenance, but not all members are practically required to participate in the main irrigation system maintenance. This is because not much labor is required for maintenance work. The effect of the economy of scale has led the Muang Fai group to make it a rule that every village must send one laborer from every 10 rai (1.6 ha) of service area. Through inter-personal arrangements, some members with less than 10 rai-holdings can arrange to send a representative to perform their part of the work, with the approval of their village irrigation organizers. This personal arrangement can be considered to strengthen the social cohesion among the members. However, some individual members cannot arrange for a representative, and thus have to work more than those who can.

From the perspective of an outsider, there is inequality between the upstream and downstream villages. The rule that upstream villages can stop working on the remaining ditch sections beyond their villages is in contrast to the small-scale Pongsak Muang Fai system, in which every member has to work equally down to the tail end of the main ditch. The historical merger of the two traditional wooden weirs serving areas in different reaches has put the downstream villages in a disadvantaged position. There are three reasons why they may have accepted this arrangement. First, before the merger, the downstream villages used to clean the long ditch from the weir down to their villages on their own, and may have regarded the agreement by the upstream villages to work with them in the upper sections as assistance to them on those sections. Thus, they accepted this arrangement. Second, the downstream villages may have requested the upstream villages to clean the upper sections while the downstream villages cleaned the lower sections. However, if the downstream villages had proposed this, then it would not have given the downstream farmers confidence that the upper sections would be cleaned sufficiently enough to facilitate the water flow to their villages. Thus, they were willing to participate in the maintenance of the upper sections. Also, the work that they are sharing in the upper

sections is not arduous, because the upper villages have larger service areas than theirs, and hence greater work portions than those assigned to the downstream villages. Thus, they agreed to participate in maintaining the upper section, which gave them the opportunity to monitor the quality of the maintenance work in the upper sections. Third, the downstream villages could have requested the upstream farmers to work with them down to the tail-end. However, since the acreage and membership of the upstream villages are larger than those in the downstream villages, this naturally biased economy of scale does not necessitate the upstream villages to seek an increase in membership to share the heavy workload, as in the small-scale Pongsak Muang Fai system. Thus, the downstream villages have to accept the present agreement. From the viewpoint of insiders, equality can be acceptably translated into differentiated levels of participation that outsiders may view as inequality.

Understanding why there is a deviation from the principle of equality, at least as perceived by an outsider, requires knowledge of the local conditions, history and situations of the village irrigation organizers. As long as the organizers know and accept these, they can establish an agreement that they and their village irrigation members are prepared to abide by. The inter-village irrigation management planning meeting is the arena where such common knowledge is accepted and a consensus is reached. This issue can also be seen in the management structure of the Japanese water users' associations for paddy farming prior to the enactment of the Land Improvement Law of 1949. The associations made agricultural water management decisions based on their community's group identity as evolved in the course of history, and created, in principle, the foundation for the community-based water management system in Japan (Japanese National Committee of the ICID, 1996).

In the Soprong case study, a self-reliant, or in other words, a private, large scale irrigation system, the differentiated levels of participation caused by the naturally biased economy of scale, historical developments and familiarity with local conditions are accepted through the social processes. This study result leads to the question of whether similar differentiation should be allowed to take place in a governmental irrigation project, which is invested, fully or partially, by taxes collected from all payers and partly allocated to the irrigation sector under the expectation that the investment will improve the livelihood of the people and the economy of the country. There is also the question of whether the natural social dynamisms within such a project and government intervention in the form of a development project which can be considered as a juncture in historical developments can provide for the best popular leverage mechanism to maintain the equality of irrigation beneficiaries, or irrigation members if there is a membership system, which is the principal basis for their sustainable participation, and the sustainability of returns from government investment. It is as important for irrigation bureaucrats to understand the need to create a sustainable participatory structure as it is for irrigation beneficiaries, and they must also assess whether they have the capacity to create this structure. Historically disadvantaged people can have a strong voice as long as their counterparts have to depend on their labor contributions for

system maintenance (Shukla et al, 2002). The government's role is to advocate for the establishment of a sustainable participatory structure, in which the principle of equality is socially realized.

