

RESOURCE MOBILIZATION IN TRADITIONAL IRRIGATION SYSTEMS
OF NORTHERN THAILAND: A COMPARISON BETWEEN THE LOWLAND
AND THE UPLAND IRRIGATION COMMUNITIES

A Thesis

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by

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BIOGRAPHICAL SKETCH

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CHAPTER I

INTRODUCTION

Two Themes for a Study of Social Organization in Irrigation of Northern Thailand

The study is concerned with two ethnic groups in the population of northern Thailand; one group is the lowland northern Thai or khonmuang and the other is a hill ethnic group called "Lua" or "Lawa." The focus of this study is the social organization of the community irrigation systems in two localities of Chomthong District, which is in the southern part of Chiang Mai Province. The research is a comparative analysis based on ethnographic accounts of two muang fai irrigation communities on the Mae Klang River and the Mae Pae River.

Lowland northern Thai or Khon Muang are a majority of the northern Thai population occupying the four major river valleys of Ping, Wang, Yom, and Nan Rivers. These people grow mainly wet rice with the assistance of extensive canal irrigation. They speak their own dialect, "Kham Muang." There are several ethnic groups scattered throughout the vast hill lands of northern Thailand. Most of the "Lua" people live in the western mountain range along the Thailand-Burma border in Chiang Mai, Chiang Rai, and Mae Hong Son Provinces. They engage mainly in dry rice cultivation and speak their own language.

However, today some of Lua have migrated to live in lowland areas; many of them dress and speak like lowland people and have adopted irrigated agriculture.

Northern Thailand can be best described as a diverse society with a long history of co-existence of many ethnic groups rather than a uniform society of lowland Thai, as is the conventional view. There exists a noticeable range of variation in ecological conditions and demographic, social and cultural characteristics in northern Thailand. In glancing at a physical map of northern Thailand, one can immediately see two contrasting geographic divisions, the hills and the valleys. Several mountain ranges extend from the north to the south, forming two major zones of hills and valleys. The mountains are home for many hill ethnic groups, while the valleys hold the settlements of the lowland northern Thai. In the face of this diversity there is a major theme,¹ the hills and the valleys represent two distinctive but interrelated patterns of the northern Thai way of life. From most of the previous studies one may get an incomplete and therefore unrealistic picture of northern Thailand, for usually those studies focused upon only one segment of northern Thai society. Some

¹Many social scientists have made contributions to the study of hill-valley relations and to them I am indebted. Among those researchers I particularly want to note E. R. Leach, Political Systems of Highland Burma, (Cambridge, Mass.: Harvard University Press, 1954); C. Geertz, Agricultural Involution, (Berkeley: University of California Press, 1963); and Robbins Burling, Hill Farms and Padi Fields: Life in Mainland Southeast Asia (Englewood Cliffs, N. J.: Prentice-Hall, 1965). Studies especially related to Thailand are the works of Peter Kunstadter, M. M. Bruneau, and Shigeharu Tanabe, which will be discussed in several chapters of this research.

researchers have described lowland communities without recognition of the existence of their interrelations with hill communities; on the other hand, some researchers have discussed hill communities while excluding the other. However, in recent decades some researchers have made a useful contribution by emphasizing the interrelationships between the hill and valley communities.

Thus, in this research I have incorporated into the study design both a hill and a valley system so that systematic comparison can be made regarding the similarities and differences in the organization of irrigation within these contrasting ecological and cultural settings.

The hill and the valley communities have co-existed for many years in the history of northern Thailand. The historical records go back as far as the beginning of the 19th century and indicate that most of these communities in the hill and valley areas were self-sufficient settlements producing most of their necessities; the exchange between them seems to have been on a small scale. Historical records from the end of the 19th century describe busy trade routes in the mountains, in the lowland areas, and between the two. Hill and valley communities are interdependent and continually exchange ideas, food products, agricultural and household tools, and labor. Certainly the contact between the two varies in degree in different localities and at different times. The contact and exchange are greater when hill people live in relatively close proximity to large lowland settlements, towns and market centers. As time has passed, the interrelationships

between hill and valley communities have deepened as the networks of roads and communication systems have brought them even closer together.

Northern Thailand existed as a separate state for over 600 years but between 1556 and 1763 was under the rule of Burma. The Northern Thai Kingdom, with its capital city at Chiang Mai, was integrated into the kingdom of Siam at the turn of the 20th century. The establishment of a new local political structure under the control of the central Thai government marked this change at the beginning of the 20 century. Since then, changes has been rapid and extensive throughout northern Thailand. However, the people in the most remote hill villages and in some of the remote lowland villages have felt the impact of this change to a lesser degree and at a later period than the people of the large lowland communities. Thus some communities, naturally, have experienced a greater change than others, but no community has wholly escaped. The people and the local organizations have had to adapt to keep pace with the demands of new conditions.

Therefore we need to consider the relationship between local communities and external influence. Certainly in the present day there is greater contact between local areas and the central government at the national level than there was at the beginning of the 20th century. However, in the attempt to reform the entire administrative strcuture, the linkage that was established attempted to integrate all local communities to the central body. We can observe that the central government's involvement in local affairs demonstrates two

characteristics. The involvement is direct and very active in the central zones, while it is indirect and less active in the peripheral zones. In reality, we see that the central government has established centralized local organizations at the city centers of all provinces, and thus power is unevenly distributed. That is, in most cases the power is heavily located at the city center; little of it reaches the periphery. In this study, we will use the theme of the center and the periphery to examine the linkage between local organizations and the central administration.

This perspective on the interrelationships between the hill and the valley communities is apparent when we consider the utilization of water resources and the fact that they share rivers and streams. The muang fai (weir and canal) irrigation practice, though it originated in the lowland areas, has become common among the hill ethnic groups at sites where it is possible to develop irrigated agriculture. Today, traditional irrigation systems support intensive agriculture throughout northern Thailand, ensuring a productive first crop and a good opportunity for a second and third crop. Using traditional irrigation systems, northern Thai people utilize their water resources for food production for their communities and their markets.

Previous studies have indicated a considerable range of variation in the size and complexity of the muang fai irrigation systems in various localities. The systems described range from small-scale irrigation systems with few canal branches that serve less

than one hundred rai¹ (16 hectares) in one or two hill valleys to large-scale ones with extensive networks that supply water to more than ten thousand rai (1,600 hectares) of lowland area.² Moreover, some systems described in those studies benefit only a small group of people from one or two villages, while others have extensive canal networks and are utilized by people from several villages.³

Bruneau and Tanabe have made a useful classification of the muang fai irrigation system on the basis of topography and

¹A rai is a unit of measurement of land; one rai is equal to 0.16 hectare.

²See more detail on the discussion of variation and type of the maung fai irrigation and the classification in M. M. Bruneau, "Irrigation traditionnelle dans le Nord de la Thaïlande: L'exemple du bassin de Chiangmai," Bulletin de l'Association de Geographes Français, 362-363 (1968): 155-165. See also Shigaharu Tanabe, "Peasant Farming in Thailand: A Comparative Study of Rice Cultivation and Agricultural Technology in Chiang Mai and Ayuttaya," Ph. D. dissertation, The School of Oriental and African Studies, University of London, 1981.

³Michael Moerman, Agricultural Change and Peasant Choice in a Thai Village (Berkeley: University of California Press, 1968); Jack M. Potter, Thai Peasant Social Structure (Chicago: University of Chicago Press, 1975); Abha Siri Wong, A Comparative Study of Traditional Irrigation Systems in Two Communities of Northern Thailand (Bangkok: Institute of Social Science Research, Chulalongkorn University, 1979); Wanpen Suraroek et al., Water Management Conflicts in Northern Thai Irrigation Systems (Chiang Mai, Thailand: Chiang Mai University, 1980). See also Bruneau, "Irrigation Traditionnelle," and Tanabe, "Peasant Farming."

hydrological conditions.¹ Bruneau classifies the irrigation systems into two types, small systems of the mountain type and large systems of the plain type. This is relevant to the theme of this study; however, it must be employed broadly and with caution. There is also overlapping between these two categories in the real situation; that is, small-scale systems operate in the narrow valleys of lowland areas as well as in highland areas. Therefore, additional information from Tanabe can be very useful in understanding the overlapping cases. According to Tanabe, there are three types: a valley and alluvial fan type (100 rai to 1,000 rai), and alluvial plain type (1,000 rai to 10,000 rai), and an integrated headwork type (over 10,000 rai). The first category (the valley and alluvial fan type) can refer to small at both high and low elevations.

There has been quite a bit of research on this, and a number of articles have discussed aspects of the organization of the muang fai irrigation system of northern Thailand. These include the studies of the following: Nimmanahaeminda (1965), Wijeyewardene (1965), Bruneau (1968), Moreman (1968), Potter (1976), Ishii (1978), Siriwong (1979),

¹Bruneau, "Irrigation Traditionelle," and Tanabe, "Peasant Farming." Kung also classifies the muang fai irrigation system according to size: small systems (less than 1,000 rai), medium-sized systems (1,000 to 5,000 rai), and large-sized systems (above 5,000 rai). Peter Kung, "A Review of River Basins and Irrigation Systems in Northern Thailand," in Irrigated Agricultural in Northern Thailand, Agricultural Development Council National Seminar Report No. 5 (Bangkok, Thailand: Agricultural Development Council, 1974), pp. 52-71.

Calavan (1980), Suraroek (1980), Gypmantasiri (1980), Tanabe (1981).¹ None of these studies have provided a complete analysis of the muang fai organization because of their emphasis on the practices observed in lowland communities, and because of the lack of ethnographic data from both hill and valley communities which would allow the researchers to see a comparative picture of the differences and similarities. Burneau, though he has observed the differences between the hill and plains irrigation systems, does not attempt to compare or contrast aspects of the irrigation organization. Moreover, either those who provide good ethnographic accounts are not interested in the hill communities or their case-study approach limits them from obtaining a wider perspective on the muang fai organization. We can see such cases in the works of Moreman, Calavan, Potter, and Tanabe.² Kunstadter, who has attempted the analysis of upland and lowland relations and has discussed the irrigation system and organization of hill areas, has not given a balanced proportion of his analysis to

¹Studies describing similar systems in nearby regions include Christian Taillard, "L'irrigation dans le nord du Laos: L'exemple du bassin de la Nam Song a Vang Vieng," in Etudes de geographie tropicale offerte a Pierre Gourou (Paris: Mouton, 1972), pp. 241-250; E. Walter Coward, Jr., "Agrarian Modernization and Village Leadership: Irrigation Leaders in Laos," Asian Forum 3 (1971): 148-163.

²Moreman, Agricultural Change and Peasant Choice; Kay Mitchell Calavan, "Princes and Commoners in Rural Northern Thailand," in Royalty and Commoners: Essay in Thai Administrative, Economic and Social History, Contribution to Southeast Asian Studies Vol. 15, ed. by Constance M. Wilson, Chrystal Stillings Smith, and George Vinal Smith (Leiden: E. J. Brill, 1980), pp. 73-83; Potter, Thai Peasant Social Structure; Tanabe, "Peasant Farming."

lowland communities. His works which contain information on irrigation are totally based on the data collected from Lua communities.

We may conclude that there is a variation between the hill and valley localities and an observable change over time in the recent history of northern Thailand. If we attempt to seek the answer to the question "Why?," it is interesting that we can hypothesize both local variations in ecological conditions and the history of the sociopolitical situation as reasons for current behavior in irrigation. Then we can more clearly see the picture of the muang fai irrigation organization and its adaptation. It is at this point in this thesis when we find it more fruitful to apply an ecological approach.

Coward has suggested an ecological perspective and an analytical framework for the study of institutions and organizations of irrigation. He states:

One can speak fruitfully of the ecology of irrigation institutions and organizations and use this analytic approach to compare various forms and arrangements for system operation, to understand the absence of irrigation institutions and organizations in a given context, or to anticipate the likely organizational consequences of an irrigation arrangement being planned.¹

The decision to make the irrigation organization in northern Thailand the subject of this thesis was initially based on several conditions, not the least of which was the apparent challenge on

¹E. Walter Coward, Jr., "Irrigation Development: Institutional and Organizational Issues," in Irrigation and Agricultural Development in Asia, ed. E. Walter Coward, Jr., (Ithaca, New York: Cornell University Press, 1980), p. 22. See also E. Walter Coward, Jr., "Institutional and Organizational Factors Affecting Irrigation," in International Rice Contd.

the personal and scientific level that such a study would present. The following section will be a brief discussion of the significance of an ecological perspective.