Village Irrigation Intermediaries: Facilitators and Beyond

The village irrigation organizers do not act merely as facilitators, but as the delegates of the village irrigation members to defend their rights to the irrigation water in the inter-village irrigation water management planning. To effectively perform this work, they must have accurate information on village farming conditions, water requirements and irrigation facilities. The organizers come to the meetings as mediators wanting to build a consensus, or win-win solutions; this is a rational approach which is important for participation (Vattanasap, 2001; and Phanthasen, 2001). After the final water management agreement is declared by the Muang Fai leader, the organizers have to continue monitoring the implementation of the system-wide water management plan, especially during water shortage periods, and seek justice from the Muang Fai leader if violations occur. In return for the irrigation water rights they have obtained, they are obligated to mobilize labor from their villages for the system maintenance and repair.

The village irrigation organizers play a crucial role not only in the inter-village management, but also inside their own villages. They are committed by the inter-village irrigation management agreement to organize water management in their villages in compliance with the system-wide plan. Their ability to understand the hydraulic, farming and social dimensions of the system is the key to making the intra-village irrigation management process work, as it must not alienate any members, and at the same time must not undercut the inter-village irrigation management process. They must have a thorough knowledge of both the members and their individual water needs, and the skills to combine the individuals' water needs so that every member can obtain the necessary water. In some villages, the organizers are also in charge of operating major irrigation and drainage structures. Conflicts could occur if individual members were allowed to freely operate these structures. In addition to monitoring the inter-village irrigation operation, they have to oversee the intra-village operation and mediate conflicts or constraints that may occur. Their tasks are thus tedious, comprising both daily tasks and annual ones. Managers performing this type of management must be more responsive than managers working in a bureaucracy, as managers in a bureaucracy work only during office hours.

The village irrigation organizers have many tasks to perform, but their remuneration is not substantial. What, then, makes them successful in performing their tasks, and what motivates them to accept the tasks? The claim that leaders of tertiary and secondary irrigation canal groups in national irrigation systems cannot be that effective because they are not paid is not necessarily true. Studies have been conducted on the factors influencing cooperation among irrigation members in water management (Nimmanhaeminda, 1989), but the success of the village irrigation

organizers in this case study comes from their status as the delegates of village irrigation members who are endorsed and supported by village headmen in performing joint Soprong irrigation management planning. Their status comes from the social system, unlike that of canal leaders in state irrigation systems that is created under the hydraulic system, and thus all village irrigation members are obligated to cooperate with them. If they are not cooperative, the village irrigation organizers can impose penalties on any member who violates the intra- and inter-village irrigation rules, or can choose to abandon the job and leave the village irrigation members without delegates to defend their rights, an event other irrigation members will not allow to happen.

The cross social ties between the village irrigation organizers and village irrigation members, and between the members and the top Muang Fai leader, are hard to cultivate. As a result, irrigation members try to keep their village irrigation organizers and the Muang Fai leader in position as long as they can, and thus these positions have a long or even a life term. The social sanction relationship between the village irrigation organizers and village irrigation members is very distinct from the relationship between the state irrigation officers and the farmers in state irrigation systems, in which there is no such mechanism for social sanction because the farmers consider the officers mere service providers, not their delegates.

Village Social Relations Support Hydraulic Management

The use of the village as the basic unit of irrigation management reflects the fact that the Soprong Muang Fai group has placed people and the communities they live in at the heart of the management system. This practice coincides with the Chatthip school's emphasis on village potential as the key to improving people's livelihood (Nartsupha and Lertvisha 1994, Nozaki and Baker 2003). As shown in the case study, the villages are still fairly strong, as proven by the frequency of village meetings. For example, the Mae Khongtai village held over ten formal village meetings during the past year to consider many important issues.

Irrigation systems serve people. However, people naturally have different attributes or motivations. There is thus a need to unify them in some way so that they can work together on agricultural water problems. To achieve equality in water sharing rights in a large-scale system, a large number of people must be organized. Instead of using one of the irrigation facilities, such as the tertiary, secondary, primary canals or headwork as the basis for organizing people as in some state irrigation systems, the Soprong group uses the village, a social unit, to organize the system. Details of their joint hydraulic management plan come after they get organized. When an irrigation management plan is developed through a social process such as the one used in this system, it is effective and sustainable because it is respected by the people who create it. The efficiency of the plan is influenced by the quality of the information on hydraulic conditions that the people, or their representatives, possess and/or comprehend.

In this case study, a decline in the number of attendees in the general assemblies due to the stability of water management plans that have been in place for years or other reasons may harm the momentum of the three-level, cross relationship between the Muang Fai leader, village irrigation organizers and village irrigation members. A similar phenomenon is also taking place in a traditional irrigation system that has been modified into a participatory irrigation system in Japan. The management teams of the Manno-ike irrigation system (Ounvichit and Klaymon, 2001) and the Soprong irrigation system tend to seek more and more assistance from the state and local governments. Several studies have been conducted to conserve the spirit of the self-reliant or traditionally participatory systems. Recommended measures include the networking of the systems to support each other, the preservation of their self-determination strategies, the acceptance of joint management with public agencies, monitoring of the impact of government actions on their systems by local organizations, and the amendment of related laws to support the autonomy of their systems (Tan-Kim-Yong, 1995a, b, c, d and Atharn, 1995). In the case of the Soprong group, it is seeking more support from the government. Under the present country-wide administrative reform, local governments are gaining greater authority in charting their local development plans and are able to obtain a larger proportion of their development budgets from the state government. In the future, the Soprong Muang Fai group may be able to obtain more assistance from the Maeka Tambon Administrative Organization that can set aside budget for the repair and improvement of its irrigation facilities. The assistance will increase the visibility of the irrigation management to the local community, and enhance the integration of irrigation with other related sectors such as agriculture and water resources management. However, appropriate role-sharing between the Muang Fai group and local governments will be needed so that the irrigation system can render the highest and most equitable benefits to all irrigation members.

Conclusions

The participatory management structure of the large-scale Soprong Muang Fai irrigation system comprises three-level components of individual members, village irrigation organizers and the Muang Fai leader, all of whom have cross relations. The Muang Fai leader is related to all members regardless of their villages and has the duty to check and balance the cost and benefit to each village irrigation group by adhering to the principle of equality. The leader must work with the village irrigation organizers, as they have the common duty of achieving consensus on how to jointly manage irrigation matters based on the information on local conditions and needs which the village irrigation organizers provide. The village irrigation organizers must cooperate with their members as the delegates defending their water rights in exchange for remuneration and social recognition. In seeking water rights for their members, the delegates must promise, on behalf of their members, to share the costs of maintaining the system, which their members have to provide. The delegates need cooperation from their members in implementing the intra- and inter village irrigation management and maintenance plans, and have the social sanction instruments, as supported by their delegate status and by the village

headmen, as well as the monetary penalty rules, as supported by the Muang Fai leader, to bring this cooperation about. The effectiveness of this management structure comes from four major factors, i.e. its principle of equality, the accountability of the Muang Fai leader and village irrigation organizers to their members, the availability of a platform for information exchange and joint decision-making, and the reliance on the social system over the hydraulic system for the institutional arrangements. This case study provides lessons on the necessity for careful treatment of three issues, including the distribution of cost where an economy of scale is possible, the influence of a juncture in the historical development that will embed itself in the subsequent institutional set-up of the irrigation management, and the effect of social changes on the principle and/or implementation of participatory irrigation management.

CHAPTER 10

CONCLUSIONS

Backdrop of the Study

The Thai government has invested substantially in the irrigation sector and irrigation areas under national projects increased from 1.38 million hectares in the First National Development Plan to 5.12 million hectares at the end of the Ninth National Plan. The rate of irrigation area increase reached a peak of 53.22% in the Third Plan before diminishing to less than 2% under the Ninth Plan. Rather than the increase in the area, emphasis has been shifted to increase productivity through sustainable irrigation management, without which farmers' participation in irrigation water management is hard to realize because irrigation in Thailand is mainly by open channel method to serve a large number of small farms. Without their participation, the bureaucrats cannot provide reliable water supply to all farms, leading to inability to realize the expected public project returns, and early deterioration or damage of irrigation facilities that the government has invested. The 8-10th Plans and the on-going administrative reform have recognized the significance of participation and provided a general direction for its promotion. However, in practice, efforts to promote participation in national irrigation management seem to have been running into perpetual problems. Thailand is not the only country that is facing these problems and there have been searches for ways across the world to promote participation for sustainable irrigation management.

This study analyzed the field situations of the participation of farmers in irrigation management in national projects Thailand and clarified practical problems from the project initiation stages down to the on-farm management stages. Fundamental problems were identified as the basis for scoping for solutions to the problem and for generalizing the principles of participation for sustainable irrigation management. The methodology of the study relied mainly on empirical data but also made use of background knowledge in irrigation management applied science and five major groups of theories including the Social and Cultural Changes Theories, the Multi-Disciplinary Approach, the Institutionalisms, the Social Organization Theories and the Development Program Management Theories. The empirical data were juxtaposed from five study cases. Two of these cases were related to the practical problems of participation in the Mae Kuang and Thadi national irrigation projects in Chiangmai and Nakhon Si Thammarat provinces, respectively. The other two were related to the management practices of the Pongsak and Soprong self-reliant Muang Fai irrigation systems in Mae Hong Son and Chiangmai provinces, respectively. The case of the Manno-ike land improvement project in Kagawa Prefecture of Japan was studied side by side with the Mae Kuang Project. The methods used in obtaining the data included documentary reviews, field surveys and observations, questionnaires, farmers' meetings, focus group interviews, and participatory action research.