The Application of the Ecological Perspective,
Concepts, and Method

Social scientists share a basic view that human behavior has regularities and recurrent patterns. In essence, they seek to understand behavior in several aspects of life in order to be able to explain social behavior, phenomena and change. However, the scope of their investigations is not limited to questions on what the regularities are; rather the study seeks to answer why people behave or interact differently. The differences in the regularities are observed between one local area and other and between the past and the present. These are questions relating to variation in localities and in time. Social scientists have recognized the significance of an interpretation of the interrelations between human groups and their habitat and have succeeded in integrating an ecological perspective into their main themes of analysis. With the adoption of ecological

Research Institute, Water Management in Philippines Irrigation System:
Research and Operation (Philippines, 1973), pp. 207-218.

views, the studies have strengthened comparison in space and in time.¹

Ecology is defined as "a way of seeing," an approach to understanding relationships between organisms and their environment.²

It is only relatively recently that social scientists have begun investigating relationships between the environment, society and culture. The method of cultural ecology of Julian H. Steward marked an important development by introducing an ecological perspective into cultural anthropology.³ Defined broadly, cultural ecology refers to the dynamic interrelationships between man and the natural and cultural components of his environment. The explanation for some aspects of cultural variation can be found in the adaptation of a society to its

¹The application of the ecological approach to social science is discussed by Andrew P. Vayda, who states that there are two ecological approaches or ways of relating cultural behavior to environmental phenomena. The first way is to show items of cultural behavior functioning as part of systems that also include environmental phenomena. The second is to explain environmental phenomena as being responsible in some manner for the origin or development of cultural behavior. See Andrew P. Vayda, "An Ecological Approach in Cultural Anthropology," Bucknell Review 17 no. 1, (1969): 112-119.

²Netting views ecology as "a way of seeing." He has supported the ideas of M. Bates and P. Shepard that ecology is not a subject or a discipline. Ecology is considered as a point of view because "there is no body thought and technique which frames an ecology of man." See Robert McC. Netting, Cultural Ecology (California: Benjamin/Cummings Publishing Company, 1977); M. Bates, "Human Ecology," in Anthropology Today, ed. A. L. Kroeber (Chicago: University of Chicago Press, 1953), pp. 700-713; and P. Shepard, "Introduction: Ecology and Man -- A Viewpoint," in The Subversive Science, eds. Paul Shepard and Daniel McKinley (Boston: Houghton-Mifflin, 1969), pp. 1-10.

³Julian H. Steward, Theory of Culture Change (Urbana: University of Illinois Press, 1955).

environment. Netting states the following: "My use of the term ecology is meant to emphasize the systematic interaction of specific environmental, cultural, and social factors and the process by which adaptation takes place."¹

In Cohen's definition, adaptation refers to the process by which a population or group alters its relation to its habitat.² In this definition we see three key words" process, population or group, and habitat. The first, "process," indicates a dynamic relationship between human groups and their habitat; process here refers to continuing interaction over a period of time. "The concept of adaptation is historical."³ It is clear that to observe an adaptation of a human group is to look into the historical aspect of relations.

Second, from a social scientist's point of view, we are concerned with the relationship between human being in groups as well; therefore, the focus is on the population or a human group as an adaptive unit. It is for this reason that the study of adaptation is an observation of a population or a group.

When applied to the study of human groups, the "habitat" includes both physical or natural habitats and man-made habitats.

¹Robert McC. Netting, Hill Farmers of Nigeria: Cultural Ecology of the Kofyar of the Jos Plateau (Seattle: University of Washington Press, 1968), p. 17.

²Yehudi A. Cohen, "Introduction" in Yehudi A. Cohen, ed., Man in Adaptation: The Cultural Present (2nd. ed.; Chicago: Aldine Publishing Company, 1974), p. 3.

³Ibid.

Man creates and recreates, adding to the components of the environment.

"Natural habitat is only one component of an environment."¹ The man-made habitats emphasized by Cohen are political forces, especially the centralized political modes. Therefore, when we study politically integrated societies, it is necessary to emphasize political elements.²

Though the concept of 'habitat' is originally limited to natural habitats, social scientists have extended it to include many social and cultural factors, or components of the environment. What kinds of habitats and what components of the environment are to be included in a specific study has to be explored in the real situation. To include too many factors in one single study may cause one to end up with meaningless results. As Netting points out, "there is a danger in indiscriminate piling up of presumably functional connections that may end by calling everything ecology."³ Especially at the micro-level, to examine the pattern of irrigation behavior, Coward has

¹Ibid, p. 4.

²At this point, Cohen is very explicit in pointing out the importance of the political elements in the habitat of human groups. He states: "Likewise, centralized political modes represent energy systems that - like bows and arrows, digging sticks or hoes, plows, steam, or electricity - provide limits and potentials for man's exploitation of the natural habitat and for the development of certain kinds of social relationships. . . . Local social groups must adapt their organizations of social relations to these political forces, and vice versa, if there is to be order, regularity, and predictability in patterns of cooperation and competition and if the groups are to survive as viable units." Ibid, p. 2.

³Netting, Hill Farmers of Nigeria, p. 15.

suggested one should include factors in the physical and natural habitat and the sociopolitical context. He further has suggested some other factors to be considered, for instance, rainfall patterns, canal layouts, and bureaucratic procedures.¹

Cultural ecology allows us to examine the influence of the local habitat and of the non-local context which may be considered as internal and external factors.² In this case, the examination of sociopolitical conditions or of the central administration can be useful, especially when one wants to study a specific organization of a local area. The linkage between the local organization and the central government administration can explain the influence of the external sociopolitical elements.

It is imperative that a study in cultural ecology combine a comparative method and an historical method to examine local variation and adaptation over time in seeking to answer the questions: How are things related? Why are things as they exist at the present? and How did they become as they are?³ It is the purpose of this present research

¹Coward, "Irrigation Development," pp. 21-22.

²Steward has provided the perspective on local and external relations, the relations between local ecological systems and regional ecological systems, in the concept of 'integration.' See Julian H. Steward, Theory of Culture Change; and the introductory chapter of Jane C. Steward and Robert F. Murphy, eds., Evolution and Ecology (Urbana: University of Illinois Press, 1977).

³Ibid.

to apply both comparative and historical methods to understand the irrigation organization of the muang fai system in two localities.

The Previous Literature and The Questions for Further Research

The Ecological Perspective and the Questions in This Thesis

The method of cultural ecology of Steward studies the following:

(1) the relation between environment and exploitative or productive technology; (2) the behavior patterns involved in the exploitation of a particular area by means of a particular technology; and (3) the extent to which the behavior patterns entailed in exploiting the environment affect other aspects of culture.¹

This framework has been suggested for application to the problems of adaptation and evolution in human society and culture. It emphasizes the critical relationship between environment and technological-economic arrangements, which are further related to other parts of a people's social and cultural adaptation. However, in an empirical study one may want to examine, within a part of the whole framework, the relationship between the social organization of a specific function and the habitat. The application of an ecological perspective has some advantages over the use of a functional and structural analysis. If an ecological perspective is used, then

¹Steward, Theory of Cultural Change, p. 42.

"functionalism can extend beyond the social sphere, and structural arrangements can be seen to have adaptive value."¹

The perspective and framework of cultural ecology require social scientists to examine not only a social organization but also its relationships with environmental factors. In this thesis, social organization for a specific function such as irrigation can be considered as a part of people's adaptation to local habitat and external factors. By focusing on one concern (irrigation), we may learn how the group adapts in its response to habitat and other factors.

On the other hand, when we look at the ecological perspective developed by sociologists in recent decades, we become concerned about organizational and environmental relationships. In particular, sociologists who are interested in an open systems approach pursue their studies by looking at many types of organization from an ecological perspective. The recent work of Scott has discussed this trend.² However, most of the studies he discusses focus upon large, formal, complex organizations, such as bureaucratic governmental or business organizations. The methods applied in many of these studies

¹Ibid, p. 14.

²Scott has made a useful interpretation of theory and methodology in sociological studies of organization, and of the development of a new open systems approach. The book covers many interesting works, debates and arguments within this field of study. However, most of the studies cited in this work emphasize organizational structure and its environment. See W. Richard Scott, Organizations: Rational, Natural, and Open System (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1981).

were sophisticated; many of them employed deductive approaches. Moreover, the analyses are mostly devoted to the study of the behavior of an organization itself, rather than to understanding social and cultural change. The present study has benefited from ideas in both cultural ecology and the open-system approach to the study of organization. However, our particular concerns are with the social organization of irrigation in rural settings, within an agricultural society during the period of change in northern Thailand; consequently the cultural ecological perspective is most relevant.

Empirical studies in anthropology and sociology have been useful in focusing the scope of the present study and in directing the questions at the end of this chapter; therefore they should be discussed briefly.

Steward is more interested in observing the relationship between social and political patterns and subsistence patterns. When he did his research, he included social and political variables, such as density and distribution of population; roles of the sexes, family, and communal groups in productive activities; size and composition and permanency of villages; and political direction of cooperative activities.¹ These are major variables of the "cultural core," and

¹Julian H. Steward, Basin - Plateau Aboriginal Sociopolitical Groups, Bulletin 120 (Washington, D. C.: Bureau of American Ethnology, 1938), p. 2. See also Netting, Hill Farmers of Nigeria, p. 18.

these features relate closely to the subsistence activities and economic arrangements.¹ Steward's hypothesis indicates the relationship between the natural setting (semi-arid, arid area) and the kinds of subsistence activities, economic arrangements (irrigated agriculture), and social organizations (family, kinship and band organization, centralized-control organization) to be found there.²

To a group of social scientists, irrigated agriculture, and particularly irrigation itself, has become the center of interest when they study the relationship between patterns of food production and political system. Linton indicates that there is a relationship between the introduction of wet rice agriculture (the practice in allotment of land and control of irrigation) and the rise of permanent fortified villages, class stratification, and feudal kinship.³

Based on the method of historiography, Wittfogel has made conclusions on the relationship between large-scale irrigation and centralized political control.⁴ Although the methodology is different

¹When Netting conducted his research, he decided to use as variables demographic, productive groups, and rights to the means of production as a "cultural core" under the new name of "social instrumentalities." See Netting, Hill Farmer of Nigeria, pp. 14-18.

²Later, Steward became interested in the centralized control organization which is the main interest of Wittfogel.

³Ralph Linton, "The Tanala of Madagascar," in The Individual and His Society, ed. A. Kardiner (New York: Columbia University Press, 1939), pp. 282-290. See also Robert McC. Netting, "Agrarian Ecology," Annual Review of Anthropology 3 (1977): 21-25.

⁴Karl A. Wittfogel, Oriental Despotism (New Haven: Yale University Press, 1957).

from that of cultural ecological studies, the theoretical basis is similar. Wittfogel's study deals with variables of environment (semi-arid, arid area), technology (large-scale irrigation), economic patterns (irrigated agriculture) and political structure (centralized political control). This hypothesis has drawn a lot of attention from social scientists who conduct research on irrigation subjects. One group is interested in irrigation and the origin of the state; the other tends to be more concerned with the functional relationships of a set of variables in Wittfogel's work in various localities.¹ Most researchers have reached the conclusion that the large-scale irrigation system does not lead to a centralized political structure. However, these studies have used data from various scales of irrigation from several localities; there is concern that the hypothesis should be reformulated and the empirical investigations should differentiate the scale and complexity of the kinds of irrigation studied.

A study by Netting demonstrates a different system and situation in which the water control system is successful without centralized direction. Each family operates and maintains its part without knowledge about the entire system. As Netting explains:

¹These researches include those of Leach (1961), Million (1962), Price (1971), Geertz (1972), Mitchell (1973), Bennett (1974), Hunt and Hunt (1974), Netting (1974), Spooner (1974), and Downing (1974). See a good discussion of this literature in William P. Mitchell, "The Hydraulic Hypothesis: A Reappraisal," Current Anthropology 14: 5 (December 1973); and Robert C. Hunt and Eva Hunt, "Canal Irrigation and Local Social Organization," Current Anthropology 17:3 (September 1976). See also Netting, Cultural Ecology.

It would appear that small-scale irrigation systems which grow essentially without plan and are maintained with a minimum of cooperative effort can function on the basis of an intricate series of water sharing agreements each meshing with others but known to individuals only insofar as their own use rights are exercised.¹

The small-scale irrigation which exists within a specific habitat in the mountain area tends to require a less complex routine of activities and simple, occasional cooperation among water users, and seems not to encourage any central coordination. Not only has Netting indicated a relationship between small-scale irrigation and the lack of central control, but he also has implied that there is a distinctive pattern of behavior and relationships among water users in the mountain area. It is interesting to see that simple cooperative behavior is an adaptive form in this habitat.

There are some studies which attempt to develop further the hydraulic proposition. Hunt and Hunt reexamine the proposition and suggest a new model for understanding the local social organization of canal irrigation.² The focus is the concept of role embeddedness, or the relationship between role authorities and their power linkages within local communities and with the extralocal social environment. These linkages are developed through irrigation activity systems.

¹Robert McC. Netting, "The System Nobody Knows: Village Irrigation in the Swiss Alps," in Irrigation's Impact on Society, eds. T. E. Downing and M. Gibson (Tucson: University of Arizona, 1974), pp. 67-75.

²Hunt and Hunt, "Canal Irrigation," pp. 389-398.