Results of the Study

The results of the case studies on national irrigation management revealed that the participation level in national irrigation project processes from the initiation stage, to the planning, designing, construction, operation, maintenance, repair and improvement stages was very low. The processes were centralized by the state irrigation agency and monopolized by state bureaucrats. The identification of beneficiaries at the planning stage by the bureaucrats was not formally recognized by related farmers. Only the number of beneficiary farmers and communities was available at the conclusion of the plan. As the project initiation and planning proceeded without adequate attention to the field socio-economic conditions, needs and constraints, the irrigation systems did not physically and socially integrate well with the local conditions and existing irrigation systems, negatively influencing the operational set-up of national projects and irrigated agriculture development in the project areas.

The farmers identified by the bureaucrats as project beneficiaries were simply imposed with irrigation operation rules as contained in the system design prepared by the bureaucrats. Farmers in strategic positions did not find any need to respect the rules and the bureaucrats had no authority to force them to do so. With very minor role as information provider in the planning and design stages, farmers in general were not aware of the opportunities brought about by irrigation water access and this slackened the expected irrigated agricultural development. This is in contrast to the Muang Fai irrigation systems. Despite their use of relatively lower information and irrigation technology, Muang Fai members actively participated in initiating and planning their irrigation systems and built consensus on their organizational and hydraulic management to the benefit of all self-identified members. These they did with keener ideas about production development; hence their cropping intensity became as high as the water capacity would allow. The farmers in the national irrigation systems who did not get, or found it too demanding to get enough water on time either continue with their traditional production and irrigation methods or, in severe cases, idle their farms, to the detriment of the national investment.

When the main irrigation systems were being planned, the state irrigation agency presumed that farmers would promptly extend the systems down to the on-farm level. However, without a proper method of clear beneficiary identification in the earlier stage, it was hard for farmers to quickly get organized to do so. And while they were trying to get organized, if they may, the state project plan rolled to the next stage of construction. In this situation, the risks that the structural or non-structural extension of the irrigation network down to the on-farm level, which is indispensable for achieving the ultimate goal of irrigation water for all beneficiaries, would not be realized became very high. The belated attempts, even through infringement of irrigation laws, by the state irrigation agency to add on-farm irrigation facilities were encountered with the problems of the in-place hydraulic bias among the farmers which was aggravated by the introduction of the main system, the lack of incentive

which can be gained from irrigated agricultural development and the unstable agricultural land management. The attempts through a random provision of limited on-farm facilities with the available but limited public funds were but to enlarge the bias and gap, and reflected the tactlessness in irrigation management.

Nearly all the construction cost of the national irrigation systems came from the national coffers or the tax-payers' money. However, there appeared no clear commitment on both the irrigation water users and the bureaucrats to maximize the returns of the public investment. The mechanisms for following up the impacts of the government budget and international loan uses for irrigation projects were lacking; only a few irrigation systems were ever systematically evaluated of their social impacts. A high number of physical improvement projects in the early operation period that continue to trickle in every year indicated that there might be problems with the original design and/or construction quality.

As with the previous stages, operation was largely decided and implemented by state bureaucrats who collected farm and water data, calculated discharge, and prepared the water allocation plans. Common problems that followed were related to the precision of the data base and calculation, the effectiveness of the plan dissemination, and the behavioral control of a large number of farmers. The temporal and spatial clashes between farming plans and water schedules and the strategic water-taking action of some farmers made it necessary to make frequent adjustments in the actual water allocation schedules, subjecting some farmers to the perpetually unpredictable water arrival, and hence their aversion to increase or even to maintain their production rate. To rectify the long-overdue problems, the bureaucrats attempted to organize the irrigation water users based on their hydraulic relationship with the purpose that the organizations follow their operation plans. However, the attempts engaged a slow, digressive and regressive progress, with most of the organizations were but a document list of tertiary and secondary canal groups without any system-wide organization. The on-going transfer of irrigation management of the tertiary and secondary canals under the decentralization framework is a circumstantially justified way of integrating the hydraulic dimension with the social dimension. However, what happened in the field strongly reflected that there is either a lack of the goal or the understanding of the goal of irrigation management in the process, sending an alarm of lacks of thoroughness on the adaptation of management mechanisms to achieve the national goal.

The maintenance, repair and improvement of national irrigation systems depended largely on the state budget allocation which was not enough to keep the systems well-maintained. In addition, the bureaucrats and the upstream farmers tended to prefer adding or modifying physical irrigation facilities whenever public funds were available to trying to search for preventive management measures, which were much sought after by downstream farmers. The decisions on how the government budget was to be used again fell into the hand of the bureaucrats based mainly on the field data they had collected.

The results of the case studies on the Muang Fai systems revealed that Muang Fai members involved in all irrigation management processes, either directly or through a delegation system. Despite their lower technology when compared with national irrigation systems, they could effectively serve all their members who were willing to accept higher costs than beneficiaries of national irrigation systems. All decisions on what and how to do things together were clearly laid out through exchange of local information and were strictly followed. The management structure of the small scale system was straightforward, using the farmer-chosen farm intake sizes as the priority criteria for all joint management matters, including system investment, maintenance, operation and maintenance. That of the larger scale system was in-laid with extended mechanisms for joint planning and synchronized operation, accountability check and balance, and social sanction instruments through association with the village social system. The commonality of the small and large scale systems is the observance of the equality of their members and their management agreements. Both of them placed high emphasis on efforts to make all the irrigation management processes transparent to all members, postponing a complicated management such as rotational water taking until continuous flow became impossible. Their management terminologies were simple and well-understood by the members, unlike the official jargons which kept the farmers outside the national irrigation management. The Japanese land improvement district case drew parallels with the Muang Fai cases even though their autonomous management was partially supported by the public investment and technical assistance. The parallels were in regard to the simple terminologies and visible functions of technologies, the self-identification and commitment to their organization, and the use of the social system as the basis for hydraulic management.

Fundamental Problems of Participation in National Irrigation Management

All the hordes of practical problems of participation in national irrigation management were fundamentally related to the improper approach in identifying project beneficiaries as discussed in Chapter 5. The bureaucratic irrigation planning approach assumed that all farmers in the project boundary which was demarcated based on the physical design considerations were project beneficiaries. However, after the project was constructed, the bureaucrats' self-decided water operation plans, regardless of their quality, could not bring water to all of the beneficiaries and generate the targeted returns from the state investment without water users' participation. Attempts to belatedly organize the indeterminate beneficiaries to rectify the situation were doomed to frustration or failure, especially when the hydraulic bureaucrats were trying to employ the forgone hydraulic bases which might have been effective in the early project stages, in organizing the indeterminate beneficiaries.

A clearer framework is urgently needed for the proper identification of beneficiaries of new national irrigation projects as well as the constructed projects which are larger in number and acreage than the would-be projects in order to elevate participation and boost the probability of achieving the state project targets. To

scope what elements the framework should be constituted of, it is necessary to first consider what the goal of an irrigation project is. The ultimate goal of an irrigation project is to bring about the maximum project returns from the state investment. Saying this often drew critiques on the neglect of sustainable and balanced development. Thus, it is necessary to note here that such is the matter as to how the maximum returns are set up in the planning stage, in other words, how much comprehensive the planners are in performing their work. To bring about the maximum returns, the practical task of irrigation managers, bureaucrats in national irrigation systems and leaders of Muang Fai alike, is to bring enough water on time to meet the demand of all farmers as discussed in Chapter 7. A working platform is needed to collate and compile information on the demand and decide what the best way to share water is. A mechanism is needed to bind the beneficiaries to ensure that the decision can be actually realized. As a result, the presently monopoly of data collection and decision-making by bureaucrats without participation of prospective beneficiaries would make the beneficiaries thought it is the duty of the bureaucrats to do all to satisfy them; in other words the monopoly would not create the sense of belonging or ownership in the project as seen in Chapter 7. Therefore, the working platform must be run mainly by the prospective beneficiaries themselves.

These processes of information collation and compilation and decision-making were pre-requisites of the development as illustrated by the cases of self-managed Muang Fai irrigation systems in Chapters 8 and 9. They must be completed before the layout of the irrigation network is finalized so that water allocation conflicts can be thrashed out between prospective beneficiaries in small irrigation systems, and between delegates of organized prospective beneficiaries in large irrigation systems. These are the time when the irrigation organizations can deliberate their conflicts of interests and differences in other sociological traits of individuals to find a rational social outcome. These are also the time when the beneficiaries and delegates weigh the possibility of conforming their farm management and the irrigation management inside their regional groups to the management of the main system or negotiate with others in modifying the emanating main system management to meet their constraints. These processes practically imply that the developments of the main and on-farm irrigation systems, physically and managerially, are to be developed concurrently.