"The construction and conflict resolution are linked closely with extra-local organization, while maintenance and daily allocation matters are in local hands."¹ Hunt and Hunt see the importance of including ecological factors in research on irrigation.

In an attempt to reformulate Wittfogel's hypothesis, Mitchell has shifted the emphasis from irrigation itself to the centralized coordination in the organization of irrigation activities.² The centralized control which has been developed in an irrigation system further affects and increases the centralized political power in other areas of social life. The point Mitchell made has brought social scientists to seek more understanding of the organization of irrigation and particularly to study the organizational pattern of irrigation in various societies. More attention has since been paid to the organization of community irrigation in several localities.

With his interest in the study of the irrigation systems in Asia, Coward has brought to our attention the institutional and organizational factors in irrigation.³ Moreover, he has proposed the use of an ecological approach to look at the problem of institutions and organizations in irrigation. To study the pattern of behavior and

¹Ibid, p. 396.

²Mitchell, "The Hydraulic Hypothesis," pp. 532-534.

³Coward, "Irrigation Development."

interaction in irrigation is to understand the rules, roles and social groups in relation to an activity system (allocation, maintenance, conflict management). Using an ecological perspective, we are able to understand the behavior patterns adapted in response to habitat and sociopolitical context. The rules can be rigid and/or elaborate; roles may be complex and differentiated; social groups may vary in size and composition. The reasons to explain this variation lie in the relationship between institutions and organizations and the ecological factors.

For the research upon which this paper is based, the questions were concerned with the patterns of irrigation behavior and the relationships among people in two communities. That is, it was an observation of social organization in irrigation within the differing ecological conditions of the lowland and upland areas of northern Thailand. Moreover, from our knowledge of the actual situation we know that no local community exists as a completely isolated, totally independent unit. With our concern for an ecological view, including the local habitat and the external sociopolitical situation, this present study further compares the lowland and upland social organization. The study also makes use of a center and periphery framework. The study has applied Coward's analytical framework to examine the rules, roles and social groups in various activities of the muang fai irrigation system. The study is based on the data from field work in two muang fai irrigation communities in the district of Chomthong in Chiang Mai province of northern Thailand.

This research further attempts to study the organizational patterns of the muang fai irrigation system and its relationship to a number of ecological factors. Therefore, at this point we need to look at what we can learn from the current literature.

Irrigation Organization Patterns and Ecological Factors

The organization of irrigation is considered an adaptive form of socially organized behavior. These organizations function for a specific purpose: to control water resources for agriculture. There are a large number of studies that indicate the existence of collective efforts among people in agricultural communities in many countries. In northern Thailand the muang fai irrigation organization is an active, corporate group which persists through the history of northern Thai society. There are interesting questions about organizational patterns, which differ between hill and valley communities. A further attempt of this research is to look into adaptive organizational patterns, which will be investigated in the second section. The data from the two cases investigated in this thesis and from previous studies are compared to see how the organizational arrangements and procedures are formed in response to a number of ecological factors.

The community irrigation system, a system that is constructed, operated, and maintained by an organization of water users, has been referred to several terms: indigenous irrigation system, traditional irrigation system, and peoples' irrigation system. These studies help to explain the patterns of irrigation organization in various localities.

Geertz's study of a Balinese system provides an understanding of the concept of organization of irrigation and a clear picture of Balinese society, wherein two separated ecological units of settlement and irrigation co-exist.¹ The irrigation organization, or subak, and the settlement unit, or bandjar, are separate units, and they function autonomously, although there may be an overlap between the two organizations. Comparative analysis and cross-cultural data help provide a wider perspective on similarities and differences and extend the strength of generalization beyond the case study.

Based on the results from a comparative analysis, Coward has formulated three themes inherent in community irrigation systems: accountable leadership, mini-unit organization, and canal-based organization.² Moreover, Coward also presents a picture of variation in the complexity of the leader's role and in the complexity of village composition (non-village, pan-village association, and differential membership categories). As he discusses each theme of community irrigation organization, he posits some statements which suggest

¹Clifford Geertz, "Organization of the Balinese Subak," in Villages in Indonesia, ed. Koentjaraningrat (Ithaca: Cornell University Press, 1967); it has been reprinted recently in Irrigation and Agricultural Development in Asia, ed. E. Walter Coward, Jr. (Ithaca: Cornell University Press, 1980), pp. 70-90.

²E. Walter Coward, Jr., "Management Themes in the Community Irrigation System," in Irrigation and Agricultural Development in Asia, ed. E. Walter Coward, Jr. (Ithaca, New York: Cornell University Press, 1980), pp. 203-220.

further questions for empirical studies. This will be discussed in the following paragraphs.

Discussing the first theme he says that the traditional irrigation leader usually serves a small group of water users, is locally elected and receives rewards directly from the water users whom he serves.¹ In discussing the second theme, that of mini-unit organization, he notes that the irrigation organization is comprised of several groups of water users at the physical sub-units, or "mini-units," of the irrigation system. The water users of each social unit choose a leader who has duties similar to those of the leaders at the system level in distribution and allocation of water, mobilization of labor for maintenance, and management of conflicts.² Lastly he discusses canal-based organizations, which are often separate units, though sometimes with high overlap. His conclusion is that irrigation community is composed of field neighbors, not village neighbors. The irrigation community may recruit members from several villages, and may form its administrative structure in various ways.³

This discussion of some differences found in the cross-cultural data has provided a view of the degree of complexity in the leader's role, village composition of organizations, the existence of overlapping between village and irrigation leadership, and the degree of diversity among water users within mini-units, and the degree of coordination within the organization. This leads to the interest of the present

¹Ibid, p. 206.

²Ibid, pp. 207-208.

³Ibid, pp. 208-210.

study, which attempts to explore the patterns of community irrigation organization and the factors explaining the differing organizational arrangements and procedures in northern Thailand.

The scope of a leader's duties may be limited, or may be extended to cover a wide range of activities. This indicates a certain range of variation in the leader's role, which can be less complex or more complex. It is interesting to ask why? As Coward has suggested; "While it is not clear what determines this more complex leadership role, one might hypothesize that the higher population density in Bali requires greater coordination of water use among various groups obtaining water from the same stream."¹ And in another statement he says, "The actual responsibilities of traditional irrigation leaders vary, in part, according to the size and physical aspects of the irrigation system and the location of ultimate control of the system."²

There are a variety of leader's duties in the community irrigation system: allocating and distributing water, mobilizing resources for the system's maintenance, resolving conflicts, and leading the irrigation rituals. It is very important to ask what are the factors defining different patterns of the leader's role and in what ecological conditions do the specific patterns exist?

It is also necessary to investigate the relationship between the village organizational pattern and the pattern of settlement:

¹Ibid, p. 206.

²Ibid, p. 205.

Does arrangement of the village affect the complexity of the irrigation organization? In other words, Why do the organizations manifest different degrees of complexity? Why do the organizations form different arrangements and different activity procedures at the system level and the mini-unit level? All these questions are the central concern of this thesis.

Many studies have brought the technological aspect of irrigation systems into our consideration. In addition, the reports on various sizes of systems show differences in canal layout, length of canal, arrangement of plots, topographical characteristics of fields, and so on.¹ Levine indicates that a significant relationship exists between engineering design and operation and the system's social organization.² Among several distinctions, there are variations in

¹Those who are interested in the information on the physical characteristics of an irrigation system can do a brief survey of most of the researches on community irrigation. Coward has provided a bibliography in "Irrigation Institutions and Organizations: An International Bibliography," Ithaca: Cornell University International Agriculture, mimeograph Bulletin No. 49, 1976.

²Although Levine's work is oriented towards development problems, here we see the important point he suggests in the relationship between physical aspect and organizational pattern. The points he has made also call for a look at the question of adaptation. See Gilbert Levine, "The Relationship of Design, Operation, and Management," in Irrigation and Agricultural Development in Asia, ed. E. Walter Coward, Jr. (Ithaca, New York: Cornell University Press, 1980), pp. 51-62.

physical structure between upland and lowland systems. Certainly, the structural form and detailed characteristics of the engineering devices are different. However, most fundamental is the work requirement, or the pattern of work demanded by various physical forms.¹

Spencer especially explains the water control in the terraced rice-field agriculture in Southeast Asia in which the physical structure of the irrigation system in the upland area is different from that in the lowland area.² We can also find some descriptions of upland irrigation system by Kunstadter, and Bacdayan, and Netting.³ From these studies

¹When Steward and Murphy refined the method of cultural ecology, they suggested the observation of the relationship between patterns of work and organization of work. This points out the emphasis on the work requirement with socially organized behavior. Obviously, Coward has suggested the system of irrigation activities and the rules, roles and social groups which vary with them. Also, when we examine the sociological studies in the field of organization, we find that it is important to observe the pattern of work. Scott says that "the prime source of core complexity is seen to be the nature of work being carried out - the demands made by technology on the structure." See Steward and Murphy, Evolution and Ecology; Coward, "Management Themes"; and Scott, Organizations.

²J. E. Spencer, "Water Control in Terraced Rice Field Agriculture in Southeast Asia," in Irrigation Impact in Society, eds. T. E. Downing and M. Gibson, Tucson: University of Arizona, 1974), pp. 59-65.

³Peter Kunstadter, "The Future of Upland Tribal People in the Nation of Southeast Asia: Lua' (Lawa) and Karen Hill People of Northwest Thailand," paper presented at annual meeting of the American Anthropological Association, Denver, Colo., 1965; "Irrigation and Social Structure: Narrow Valleys and Individual Enterprise," paper presented at 11th Pacific Sciences Congress, Tokyo, Aug.-Sept. 1966; and "Subsistence Agricultural Economics of Lua and Karen Hill Farmers of Mae Sariang District, Northwestern Thailand," in International Seminar on Shifting Cultivation and Economic Development in Northern Thailand, pp. 47-144 (Bangkok: Land Development Department, 1970). Albert S. Bacdayan, "Mountain Irrigators in the Philippines," in Irrigation and Agricultural Development in Asia, ed. E. Walter Coward, Jr (Ithaca, Contd.

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we understand that the pattern of work in distribution and maintenance is different from that of the lowland system. This also suggests a relationship between the irrigation activities and organizational arrangements and procedures.

We have found that the abundance or shortage of water is a central interest in irrigation studies. The scarcity of water supply may demand an elaborate system of allocation and distribution and complex rules to enforce distribution and use among members of the group. Hunt and Hunt say: "Water scarcity is not a fixed condition of any place, but rather a particular relationship between supply and demand for water at a given point in time."¹ When scarcity occurs, the group may respond to it in several ways, such as finding new sources, adopting new technology, or placing limits on demand. Downing has posited a relationship between rigid social organization and water scarcity during the moisture-sensitive period.² As we are concerned with the pattern of irrigation organization, Downing's study has provided the idea of observing the influence of water scarcity on organizational arrangements and procedures.

Scale of size of particular irrigation systems is also an important issue; researchers have defined this in different ways, such

New York: Cornell University Press, 1980), pp. 172-185. Netting, "The System Nobody Knows."

¹Hunt and Hunt, "Canal Irrigation," p.392.

²Theodore E. Downing, "Irrigation and Moisture-sensitive Period: A Zapotec Case," in Irrigation's Impact on Society, eds. T. E. Downing and M. Gibson (Tucson: University of Arizona, 1974), pp. 43-57.

as the number of hectares served, the population involved, or the length of canals.¹ As Spooner has observed, there is a great range in scale of particular irrigation technology like canal irrigation (that is, water flowing from a permanent surface source), while small scale is a general characteristic of ground water irrigation.² Spooner has suggested the use of terms like simple and complex to describe irrigation systems. He proposes to replace scale, or size, with the dimension of complexity as measured against potential hydraulic development.³

He classifies the irrigation system according to economic distinctions. To define simple system and complex system, Spooner uses a typology that includes a complicated relationship between technology, economic requirements, and the economic ability of the population. The system wherein the engineering structure requires investment within the ability of the individual operator to control and maintain can thus be defined as a simple system. When the engineering structure demands investment that is beyond the ability of individuals or a group of cultivators, Spooner sees it as a complex system. Thus the research has to clarify the complexity of the technology, the degree of

¹Hunt and Hunt, "Canal Irrigation," p. 390.

²Brian Spooner, "Irrigation and Society: The Iranian Plateau," in Irrigation's Impact on Society, eds. T. E. Downing and M. Gibson (Tucson: University of Arizona, 1974), pp. 43-57.

³Ibid, p. 48.

investment required, and the level of ability of the individuals and groups. To link investment with people's ability implies the question of supply and demand in labor, materials, and cash. Spooner has explained these questions totally with qualitative data. Without quantitative data, it is difficult to do a comparative analysis of economic distinctions, especially if the research is extended to deal with several systems of various scale.¹ Spooner's typology seems to be influenced by the limited range in the size of the systems he considered: most of the systems are of small size and based on ground water use. In considering a broader range of systems one would need to use a matrix involving both scale and complexity.