In self-managed irrigation systems, prospective beneficiaries usually identify themselves. In national irrigation systems, the mobilization of prospective beneficiaries is a structural problem. The Mae Kuang and Thadi cases indicate that there is no clear avenue for prospective beneficiaries to seek a state project. Rather, the project formation came by, in the best scenarios, via a well-intention top-down approach, and in the worst scenario, via an ill-intention hidden agenda from the top as well as from the bottom. In any scenario, the results are the same, i.e. there are no clearly identified beneficiaries but merely a vague number of beneficiary farmers and communities. What should be the avenue to identify the project beneficiaries is a challenging question.

One can think of prospective beneficiaries identifying and organizing themselves as autonomous body like in the self-managed irrigation systems to seek a state project to satisfy their common needs of irrigation water. However, local statistics indicate that such self-organization into a formal and public level like irrigation associations or cooperatives often fell through. A possible reason is the nature of irrigation activities. Irrigation activities are agricultural support systems, not the production systems direct. Without concrete products, organization of farmers around irrigation would be difficult. The individualistic movement seems to work well where only with irrigation the members can harvest their products. Where the needs of irrigation water of farmers have a wide variation, a fabrication of mechanism to frame the organization to their purposes will be necessary but hard to enforce by an autonomous or state-led organization. In addition, unfamiliarity with public commitment could result in too many advocacy movements vying competitively for state projects, causing social disruptions while not really addressing the needs of the marginalized social groups such as landless farmers who cannot even afford a genuine movement truly for themselves and who are the groups that need the public support the most.

Alternatively, if the relationship between the prospective beneficiaries and the existing local formal social organizations is used, the identification of the prospective beneficiaries may better benefit the local culture and the original nature of state projects because local formal social organizations like villages and local governments have incentives to support the organization of prospective beneficiaries because irrigation management bears the same goal with their goal for better livelihood and social harmony. The local formal social organizations can also provide office facilities and social sanction instruments in irrigation management and can channel other associated supports for agricultural development to the prospective irrigation beneficiaries. Hence, an affiliation with the local formal social organizations can strengthen the emanating hydraulic relationship and, subsequently, the hydraulic management decisions, in a sustainable way.

An understanding in the goal of irrigation management of farmers, villages, and *tambons* is indispensable for the success of an orderly participation in irrigation management. The on-going implementation of the administrative decentralization long-term policy is providing a good context for them, especially the first legal unit of tambon, to take a new role in deciding on local management of natural resources for their livelihood, including the problem of unstable land rent which is currently one the major impediments to achieving the irrigation management goal and bars the tenant farmers from climbing up the social ladder despite their hard work. It can also support the fabrication of the participation structure even though a little more time is needed for the farmers, villages and tambons to gain more experience in so-doing. Promotion of their cognitive awareness of the goal of irrigation management surges forwards as the first priority over and above the oft-providing training in irrigation operations such as gate turning or greasing cogs and wheels, the skills that are not hard to grasp and apply once the common goal is clear.

Such goal must also be recognized by the state and the state agencies that run state projects. In a transition to greater people's participation in state projects, a re-positioning of the state agencies such as state irrigation agency is necessary. Unless the state agencies' re-positioning is in concert with the decentralization program, the national integrity can be put in jeopardy. In the case of the state irrigation agency which has been historically a kind of an omnipotent agency during the growth rush period, it is likely to face a tough time in its re-positioning to accept what appears to be a minor role but actually a very important role for the sustainability of the country's agricultural production, as proved by the facts that every country around the world are willing to set aside 5-10% or more of its GDP to maintain their irrigation sector for varying purposes ranging from self-sufficiency to self-reliance and exchange earnings. A promotion of these agencies' understanding in the vitality of their contribution to the long-term gain of the country, which is their main customer, is also necessary if the goal of the irrigation management is to be achieved.

Experiences have shown that a re-positioning from within the agency in order to make ways for a new participation structure is hard to accomplish even when it was necessitated by the agency's aspiration or the general national economic situations as occurred in other countries as reviewed in Chapter 3. There are questions related to the morale of the staff and there are cases of tussles for postings amid agency down-sizing. A movement from within would turn out to be a movement to protect the organization despite the main mission of a state agency is for the people, not for the organization. However, if the decentralization plan can roll on, the reform in the fiscal sector will require a multi-sector impact evaluation and eventually command a revamp of the agency.

To that respect, what is worth to consider is in what role the state irrigation agency can do in the participation structure. The state irrigation agency has two main values. The first one is its multi-level accountability to a range of social profile from the level of individual people and to the national integrity. The second is its civil and hydraulic engineering expertise. To manifest its values, generally the agency has the main role to oversee that the country has sufficient, efficient and effective irrigation systems to properly support the agricultural production. With its expertise in hydraulic engineering, it can be classified as one of the state technical offices in the group of agricultural development which *inter alia* include other offices like land development and agriculture technological development. In carrying out the state projects, its local offices will have a vital role in providing technical support to the organized farmers. The on-going reassignment of technical staff especially those in the design office to local area will benefit the organized farmers if the re-assigned staff can gain a proper room to maneuver, that is the system-wide joint management planning.

Figure 10-1 illustrates the above discussion, starting from the local hydraulic and social systems which are enfolded in the larger context of local to

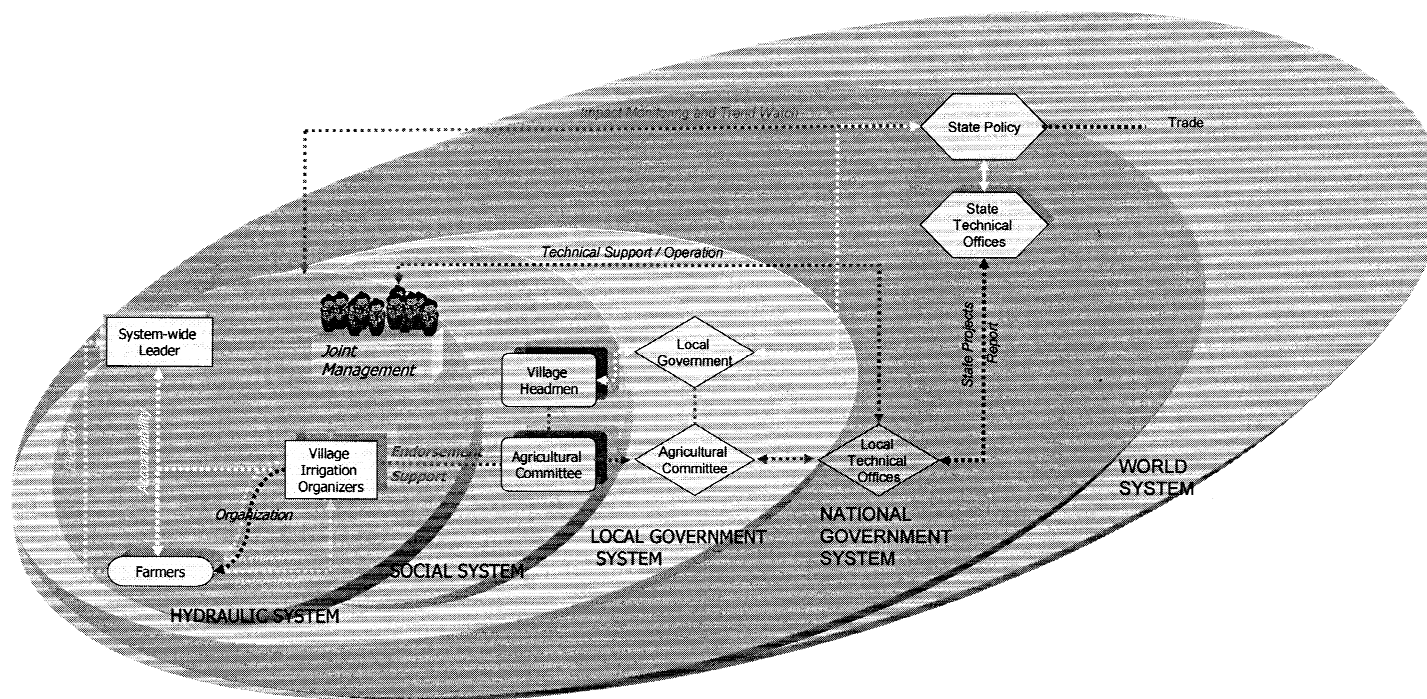


Figure 10-1: Management Structure of People's Participation for Sustainable Irrigation Management