For the purpose of this research, it is particularly significant to use scale and complexity. Complexity in technological features of an irrigation system is concerned with the nature of work required for the continuing function of the irrigation system. The pattern of work can be of varying degrees of complexity.² It is imperative to observe the influence of this factor on the organizational arrangements and procedures in the muang fai system.

¹All variables included, such as labor, materials, and cash are quantifiable; therefore, the research should use quantitative data to support ethnographic details in an attempt to define the investment and ability of individuals or of groups.

²The pattern of work has been discussed in a previous footnote on page 28, which refers to the works of Steward and Murphy, Coward, and Scott.

Bacdayan studied the links between the organization of a community irrigation system in the mountain area of the Philippines and the Philippines central government. He concluded that irrigation expansion reinforces traditional social organization and enhances articulation with the national structure. Bacdayan also found that traditional social organization has successfully managed additional functions without changing its structural form.¹ When the central bureaucracy does not intervene directly in local irrigation, it is important to observe how the community irrigation organization responds to the requirements of new tasks.

This preliminary survey of the studies about irrigation organizations frames the scope of this present study to include relevant variables. In my attempt to observe the pattern of the muang fai irrigation organization, I investigated the influences of physical, economic and sociopolitical conditions on social organization of irrigation. The questions are concerned with the muang fai organizational pattern, the ecological conditions in which the organizations exist, and the factors influencing these organizational arrangements and procedures.

¹Bacdayan, "Mountain Irrigators." This is reprinted from Ethnology 13 (1974): 246-260. Earlier, the paper was presented at the Symposium on Irrigation and Communal Organization during the annual meeting of the American Anthropological Association in New Orleans, November, 1973.

Methodology and Fieldwork

The research for this study extended over eight months of fieldwork in Chiang Mai province of northern Thailand and utilized documents, interviews and participant observation. I have selected two irrigation systems, the lowland system of the Mae Klang River and the upland system of the Mae Pae River in Chomthong District, a mountainous area to the south of the city of Chiang Mai. The diversity in geography, ethnic and cultural characteristics of Chomthong, together with its relationship with provincial, regional and national systems makes the research findings relevant to an understanding of northern Thailand. Chomthong has been an important area of interaction between hill and valley people for more than a century. Significant also is the history of the relationship of local communities, which have become close to the city center and the national government system since the beginning of the twentieth century.

With basic information from the governor's office of Chiang Mai Province, together with the assistance from colleagues who were at that time working on research in the villages of Chiang Mai,¹ I was able to select two sites in the district of Chomthong, fifty-eight kilometers to the south of Chiang Mai City. The first month was mostly concerned with the formal procedures to get permission from the governor's

¹Among these, four are Anan Ganjanapan, Chaiyan Vadhanabhuti, Sommai Premchit, and Kwanjai Thaithong.

office to work in the villages and with trips to several locations and visits to many local leaders. I managed to find a house in the same compound with a member of the irrigation organization at the end of first month. To be able to speak the northern Thai dialect was a great advantage.¹

Since the research was designed to use several methods including participant observation, interviews, and examination of historical documents, it was rather complicated to work out a daily schedule. Only a broad daily plan could be set up ahead of time, and it had to be flexible. I and my assistant had to keep up with the busy schedule of the irrigation groups, particularly the daily routine of the irrigation leaders, which meant, for example, occasional informal meetings at the house of the top leader (kae muang) before breakfast or while he was checking work along different sections of the canals, collecting fees, or checking problem sites. During the days of activities such as canal cleaning, observations and surveys were made. At the same time this was a good chance to get to know the water users, whom we would later visit in their houses for interviews.

The written historical documents kept by many villagers were good sources of information on local history. Moreover, oral history

¹Although many researchers have portrayed Chiang Mai as a rapid changing community with modern agriculture, education, and health care, actually there is a pocket of slowly changing villages, particularly at the periphery. The differences in characteristics between these villages the rest of the province can be observed. For example, in the remote villages I was often asked: "You are a woman; why do you have to travel around? How many years did you study after fourth grade?"

collected in the interviews with older villagers was very useful. I also obtained statistics collected by the district office about population, agriculture, forestry, and the government's development projects. Living in the villages was the most efficient way to keep up with all these tasks. The fieldwork was finished in May 1981, after the harvesting of the second crop in some areas, or the third crop in the others. The rest of the work was carried out at Cornell University.

The Historical Sketch of Chomthong District

The geography of a mountain chain has kept Chomthong away from the busy trade routes between Northern State and Central Thailand and Burma which were developed during the second half of the nineteenth century. The area has been connected to the city of Chiang Mai only by river and forest trails, which facilitated only little movement of people and goods. However, within the area, people of hill and valley have had a long-time relationship.

The district (amphoe) of Chomthong is comprised of eight sub-districts (tambon) which have eighty-two villages (muban) within their administrative boundaries. Because the area of Chomthong is on the periphery, it was semi-independent from the central political power of the Chiang Mai State (1774-1874). During the period of this state, under the tribute system which later became a tax system, the local

lord (phaya)¹ had full control of local communities; he worked with a few assistants, who were assigned special duties in local affairs, such as keeping records, collecting taxes, controlling irrigation, etc. Chomthong, as known to people of the former generation, was composed of three types of settlement: the major settlement (ban luang) located in the middle of the valley, in the center area; the forest settlement (ban pa), the scattered villages near the mountain; and the third type of settlement (ban doi), or the scattered hill villages in the upland areas. The first two types are places of lowland northern Thai, and the third type is the settlements of the hill people.

In the year 1900, at the beginning of the central control, Chiang Mai State was put under the thesapiban administrative system² which brought the area under Bangkok's rule. The central Thai

¹The phaya can be considered as equivalent to the present position as head of the sub-district (kamnan). This depends on the size and number of villages under control. Documents on the political structure of local communities during this period are not available. All this information was obtained as oral history from local people and monks, particularly the descendants of the old phaya of Chomthong. More discussion on this is in Chapter IV.

²The administrative system of thesapiban divides into hierarchical units: monthon, nakorn, kwaeng, kwan, mu. Northern Thai is Monthon Payab, comprised of Chiang Mai, Chiang Rai, Mae Hong Son, and Lampun. In 1930, Monthon Payab was extended to include Lampang, Phrae and Nan. See James A. Ramsey, "The Development of a Bureaucratic Polity: The Case of Northern Siam," Ph. D. thesis, Cornell University, 1971; and also Sarasawadee Prayoonsathein, "The Administrative Reform of Monthon Payab (1888-1933)," M. A. thesis, Srinakarinviroj University, 1980.

government took complete control and reformed the local administration into a provincial system around 1907.¹ It was then that the district of Chomthong was first established and administered by its first central Thai official or nai amphoe.² The power of the local native leaders gradually weakened; a local lord like the phaya was assigned a new position as kamnan to work under the new administration. Since then, all local affairs including taxes, land titles, health care, education, license registration, and legal affairs have been administered by the district office. However, water management remained under the control of local groups of farmers.

Two Sites in Chomthong District

The district of Chomthong is composed of a large lowland valley with surrounding valleys, and of hills with several peaks over 2,000 meter above sea level. Nowadays, Chomthong contains a population of 74,907, with about one-third of them residing in the large valley and the rest living in scattered villages in the small valleys and hill areas.³ The town has developed in the middle of a large valley, where there used to be a ban luang around 1950, and by 1980 its population exceeded ten thousand, or more than two thousand

¹Prayoonsathien, "The Administrative Reform," p. 264.

²The records at the district office of Chomthong indicates that the first nai amphoe was appointed around 1908.

³The statistics on population were obtained from the district office. This count was made in March 1981.

per square kilometer.¹ The town has a large local market, banks, rice mills, and several stores selling manufactured goods and agricultural equipment that attract people from surrounding villages.

One lowland irrigation system, Fai Muang Mai of the Mae Klang River, with 600 members,² is located in the large valley area and serves an area of approximately 5,000 rai (800 hectares), both rice land and other fields. The water users come from ten villages. This area is characterized by intensive agriculture, with double and triple cropping supported by the community irrigation system.³ Because of convenient access to the government services, particularly the agricultural office of the district, since 1960 the farmers in this valley have developed more rapidly than other areas of Chomthong, and

¹The most recent survey of the municipal office indicates that the town area, which is roughly equivalent to the municipal area of Chomthong, has a population of 10,233 persons. The data were obtained from the office of the municipality during the fieldwork period.

²As the reader will see, the concept of "member" is a complex one. For more details see Chapter IV.

³Pherk Gypmantisiri et al., An Interdisciplinary Perspective of Cropping Systems in the Chiang Mai Valley: Key Questions for Research, Chiang Mai, Thailand: Chiang Mai University, Multiple Cropping Project, 1980.

their agricultural system is highly intensive and diversified.¹

The changes that have taken place affected the community irrigation system and the local irrigation group.

The upland irrigation system, Fai Na Pae, is located at the Mae Pae River, which is about twenty kilometers to the south of the large valley. It is situated more than 400 meters above sea level, and serves 400 rai of rice land and other fields (sixty-four hectares). There are eighty water users. All irrigation members come from a small village named Ban Pae Luang in the sub-district of Ban Pae. Local farmers quickly developed wet-rice fields and an irrigation system around the year 1910. Actually, people also continued to practice swidden or dry-rice cultivation and grow pepper or cotton in their forest fields as well. Since the Mae Pae River can only provide sufficient water during the wet season, people can grow wet rice only once a year. New crops for the dry season were introduced to this area in 1965. However, the dry-season cultivation is limited to small

¹Anan Ganjanapan, who is now working on his thesis at Cornell University, kindly shared with me his personal materials on agricultural development. He indicates that the expansion of commercial crops such as tobacco, soybeans and sugar cane began in some areas of northern Thailand during 1920-1940. However, the government's direct involvement in multiple cropping and cash crops started around 1950. In 1965 the government promoted the agricultural projects in cash crops by encouraging the establishment of farmers' organizations and providing credit and fertilizer to farmers. However, the change took place earlier in the districts surrounding Chiang Mai City, and came rather late, between 1960 and 1970, on the periphery, including such areas as Chomthong.

areas. People here are now facing the problems of limited land and limited water. There has been no sign of further development toward highly intensive or diversified agriculture in this area. The village is considered to be on the periphery and has received relatively little and scattered development assistance from the central government.

Organization of the Thesis

The thesis is composed of three sections. The first section (Chapters II and III) is an introduction to northern Thailand, with a description of its geography, population, local administration agriculture, and irrigation system.

The second section is divided into four chapters (Chapters IV, V, VI and VII) and is a descriptive analysis, based on the ethnographic data, of two muang fai irrigation systems. It represents an attempt to portray differing irrigation communities in the lowland and upland areas. In the case of Muang Mai, the lowland irrigation community, we see a relatively more complex pattern of irrigation behavior and relationships. Roles are differentiated and clearly defined by a complex set of irrigation rules. The organization is structurally stratified, and there is a clear distinction between the irrigation leader (mu huana) and the water users (mu luk muang). The organization has a complex system dividing responsibilities and rights among members. The rights and responsibilities are defined according to the rules. The members are heterogenous in several aspects, in that they cultivate different crops, in different seasons, and have different access to

land. The leaders have a variety of duties and play an extensive role. Moreover, the work groups are arranged in a complex way, varying in size and composition. This requires relatively high coordination among the leaders.

In the case of Na Pae, the upland irrigation community, we find that the roles are less differentiated. The leaders have more or less the same rights and duties as do the water users, so there was a relatively less stratified structure in the Na Pae organization. Also, the water users share similar characteristics. The organization has a simple set of rules and a less complex way of organizing work groups.

The third section (Chapter VIII) is an attempt to look at the overall organizational pattern of muang fai irrigation in northern Thailand. A comparative analysis is made using the two cases of this investigation and several cases drawn from other studies in Chiang Mai. The purpose is to see similarities or variations in the organizational arrangements: in organization structure, administration, leaders and member categories, organization of work, relationships between leaders and members, and the links to the government central administration. The relationship between a number of ecological factors and the organization will also be analyzed.

CHAPTER II

HILL AND VALLEY COMMUNITIES OF NORTHERN THAILAND: THE PERIPHERAL AND CENTRAL ZONES

Two Ecological Zones: Hills and Valleys

Topographically, northern Thailand is clearly distinct from other parts of Thailand; it is mountainous, and the area is predominated by a large proportion of hill lands.¹ The mountain chains run from north to south, extending at gradually decreasing altitudes as far as the southern edge of the region in the provinces of Phrae, Nan, and Tak. The region includes nine provinces, namely: Chiang Mai, Chiang Rai, Nan, Mae Hong Son, Lampun, Lampang, Phrae, Tak, and Payao, covering an area of approximately 105,099 square kilometers drained by four

¹In this study, I define "hill lands" as total areas at an altitude above 330 meters, covering upland and highland areas. Therefore, the lowlands are located at an altitude below 330 meters. By this definition, the Muang Mai area is the lowlands, and the Na Pae area is the uplands. Based on a physiographic survey, Scholten reports that northern Thailand is composed of 76.5 percent highlands, 10.3 percent uplands and 13.2 percent lowlands. For more detail see Jules J. Scholten, "Physiographic, Climatic, and Pedological Basis for Irrigated Agriculture in Northern Thailand," in Irrigated Agriculture Northern Thailand (Bangkok: Agricultural Development Council, 1974), pp. 52-67. Tanabe and Gypmantasiri define the area over 330 meters as hills and mountain areas. See Tanabe, "Peasant Farming," and Gypmantasiri, An Interdisciplinary Perspective.

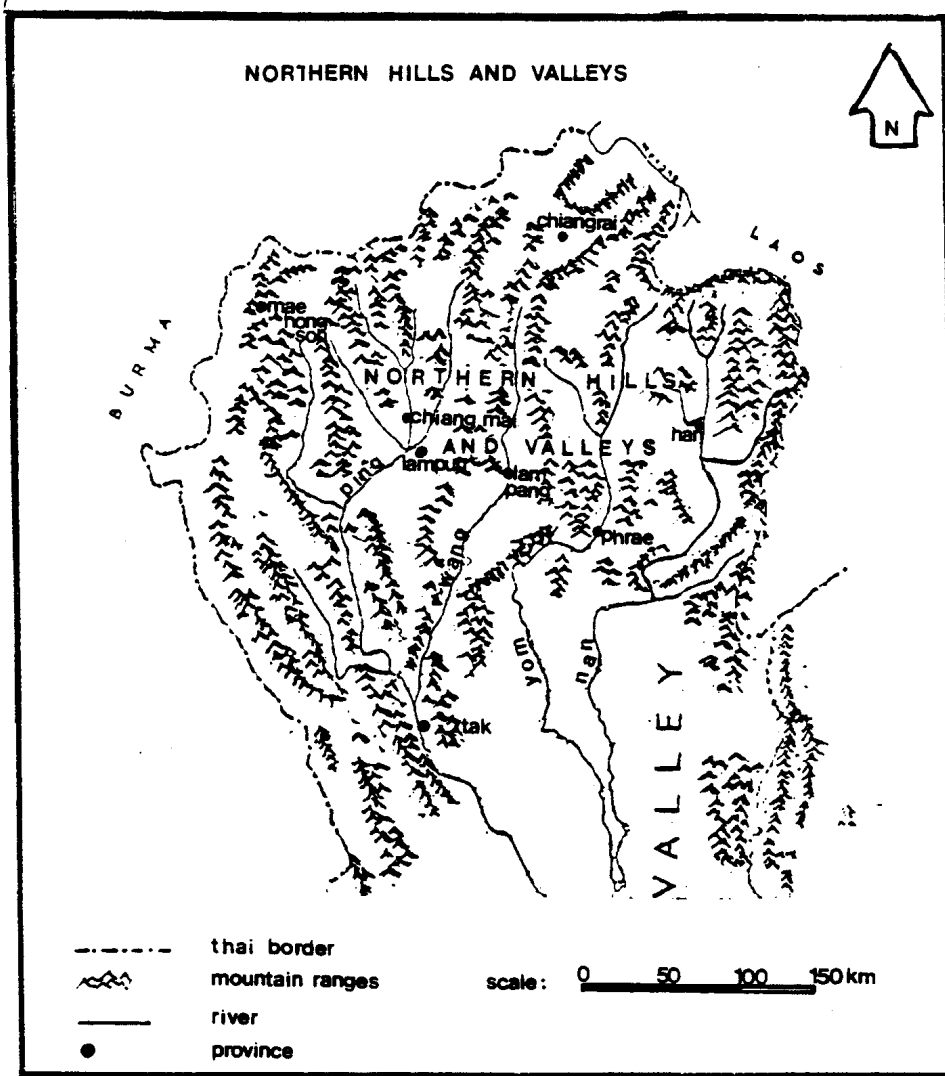


FIGURE 2.1

Source: Takeshi Motooka, Agricultural Development in Thailand
 (Kyoto: Center for Southeast Asia Studies, Kyoto
 University, 1971).

TABLE 2.1

POPULATION, NUMBER OF HOUSEHOLDS, AVERAGE SIZE OF HOUSEHOLDS, AND ANNUAL AVERAGE
PERCENTAGE INCREASE OF NORTHERN THAILAND, BY PROVINCE, 1980

Province (<u>Changwat</u>)	Population	Number of households	Average population per household	Annual average percentage increase of population*
1. CHIANG MAI	1,144,000	265,000	4.3	under 2.0
2. CHIANG RAI	892,000	188,000	4.7	under 2.0
3. MAE HONG SON	129,000	27,000	4.8	2.0 to 2.9
4. LAMPUN	330,000	75,000	4.4	under 2.0
5. LAMPANG	642,000	137,000	4.7	under 2.0
6. PHRAE	413,000	90,000	4.6	under 2.0
7. NAN	355,000	68,000	5.2	under 2.0
8. TAK	265,000	53,000	5.0	2.0 to 2.9
9. PAYAO**	411,000	86,000	4.8	under 2.0
TOTAL	4,581,000	989,000	4.7	

* The annual average percentage increase of population is classified into three categories: under 2.0, 2.0 to 2.9, and 3.0 and over.

** Payao which used to be a district within Chiang Rai Province, has recently been made a new province.

Source: The National Statistical Office, Preliminary Report 1980 Population and Housing (Thailand, 1980), pp. 6 and 13.

rivers, the Ping, Wang, Yom, and Nan.¹ In the old days, these major rivers made possible transportation and trade between the kingdoms of Lanna Thai and Sukothai. Today, the four major river basins of the Ping, Wang, Yom, and Nan are the main agricultural areas of the northern region of Thailand.

Northern Thailand has a tropical wet and dry climate, with three seasons. The rainy season begins around May and lasts until November. Because of the influence of the southwest monsoon, most of the rainfall (around 90.0 % of the annual total) falls during this season. This is followed by the winter or cold and dry season, from November until the end of February. During this season the northwest monsoon brings dry and cold air. The summer or hot, dry season lasts from March to April.² However, people generally mention only the wet and dry seasons (see Table 2.2).

As for the general climate, there is a distinction between the hill areas and valley areas in northern Thailand. The wettest months

¹Northern Thailand, or the northern region, is one of the four administrative regions. Officially, northern Thailand is defined as covering seventeen provinces in two sub-regions: the upland sub-region contains Chiang Mai, Chiang Rai, Lampang, Phrae, Nan, Mae Hong Son, Lampun, Tak, and Payao, the lowland sub-region covers Uttaradit, Kampong Pet, Nakorn Sawan, Pichit, Pitsanulok, Petchabun, Sukothai and Uthai Thani. In this study, I take northern Thailand as the region that covers nine provinces corresponding to the first sub-region.

²Scholten, "Physiographic, Climatic and Pedological Basis," p. 40.

TABLE 2.2

AVERAGE MONTHLY RAINFALL AND TEMPERATURE AT
CHIANG MAI PROVINCE

Season	Month	Chiang Mai	
		Mean rainfall mm.	Mean temperature* °C
<u>na laeng</u> (Dry season)	January	6.6	21.3
	February	11.7	23.1
	March	14.6	26.0
	April	48.7	28.6
	May	143.6	28.6
<u>na fon</u> (Rainy season)	June	146.2	28.0
	July	188.3	27.4
	August	230.8	27.0
	September	288.6	26.9
	October	125.9	26.2
<u>na laeng</u> (Dry season)	November	38.5	24.6
	December	10.0	21.8
Annual total		1,253.5	25.8
Total Jun-Nov		1,018.3	

* Mean temperature, 1937-1960.

Source: Tanabe, "Peasant Farming," p. 71.

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Source: Tanabe, "Peasant Farming," p. 71.

are August and September, with an average monthly rainfall of over 250 millimeters in the Chiang Mai Valley and perhaps twice that much in the hills. During this season maximum temperatures drop to around 30°C (86°F) in the valleys and 24°C (75°F) in the hills. As the rainy period draws to a close, the temperature declines further to the upper 20's °C in the valleys and lower than 20's °C in the hills. The temperature may drop to 15°C (59°F) at night. April and May are the hottest months, with daytime temperature of around 35°C (95°F) in the valleys and only a few degrees lower in the hills.¹

This combination of topography and climate gives northern Thailand two distinct ecological zones which, in turn, support two different socio-economic systems.²

Northern lowland people are wet-rice cultivators who have experience in efficiently controlling water and are able to carry out double and triple cropping. At higher elevations, people mainly engage in swidden agriculture. They are several hill ethnic groups that grow dry rice, some types of fruits, and opium. Recently, it is interesting to see that some of them have learned irrigated agriculture from people in the plain areas and have developed terraced rice fields in several areas of northern Thailand.

¹Walker, Farmer in the Hills, p. 3. See also Table 2.2 for the average monthly rainfall and temperature of Chiang Mai Province which is slightly different from that of Chiang Mai Valley.

²Ibid.

The diversity in the practice of swidden agriculture among hill people is relatively obvious; it has been observed that the groups settled at different altitudes practice different swidden agriculture. For instance, Karen, Lua, Thai Lue and Shan, who also cultivate a wet-rice crop, grow mostly dry rice and fruit, while the Hmong, Yao, Mhu and Akha grow dry rice for consumption and opium as a cash crop.¹

The plain areas covered with the river networks encourage communication and the exchange of ideas between communities. This creates a uniform pattern among the lowland people. But traveling through the hills is more difficult, and thus the hill people from different communities appear to be relatively more differentiated.²

Between hill and valley communities there has been interaction throughout history. People from both regions recognize each other and have been neighbors for centuries. Although some of the hill groups - Karen, Lua and Lue - have adopted some characteristics of lowland people and become more like northern Thai, there is a considerable distinction between the peoples of the hills and valleys. What we see in northern Thailand today is similar to what Burling earlier observed in Southeast Asia:

Each of the modern nations of Southeast Asia includes a nucleus of plains people who form, in each case, a relatively homogeneous and dense population. Each of these peoples speaks a single dominant language, and is characterized by adherence to one of the world's great religions and

¹Ibid, pp. 9-13.

²Burling, Hill Farms and Padi Fields.

subsistence based upon intensive "wet rice" agriculture. But each of the countries also includes a minority of hill people, who are always far more heterogeneous. They speak a multitude of languages, have had no political unity among themselves, and until the last century have never had more than tenuous political ties with the plains. The hill people usually practice shifting agriculture, and have been much slower to become Buddhists, Hindus, or Muslims than have their neighbors on the plains.¹

A traditional view either treats hill and valley peoples and their communities as being isolated or explains a single community while neglecting the linkages with neighboring communities and between the hills and the valleys. However, researchers in the last few decades have presented an interesting view of the interrelationships and similarities in socio-economic and cultural characteristics.² The hill and the lowland communities have never been isolated completely from each other. As Kunstadter states: "The lives of upland peoples are systematically linked with lowland peoples - culturally, economically, demographically, and ecologically as well as by formal administrative systems."³

¹Ibid, p. 4.

²See Leach, Political Systems of Highland Burma. See also David H. Marlowe, "Upland-Lowland Relationships: the Case of S'kaw Karen of Central Upland Western Chiang Mai"; and Peter Kunstadter, "Hill and Valley Populations in Northwestern Thailand," in Tribesmen and Peasants in North Thailand (Chiang Mai, Thailand: Tribal Research Center, 1969), pp. 53-85.

³Kunstadter, "Hill and Valley Populations," p. 70.

Valley Communities of Northern Thailand

The best agricultural soils of northern Thailand are found in the valleys. The intermountain deposition basins occurring along the courses of the rivers and their tributaries are the main sites of irrigated agriculture.¹ All valleys are extensively cultivated.

A checkerboard of fields covers most of the available low flat land.²

Wet-rice cultivation is a major agricultural activity; rice can be grown more than once a year in some areas, and tobacco, soybeans, peanuts, garlic, vegetables, onions and fruits are widely cultivated as dry-season crops in several lowland areas.

a) Agricultural Pattern

Good rice crops in northern Thailand depend greatly on irrigation systems as a supplement to rain in the wet season and as a main source during the dry season. The people of the valleys in northern Thailand have good knowledge and experience of a particular type of irrigation called locally muang fai, or a system of diversion ditches and canals. It is a local communal irrigation system that people work together to construct, operate and maintain. Along the four major rivers - the Ping, Wang, Yom and Nan - there are thousands of these irrigation systems constructed. Nearly 0.9 million rai of farm land is under these communal systems.

¹Kung, "A Review of River Basin," pp. 52-71.

²Walker, Farmers in the Hills, p. 1.

Moreover, the government has completed several development projects, both improving on existing systems and building new ones. Thus the capacity for multiple cropping has been increased, further boosting the region's agricultural productivity.