national government systems and finally to the world system which in the case of irrigation involve agricultural trade. Gaining from the indigenous wisdom of the study case in Chapter 9, members identify themselves through the social system of village. It is noted here that whenever the village channel is mentioned, at present there are two possible channels, which are the village headmen and the elected village representatives to the local government legislative council. The selection which channel is more appropriate is a very contemporary problem in the Thai local government system. Traditionally, village headmen have been the registrar of the population and contact points for several kinds of activities including the various sorts of state projects. However, the transitional decentralization process has introduced the election of village representatives to the local government's legislative council with some of them assuming positions in the administrative council. The advantage of the village headmen, in terms of their role in irrigation organizational support, is their long term in service that supports the stability of the irrigation organization; but their role in development work is diminishing amid the decentralization of the national financial system that must go towards a legal entity rather than an individual. The advantage of the village representatives in the local government is their being elected by the villagers; however their short term in service and the cultivation of their internal working mechanisms are rather slow. If these two channels are combined for strength, local development, including the irrigation sector, can also be strengthened. This is an issue of the Ministry of Interior to decide and outside the scope of this study. For this study, the term village headmen will be used based on the experience in the study case in Chapter 9 which informed that the village headmen have evidently supporting roles to irrigation organization in the Soprong Muang Fai irrigation system. However, it is assumed that the village headmen will work with sectorized work teams, such as agricultural committee, instead of leaving individuals working directly with state agencies and independently of each other as occurring at present and deprive the opportunities for integrated development, for example, agricultural development in integration with land development and irrigation development. A parallel construction is also necessary at the local government system.

After the members are identified through the village system, a general election should be held to elect the top leader of the irrigation system and the village irrigation organizers are officially endorsed. A joint management platform can then be held to exchange information on the needs and wants and conclude the water requirements of each village irrigation group and all groups. Through this platform, both development and management plans, in normal and water scarcity conditions and in all levels of the system, can be realized and it is where the state irrigation engineers can table their technical information and opinions for joint consideration and decision-making. As discussed in Chapter 7 and 9 that with intrinsic water conflicts between irrigation users and between different irrigation water user groups, the top leader who can mediate for a water management plan may, at the operational level, have difficulty in control the behavior of individual users and users' groups. It is unlikely that he can employ a number of staff to take control of strategic points like in the case of a Japanese land improvement district in Chapter 6, thus here is

another avenue for state irrigation engineers, as a neutral body, to play a role in the operation of strategic structures. Whereas the design irrigation engineers have been working more closely in the local conditions, the strategic control points will be more compatible with the social control points. The number of strategic control points that the state agency will have to take care directly will become much less than at present. Meanwhile, users or user groups with support from the social system and local government system can participate in handling more irrigation water control points. The conclusion of the plans should be done by the top irrigation leader and binding related parties to follow.

Through the participatory irrigation management structure as described above national irrigation projects will be more effective because the social or village system will see that all farms that identify themselves as members will be provided with reliable water supply, boosting the probability of realizing the expected state project returns and stemming early deterioration or damage of irrigation facilities that the government has invested. This social system is seconded by the local government and national government systems of which functions are to provide technical support, social balancing, and positioning of the country in the world system. Even though environment is not within the direct scope of the study, the participatory irrigation management structure has a potential capacity in integrating local environmental concerns now that the structure has been scaling up through the social system which embodies the local environmental dimension.

The Principles of Participation for Sustainable Irrigation Management

Based on the fundamental problem of project beneficiary identification, the skeleton structure of people's participation in irrigation management has been developed based on the lessons learnt and the experience gained under the study as described in the previous section. More details of the structure will still be needed to address the diversity of settings. In this connection, also based on the study especially the study cases, the principles of equality and transparency are generalized as the foundation of participation for sustainable irrigation management. As long as these two principles are addressed, participation for sustainable irrigation management can be achieved. Equality in distributing benefits and costs of irrigation management will make farmers confident in increasing their formal participation. The bases of equality of benefits can take various forms depending on geographical and social conditions, the technologies in use and project scales, such as farm intake size, water volume, farm acreage, household, etc. The forms of costs can also be various such as fee, local tax, labor, equipment, construction materials, etc. These bases are subject to the agreements among the farmers who make joint decisions on joint irrigation management. The principle of equality needs the principle of transparency to assure the farmers that the equality principle is being really applied. Transparency of information on water demand and supply and organizational management will maintain participation and make the irrigation management sustainable.

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