Generally, farmers grow glutinous rice as the wet-season crop for family consumption and non-glutinous rice and several cash crops during dry season. The diversity in soil, topography, rainfall and irrigation systems in the north of Thailand suggests that there exists a variation in cropping patterns and intensity. The Chiang Mai Valley is reported to be the most intensively cropped area in northern Thailand. The most common cropping pattern in the valley is two crops per year: a rice crop followed by an upland crop of a second rice; but in some areas three crops are grown: rice followed by two upland crops, or by an upland crop and another rice crop.¹ The first rice crop is sown approximately in mid-June and reaped in early November. After harvesting, the farmers spend time threshing, winnowing and transporting it to store in granaries; this usually occupies them until mid-December.² Generally, a short slack season arrives in January and then the second cropping begins.

Wet-rice agriculture under extensive irrigation can support relatively large human settlements in the valleys.³ Villages are

¹Gypmantasiri, An Interdisciplinary Perspective, p. 1.

²Walker, Farmers in the Hills, p. 4.

³Leach, Political System of Highland Burma.

relatively larger than in the hill areas and are more densely inhabited. For example, in the lowland communities of Chiang Mai Province, the population density of the urban areas is 5,618.23 persons per square kilometer and that of the rural areas is 43.45 persons per square kilometer.¹

b) The Lowland Settlements

Villages are usually located along roads and natural water courses. The villages are actually local social units where we see a cluster of houses of people, close kinsmen or neighbors, and they may not correspond to the official administrative village or mu ban as defined by the central government. The official or administrative village may include more than one natural village.²

The size of the village (defined as an official unit) varies from 48 to 328 households, with an average of 140 households in the area of Chiang Mai Valley. The average agricultural households contains 5.5 people.³ Typically, the houses are grouped together in a compact area. A few houses and the central granary of a large extended family make a compound. The farmers go to work in rice fields surrounding the village. In the old established villages, where the agricultural land has been extended to the upland areas, people build

¹Thailand, National Statistical Office (NSO), Statistical Report of Chiang Mai Province (Bangkok: Office of Prime Minister, 1976).

²Potter, Thai Peasant Social Structure, pp. 203-222.

³Gypmantasiri, An Interdisciplinary Perspective, p. 34.

semi-permanent houses to look after their fields. These may be converted later into permanent homes and a new village when the new fields seem too far from the village or when the population grows too dense in the first village.

Today, no village can be considered completely isolated, because the networks of the city and the central organization in Bangkok have been extended to reach them all. The roads and super-highways that carry people and products back and forth between rural areas and urban centers have been especially important. Many products from the villages of the north are sent to regional, national and international markets. Local markets that in the old days used to be places for exchanging local agricultural products and handicrafts have become local market centers where a variety of manufactured products from the city and local foods and materials can be found. Many villages have grown to be small towns within the last few decades.

Beginning in the early twentieth century, a transformation in the political and economic structure of northern Thailand took place, gradually at first and then rapidly over the last three decades.

Turton has pointed out that the backwardness of local transport facilities was the reason for the slow change in political and economic characteristics of the northern rural areas from 1910 to 1950. The villages did not become significantly involved in market production. The obvious change was at the political level, mainly at the district level rather than at the village level. The district officers were central Thai people who were appointed to work with all native village leaders. Since 1950 change has been rapid. The improvement of roads

has encouraged the flow of people and products between villages and cities. The population of the valley has reportedly doubled between 1950 to 1970. The establishment of rice mills, trucks for transport, markets, and local coinage have pushed economic change into the villages.¹

c) People of Northern Thailand

The valley communities of northern Thailand are widely known as the residences of local people called khonmuang, a separate ethnic group from the central Thai. Although the communities that used to be parts of the northern state of Chiang Mai have been integrated into central Thailand for more than 80 years, strong ethnic identity among them prevails until today. They designate the people of the central region as khonthai or Thai people, considered as something different from khonmuang.²

In general, the family is composed of husband, wife, and a number of unmarried children. The youngest daughter or son usually remains with the parents after marriage, while the others get married and move out to build their own residences (most of them build new houses near their parents' home and make a large family compound that very often shares the same granary). Traditionally, a compound serves

¹Turton, "Northern Thai Peasant Society," pp. 267-297.

²See Konrad Kingshill, Ku Daeng, The Red Tomb: A Village Study in Northern Thailand (2nd. ed.; Bangkok: Bangkok Christian College, 1965); Moerman, Agricultural Change and Peasant Choice; Gertrude Woodruff Marlowe, "Economic Variety in a North Thai Village,"

as a corporate group in labor exchange for all activities too.¹

d) Religion of Lowland Northern Thai

A visit to northern Thailand gives an impression of a remarkable number of Buddhist temples (wat). They appear all over the cities, and there is at least one temple for each small village. Clearly, the remarkable involvement of local people in temple activities and maintenance keeps the many temples functioning within these communities. The wat in a village of northern Thailand is a center of social, cultural, economic, and political activities - the merit-making activities, religious rituals, cultural performances, elections and meetings, school activities, etc. A majority of the lowland people are Buddhists, and generally in each local area people form a temple organization of laymen called satha wat to manage the temple activities. The members of this local group maintain a close relationship among each other and perform duties; this creates one of the most strongly united local groups of northern Thailand.²

Like almost all Southeast Asians, the northern Thai believe in a myriad of spirits.³ While people in the villages of the lowland areas are involved in merit-making at the Buddhist temple, they also

in Tribesmen and Peasants (Chiang Mai, Thailand: Tribal Research Center, 1969), pp. 15-25; and Potter, Thai Peasant Social Structure.

¹Turton, "Northern Thai Peasant Society," pp. 267-297.

²Potter, Thai Peasant Social Structure, p. 15.

³Walker, Farmers in the Hills, pp. 5-6.

make offerings of foods, liquor and flowers to the spirits in which they believe. Farmers whose cultivation depends mainly on nature may in particular seek to find some security through the supernatural and may perform ceremonies. Generally, they make offerings to several types of spirits, such as the spirit of the rice fields (phi thong, phi na), the spirit of the house (phi huen), the spirit of the weir (phi fai), and the spirit of forest (phi pa). Northern Thai people combine Buddhism and spiritist ideas and perform rituals for both.

In the region as a whole, Theravada Buddhism is one factor that serves to integrate the northern Thai peasantry into the life of the nation as a whole.¹

4) Important Local Groups

Several forms of local groups have been created to manage social, economic, religious and political activities, indicating that cooperation and exchange among people is a pattern of northern Thai life. As is widely recognized, there are groups of neighbors (muban sa-ai), groups of laymen (mu satha), groups of kinsmen (mu phinong), and groups of water users (mu muang fai). Economically, the villagers organize at different levels. Turton classifies these into three production units: the household for tasks requiring restricted cooperation; the village-community for exchanging labor in tasks requiring extended cooperation; and the supra-village production

¹Ibid.

community for the crucial tasks of maintaining dams and irrigation systems.¹

Hill Communities of Northern Thailand

In the hills there are small narrow valleys and slopes at different elevations that can be used for swidden cultivation of dry rice and some other crops like corn, cotton, tapioca and opium. There are several ethnic groups living scattered in the hills, from the foothills at an altitude of 330 meters to the high altitude over 1,200 meters. A Lua community in the southern upland areas of Chiang Mai Province is a case in this study.

The estimation made by the Department of Public Welfare indicates the population of the hill areas is between 300,000 and 500,000 persons.² Hinton states that a population of the hill areas is increasing and if present trend continue, the possibility of over population cannot be ruled out.³ Kunstadter makes an estimation of the population density in the upland communities of Karen and Lua in Mae Sariang District of Mae Hong Son Province which works out to

¹Turton, "Northern Thai Peasant Society," p. 274.

²Suwan Ruenyot, "Development and Welfare for the Hill Tribes in Thailand," in Tribesmen and Peasants in Northern Thailand (Chiang Mai, Thailand: Tribal Research Center, 1969), p. 12.

³Peter Hinton, "Introduction," in Tribesmen and Peasants in Northern Thailand (Chiang Mai, Thailand: Tribal Research Center, 1969), p. 11.

between eighteen and nineteen rai of cultivated land per person.¹

Agricultural Pattern

Hmong, Yao, Lahu and Lisu, who live above elevations of 600 meters, do not have irrigated fields. None of them presently cultivate rice, but they do grow dry rice, maize and opium.² In contrast, Karen and Lua, who settle permanent communities at lower elevations, grow dry rice in the forest fields and wet rice in irrigated fields. However, the proportion between swidden and wet-rice cultivation varies from place to place. Some of the Karen and Lua cultivate wet rice as their major crop and upland rice as a supplementary crop. Others do swidden as their primary cultivation and wet rice as secondary cultivation. In the Mae Sariang District of Mae Hong Son Province there are lowland communities of Karen and Lua people who do primarily irrigated agriculture.³ At present the Karen and Lua, who adopted irrigated agriculture from lowland communities at the beginning of twentieth century, now develop their irrigated fields in the narrow valleys and slopes and extend their fields gradually each year.⁴

¹Kunstadter, "Subsistence Agricultural Economics," pp. 47-56.

²E. C. Chapman, "Shifting Cultivation and Economic Development in the Lowlands of North Thailand," in Shifting Cultivation and Economic Development in North Thailand (Bangkok: Land Development Department, 1970), pp. 226-250.

³It is reported that most of these ethnic groups live and cultivate at the highest elevation of about 1,200 meters where the poppy grows best. See Walker, Farmers in the Hills, p. 7.

⁴It is reported that some of the Lua communities began irrigated
Contd.

To limit the scope of the present study, the discussion in this section will emphasize only the Lua and Karen, who follow irrigated agriculture in the hill areas of northern Thailand.

b) The Upland Settlements

The villages of the Lua are always scattered among Karen villages in the hills as well as in the valleys. Actually, in the valley areas of southwestern Chiang Mai, there are a large number of Karen settlements, but only a few Lua settlements. Most Lua villages lie in the hills.¹ The villages of the upland people range in size from four or five households up to perhaps two hundred households.² Compared to those of other ethnic hill groups, Lua and Karen villages are permanent; since they remain in the same places longer, they grow larger. Very often the first founding of a new village occurs when the original village grows to its full extent; the new one splits from the old one.

In most areas, rice is subsistence cultivation for both Lua and Karen. However, some of the Karen and Lua have surplus rice to sell in the markets. Moreover, these people may bring some forest products and garden products, such as cotton and pepper, to sell in lowland markets also.

agriculture at the end of the nineteenth century. These Lua of Boh Luang adopted irrigated wet-rice cultivation since 1880. See Kunstadter, "Subsistence Agricultural Economics," p. 79.

¹Kunstadter, "Hill and Valley Populations," p. 69.

²Ibid.

c) Local Organization

In general the upland population of Thailand has not been politically organized or unified above the level of the village.¹ The villages of the Lua and Karen are generally led by a headman, whose administration is guided by a group of elders (mu khon tao is the term used in one of the Lua descents in Ban Pae Luang - author). Among the upland communities, we find that each village is generally independent, but the village is linked to the lowland authorities. However, it is reported that sometimes a number of villages of either the same or different ethnic groups are linked into a wider political association under a particularly influential local headman who may also receive recognition from the lowland authorities.²

Many of the Lua villages had a formal written document or the inscribed silver plate granted by the king of Chiang Mai to legalize the status of the Lua people and their claim to cultivated land in the hills. Some Lua villages received status as khaa thaat wat, or the slaves of Buddhist temples. While Lua people were granted an exemption from all kinds of mobilization, the Lua had to pay land rent, maintain the temple, support the monks, and send tribute to the Chiang Mai king. These people were not permitted to abandon the temple or

¹Ibid.

²Walker, Farmers in the Hills, p. 11.

to desert the community.¹ At the local level, each village was rather an autonomous unit, led by the Lua headman under the advice of the elders and the head monk. The Lua headman had full authority to manage all internal affairs of the village. Above the village level, disputes between villages had to be managed by the central administration.²

Today, all upland communities, theoretically, are integrated into the provincial administration linked to the central government in Bangkok.

d) Religion of Northern Upland People

Upland people believe in spirits and perform rituals annually to many kinds of spirit. Today, however, more and more upland people are adopting the dress, language, religion and agricultural practices of the lowland people and have become indistinguishable among the northern Thai.³ Some of them are now Buddhists and follow the same religious practices as other northern Thai. Many of them make an annual visit to the major Buddhist temple in the lowland community, such as Wat Prathat Chomthong, to participate in the New Year

¹A translation of the silver plate inscription granted to the Lua at Ban Boh Luang has been made by Kraissri Nimmanahaeminda in "An Inscribed Silver-Plate Grant to the Lawa of Boh Luang," Journal of Siam Society: Felicitation Volumes of Southeast Asian Studies, 2 (1965): 233-238. In addition of this, the author obtained a published translation of a similar inscription granting legal status to the Lua at Ban Pae Luang from the abbot of the local Buddhist temple while the author was working in this area. The translation was made at Wat Pak Nam, a temple in Bangkok, and was published in 1977.

²Kunstadter, "Hill and Valley Populations," p. 72.

³Hinton, "Introduction" to Tribesmen and Peasants, p. 3.

ceremony in April.¹ Moreover, some of these people have converted to Christianity following the arrival of missionaries from Chiang Mai City.

Summary of Ecological Zones

Obviously, the contrast and the interdependence that exist between the two ecological zones explain the differences and similarities in social, cultural, economic and political characteristics of northern Thailand. Hill and valley communities have co-existed for hundreds of years; each community recognizes that it is in some ways related to the other. It is noticeable that there is considerable overlapping, with some people of the hill areas practicing irrigated agriculture, following Buddhist doctrine, and speaking the northern Thai language, while some lowland people carry out swidden agriculture.

The people of hills and valleys share natural resources, particularly the rivers and forests. Doubtless the most important link is water, as a steady flow from upland rivers and streams is vital to the lowlands, especially for irrigated farming.² With the trend toward irrigated agriculture and the establishment of irrigation systems along streams and rivers upstream, the interrelationship in the use of water becomes more obvious. In this present study of the community irrigation organization, I attempt to give a complete picture of the organizational pattern of irrigation management in northern

¹The author met hill people from several communities during the New Year ceremony at Wat Prathat Chomthong in 1980.

²Walker, Farmers in the Hills, p. 15.

Thailand and will deal with both the upland irrigation system of Na Pae and the lowland irrigation system of Muang Mai.

Central and Peripheral Zones

Thai administration is organized hierarchically; from the central government located in Bangkok there are linkages to the province (changwat), the district (amphoe), the sub-district (tambon) and even the smallest unit, the village (muban). Therefore, it is said that all lowland villages and, in theory at least, all hill villages as well are linked in a chain of administrative authority to the nation's capital.¹ Northern Thailand is composed of nine provinces, each province with its administrative body led by the government-appointed governor. All affairs of the province, such as agriculture, education, health, and finance, are directed through the ministries in Bangkok and have their province officials sent from Bangkok to work together under the leadership of the governor. On the one hand, the officials of each province actually follow the central policies of their ministries and report directly to Bangkok. On the other hand, all the representatives of these ministries have to work under the direction of the governor and collaborate with the policies and plans of the province. Clearly, the Thai administrative structure represents a highly centralized control system.

Chiang Mai City was founded as the capital city of an independent northern Thai state named 'Lanna Thai' in 1258. At one

¹Ibid.

period in its history, the state came under the control of the Burmese for 200 years, from around 1556 to 1763. The northern state, led by Chiang Mai, reestablished its independence with assistance from the central Thai, and maintained it for a hundred years before it was integrated into the Central Thai Kingdom in the year 1874. Roughly speaking, the history of the northern Thai state had four periods in its administrative and political structure: the first period as an independent Lanna Thai, ruled by the Chiang Mai King and northern Thai officials (1258-1556); the second period of Burmese domination (1556-1763); the third period of control by the Chiang Mai princes (1774-1874); and finally the period of centralization under the Bangkok government (from 1874).

Before the formation of Lanna Thai and the founding of the capital city of Chiang Mai late in the thirteenth century, it is believed that the valley peoples formed many small independent states or chieftaincies.¹ When the Lanna Thai became more powerful and dominated the central plain area of the Ping River Basin, the kingdom's power extended over other small states and communities. Through the four periods of the northern Thai kingdom, the administration clearly defined the state territory into two different zones: the central and the peripheral zones.

As we can see from its early history, the political control of the northern Thai state was of two types: direct control of the communities of the central zone in which the involvement of the central

¹Burling, Hill Farms and Padi Fields, p. 94.

authorities in this area was relatively more obvious, and indirect control over the remote areas on the peripheral zone, exercised through a tribute system. The local rulers of the remote towns or villages ruled their peoples and managed local affairs independently. However, the rulers collected and sent the tributes to the Chiang Mai authorities annually.¹

Similarly, during the period of the Chiang Mai Kingdom, between 1774 to 1874, the central government control over the people in communities of the central zone was different from that over the people of the remote areas. The free peasant (phrai)² residing in the villages near the political center had labor obligations, while the peasants of the remote villages called phrai suai, made contributions of agricultural and forest products.

This pattern of administrative linkage to local communities persists today. Under the political control of the Bangkok government, the provincial administration puts heavy emphasis on the city

¹See Holt S. Hallett, A Thousand Miles on an Elephant in the Shan States (Edinburgh: William Blackwood and Sons, 1890); Kunstadter, "The Future of Upland Tribal People," "Irrigation and Social Structure," and "Subsistence Agricultural, Economics"; and Ramsey, "The Development of a Bureaucratic Polity."

²Andrew Turton states that "The society is divided into a number of what may be called social estates: the royal princes; the hereditary aristocracy (cao); minor nobility and officials (nai); the monks; the free peasants (phrai), who could be subdivided according to the nature of their obligations; and the category of 'slaves' which comprised a variety of forms of personal dependence: debt clients and hereditary bondmen (thaat), and subject non-Thai peoples (khaa). After the centralization of Bangkok, the abolishment of slaves (thaat), and of phrai status came in the early twentieth century, and the system of

Contd.

(amphoe muang) in each province as the center of political control, where implementation of local programs and projects is carried out according to the policies emanating from Bangkok. The governor has a limited degree of independence in making decisions on local affairs, because he has to report to and consult with Bangkok, and he receives orders from Bangkok on several matters. Moreover, the provincial officials, who are appointed from each ministry, work with the governor's office but mainly according to directives from their Bangkok offices. The provincial offices are the organs of the central administration.¹

Due to the backwardness of transportation and communication in the peripheral zone, the government's involvement, services, and development activities in most communities of this zone have been relatively limited in the past. The role of the central administration in local affairs in this zone has not been as active as in the central zone or in the communities near the city center, though all local communities are formally connected to the central government.

cash taxes was introduced. See more in Turton, "Northern Thai Peasant Society," p. 272.

¹This is the reason why the government bureaucracy and local administration have been criticized by many scholars and researchers. The excessive power of the central body, overlapping duties of provincial officials, the appointment system for the governor and other officials, and other bureaucratic procedures lead to confusion and inefficiency in the administration of local affairs.

Today, the central government's involvement in local affairs in the peripheral zone is still less active, while in the central zone it is active and direct.

The development of roads and communication in northern Thailand has been more intensive since 1950 and has led to some changes in the role of the government in local communities. Many valley communities in the districts of Chomthong, Hod, Mae Chaem, Fang, Phrao, and Samoeng have received more attention from the government than they had in the past.¹ However, most of the hill communities are still on the periphery of government attention, though some of them, particularly the larger communities, have received more attention from the government in recent decades.²

Summary

The role of the central government in local areas of northern Thailand has always been more direct in the central than in the

¹There was a political reason for the central government to become involved in development, services, and other local affairs in many remote areas. Because the Communist Party has increased its activities in the peripheral zone, the central government needs to strengthen its link with remote communities. Besides other local services, the government has become active in agriculture and irrigation development in many communities.

²The development projects in many large hill communities have been expedited partly because of the problems of Communist infiltration among hill ethnic groups, of opium cultivation, and of the destruction of forest and watershed areas, which has almost reached the point of crisis. The government has developed new roads to get access to many hill communities. For instance, the large settlement of Hmong at Doi Kun Klang in the Chomthong area is connected to the district center and Chiang Mai City by Inthanon Road.

peripheral zone. Today even the more remote valley communities of northern Thailand may be said to be in the central zone because of recent development in transportation and communications. Although the hill communities are still in the peripheral zone, it is important to point out that there exists an overlapping between these zones. Some valley communities can be considered remote areas of the peripheral zone, and some hill communities can be considered communities of the central zone.

In the discussion on local irrigation communities of northern Thailand and their relation to their sociopolitical environment or external agencies, the concepts of the central and peripheral zones will be applied where appropriate to the analysis of this research. The center has been expanding over time - thus although both the Muang Mai and Na Pae systems were originally in the peripheral regions, the Muang Mai system is now in the orbit of the center.

CHAPTER III

AGRICULTURE AND IRRIGATION SYSTEMS OF NORTHERN THAILAND

Predominance of Rice Agriculture and Community Irrigation Systems

Today, northern Thai villages engage in several types of economic activities. Five major types are agricultural production, home industry, trading, service, and manual labor. The agricultural work generally includes a variety of types of cultivation and animal raising: paddy, cash crop and dry-rice farming; vegetable gardening; fruit orchards; and poultry and cattle raising. As for home industry, northern Thailand is widely known for its pottery, wood carving, silk and cotton weaving, and many other household products which are exported from the region to national and international markets. A number of villages specialize in particular products, and there the villagers engage in home industry work extensively. Usually in a village we find there are also a number of people who buy and sell agricultural and manufacturing products in the village market and small shops, and some of the traders engage in larger, extra-village businesses.

The villagers also work at various services. Each village has a number of people to serve all villagers in several ways, such as the village head, the herb doctor, the teacher, the ritual specialist,

and the irrigation leader. These service people earn income or awards either directly from the villagers or from the government agencies. For the last type of work, manual labor, in northern Thai villages one will find both wage labor and labor exchange among villagers. When the farmers intensify their cropping activities there is a heavy demand for labor in each household, sometimes more than the household can supply. Then farmers may have to utilize both the traditional labor exchange system and the new hired labor system in order to complete their work during the peak season.¹ Moreover, some of the villagers who live near the urban centers may go to work in industries and services as wage laborers.

It is very important to understand the complexity of these economic activities but also the dominant role of agricultural activities in the villages of northern Thailand. In the hill areas, people are mainly subsistence agriculturalists who engage in both wet rice and swidden crops but grow rice as the primary swidden crop.² Although the economic activities of the hill people include vegetable and fruit growing, trade, animal raising, and wage labor, rice agriculture is

¹This discussion of the economic activities in northern Thai villages is mainly based on the work of Gertrude Woodruff Marlowe, who usefull illustrates a variety of work. Marlowe also points out a misconception among researchers which gives a traditional view of villagers as all paddy farmers; it is necessary to recognize the complexity in the economic basis of the villages. See Marlowe, "Economic Variety."

²Kunstadter, "Subsistence Agricultural Economics," pp. 47-142.

clearly the predominant activity.¹ Recently Kung has observed and confirmed in his research that rice is the main crop in northern Thailand.²

Multiple Cropping and Irrigation Development

The characteristics of the area's topography, soil and rainfall indicate that there is a need for supplementary irrigation to make possible a high yield of rice in the wet season and to support a second crop and other upland crops in the dry season.³ Northern Thai farmers exhibit their indigenous knowledge and skill in a diversion type of irrigation, muang fai irrigation, which has been developed locally for several hundred years. With the construction of the government irrigation systems, irrigated agriculture has become predominant throughout the north of Thailand today.

Although data on multiple cropping for northern Thailand are not available at present, the best estimate is that between 20 and 30 percent of the land in crops is under multiple cropping.⁴ The most common practice is the cultivation of two crops per year. The

¹Kunstadter, "Hill and Valley Population," p. 74.

²Peter Kung, "A Review of Irrigation Cropping," in ADC Report on Irrigated Agriculture in Northern Thailand (Bangkok, Thailand: Agricultural Development Council, 1974), pp. 103-116.

³Kung, "A Review of River Basins."

⁴Alan R. Thodey, "Introduction," in ADC Report on Irrigated Agriculture in Northern Thailand (Bangkok, Thailand: Agricultural Development Council, 1974), p. xv.

expansion of multiple cropping in this region has been supported by the existing maung fai systems as well as by the new government schemes. The Chiang Mai Valley is the most intensively cropped area of northern Thailand,¹ and practice of the multiple cropping is closely related to water supply. The findings from the survey of the Multiple Cropping Project of Chiang Mai University indicate that single cropping is usually practiced in rainfed areas and the areas served by small muang fai systems and the government systems. Double cropping is mainly practiced within the command areas of the government systems. Triple cropping is in the service areas of the large muang fai systems. The Chiang Mai research team concluded that the farmers feel security about their water supply when they have a high degree of control over the irrigation system.²

More recently it has been reported that more than two thousand muang fai systems are presently operating in Chiang Mai Valley, the main rice producing area of northern Thailand.³ These irrigation systems cover an area of over 600,000 rai,⁴ whereas the four completed

¹Gypmantasiri, An Interdisciplinary Perspective, p. 1.

²Ibid, p. 15.

³Ibid.

⁴Peter Kung indicates that in 1980 these systems covered an area of 603,041 rai. See Kung "A Review of Irrigation Systems," p. 55.

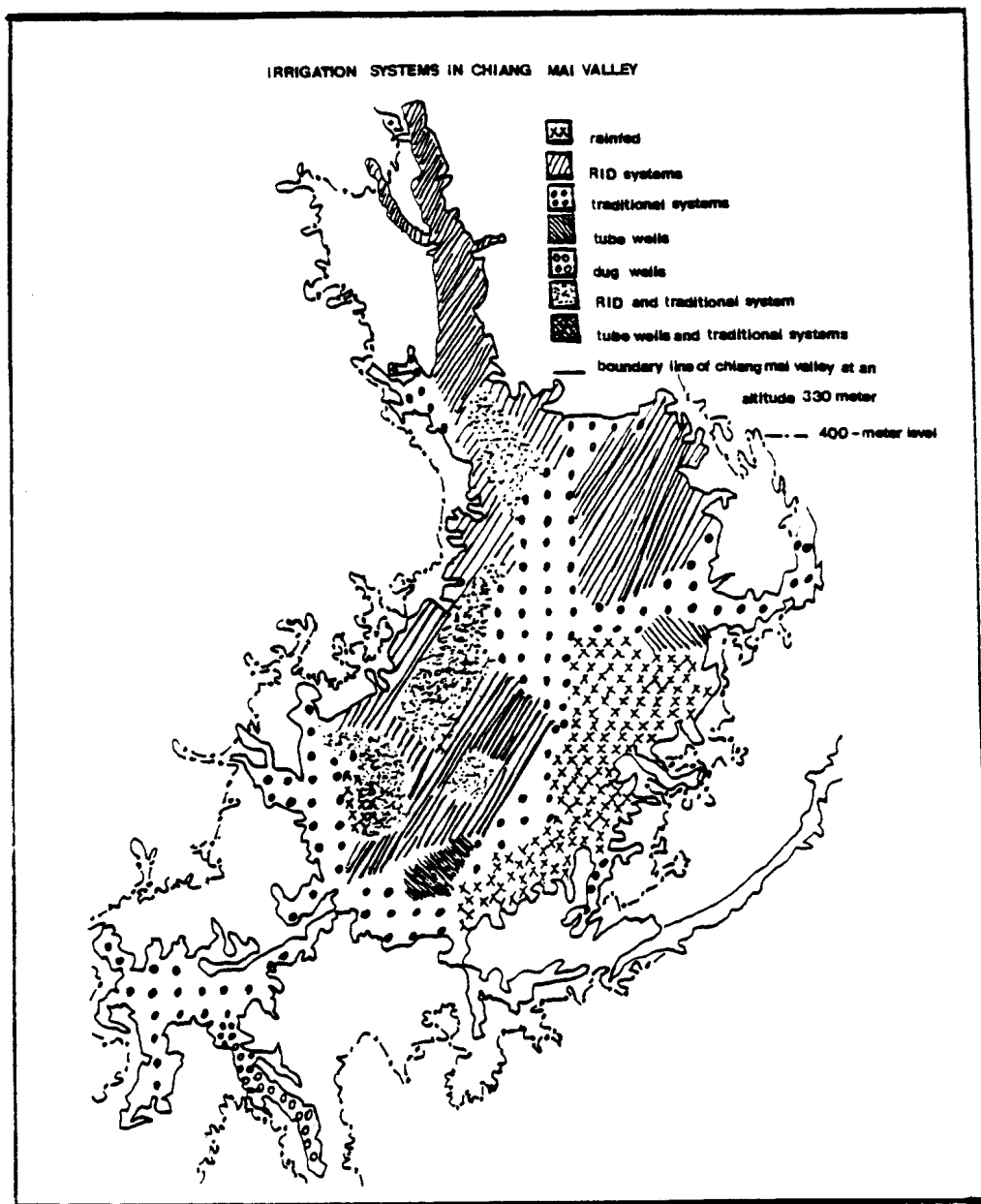


FIGURE 3.1

Source: Phrek Gypmantasiri et al., An Interdisciplinary Perspective of Cropping Systems in the Chiang Mai Valley: Key Questions for Research (Chiang Mai: Multiple Cropping Project, 1980), p. 16.

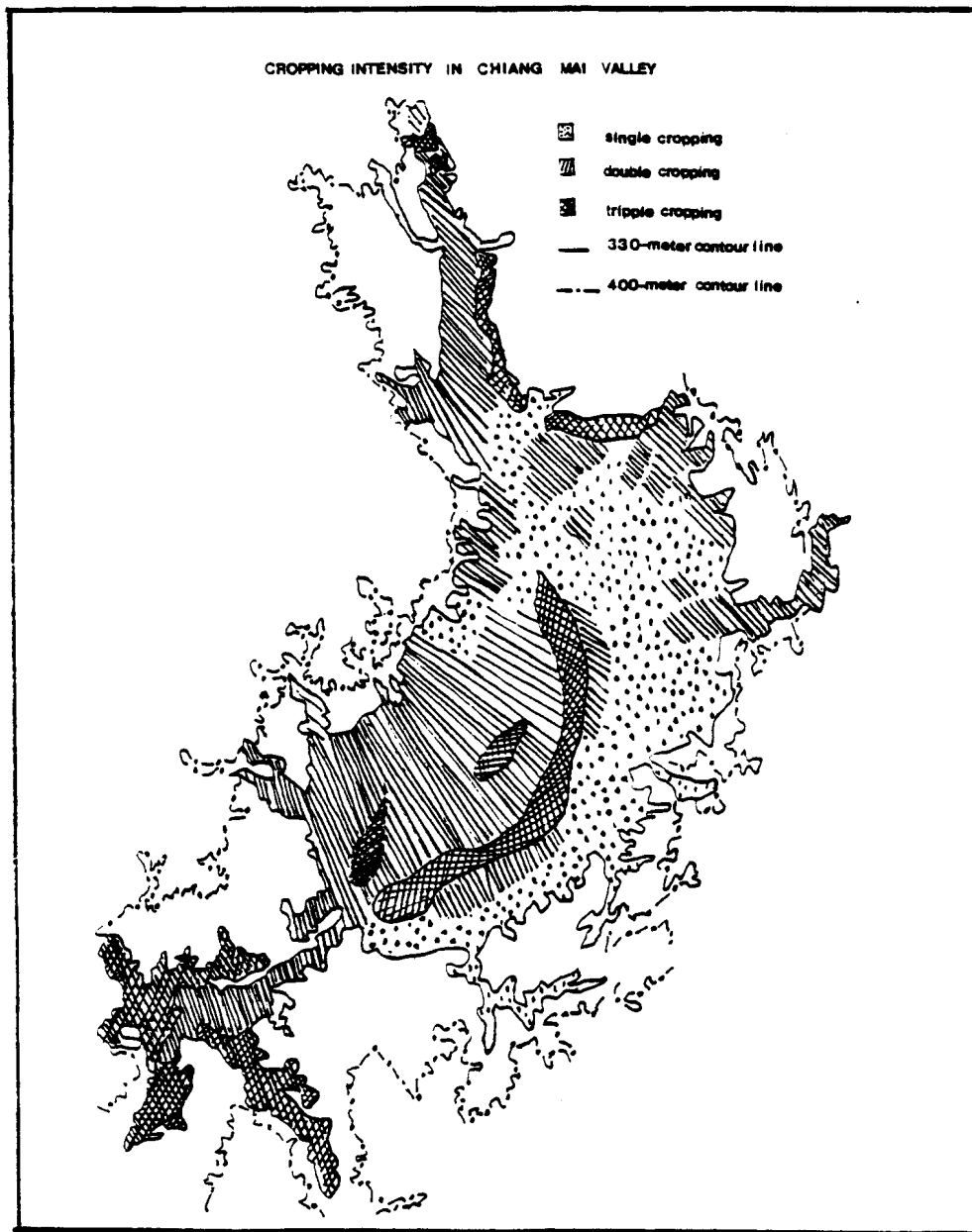


FIGURE 3.2

Source: Phrek Gypmantasiri et al., An Interdisciplinary Perspective of Cropping Systems in the Chiang Mai Valley: Key Questions for Research (Chiang Mai: Multiple Cropping Project, 1980), p. 22.

government irrigation systems serve a smaller area about 325,000 rai.¹ These statistics clearly point out the major role of the community irrigation systems in the region and their predominance in the largest cultivation area of northern Thailand, the Chiang Mai Valley.

The Community Irrigation System

The muang fai irrigation system is constructed and managed communally by a local group of water users. Before the first national irrigation scheme, Mae Faek on the Mae Ping River, was built, community irrigation supported all the irrigated land of northern Thailand.

The muang fai irrigation system is a traditional technology consisting of a diversion dam and a canal which is constructed of local materials such as bamboo, stones, and logs. Typically, the weir (fai) is of the submersible type and serves to raise the water level and slow down the flow in the river so that the water is conveyed into a main canal to the fields. With this technique, the river flow is allowed to continue so as to benefit the downstream area. The system is operated without a head regulator to control water at the intake, and therefore the whole volume of water flows into the main canal. However, excessive water is usually drained back into the river by simply opening the canal bank at the point near the intake.

The temporary structure of the weir, because it is constructed of bamboo and logs, means that it is likely to demand a large amount of seasonal labor and urgent maintenance. The larger the size of the

¹Gypmantaisri, An Interdisciplinary Perspective, p. 20.

weir, the more maintenance and material it needs. The shortage of local resources like bamboo and logs has become more obvious since regulations concerning the state-owned forest reserve land were passed around 1950. However, the government has provided some kinds of assistance to many local areas for the development of the existing traditional systems. The weirs of some muang fai systems are presently built of concrete or are reinforced at the foundation with permanent materials. In this way the muang fai system has gradually integrated new technology and materials.

The change in either the whole structure or a part of the structure may lead to adjustments in the pattern of relationships among the water users.¹ The change is probably more rapid when a government modern irrigation system has been established to cover the area of several existing muang fai systems. This by a direct approach introduces a new technological, social, and institutional arrangement to the local communities. The government irrigation organization, working under the Royal Irrigation Department (RID), is established to manage the irrigation activities required, from the system level to the level of small working units in the fields.

¹Clark Neher has presented some changes occurring within the irrigated areas served by the government system in a district which covers several existing traditional irrigation systems. New appointed leaders have come to take the place of muang fai leaders. However, some of the water users continue to maintain a relationship with the traditional leaders, following their supervision and paying them rewards and fines, while others of the water users have chosen the new government-appointed authority. See Clark Neher, "Development in Rural Thailand," University of California, Los Angeles, 1969 (mimeographed).

The muang fai irrigation technology has been transferred from lowland communities to the upland communities of the Lua and Karen ethnic groups. It has been pointed out by Kunstadter that the adoption process in the hill communities began in the present century, with the Lua the first group to learn this technology from the lowland people, later passing it on to their neighbors the Karen.¹ Together with the technique of constructing the weir and canal, the Lua have adopted wet rice cultivation, the irrigation organization, and also the muang fai rules and rituals. Lua cultivators begins developing irrigated fields in small upland valleys and terracing fields on the slopes and expand the fields every years as long as suitable land is available.

Usually the Lua use the basic muang fai technique of raising the water level in the stream or river by a weir and diverting this water into a canal. They too use available local materials such as stones, bamboo, and logs. The weir in the hill area tend to be small, the largest one in the hills of Mae Sariang area in the province of Mae Hong Son is around 15 to 20 meters wide and one meter high. Also, the weir is temporary and is damaged by the occasional torrents which follow the heavy rains.²

A Lua irrigation group has a small number of members and is a cooperative group for constructing and repairing the weir and cleaning the canals. One member of the group is the irrigation leader, who

¹Kunstadter, "Subsistence Agricultural Economics," p. 80.

²Ibid.

organizes the activities, including the ritual. The members are the field owners of the irrigated area and they have to share the work. The Lua water users perform a ritual to the weir spirit following the traditional muang fai ritual of the lowland people.

The topography of the hill areas allows the development of irrigated fields in small narrow valleys and slopes which are scattered. Each irrigated area is composed of four or five fields which belong to a small group. Generally, we find small weirs along one stream; each weir and canal leading to small irrigated fields is a single system which operates independently.

Lua and Karen are close neighbors in both their residences and their fields. The Lua were permanent settlers in the hill areas before the Karen. The Lua people used to have a legal position approved by the Chiang Mai king to collect land tax and tributes from the Karen. Karen want to work in the former cultivated land of Lua have to pay rent. The traditional relationship between the Lua and the Karen changed when the national cash tax system of the central Thai government took the place of the old land tax and rent system.

The national government does not guarantee rights to the swidden land in the hills. The Lua and Karen people are in the same position: they have the right to do swidden farming for their living but not the right to own the land. This legal situation has led the hill ethnic groups to bring in irrigation systems and develop irrigated fields which can be owned, mortgaged and sold. The Lua and Karen compete in expanding their irrigated fields as well as their swidden fields.

However, the matter of water rights and allocation between the systems is managed on the basis of two principles -- the owner of the first dam to be built should have priority, and the people upstream should have priority over those downstream.¹

The overall picture of irrigation in northern Thailand is that diversion irrigation systems are predominant in supporting agriculture in the valley areas. The traditional maung fai technology has contributed greatly to food production for consumption within the region and outside the region as well.

¹Ibid.

CHAPTER IV

THE LOWLAND COMMUNITY IRRIGATION SYSTEM OF THE MUANG MAI:

ORGANIZATION AND ADAPTATION

Fai Muang Mai is one of three irrigation systems located on the Mae Klang River in the southern part of Chiang Mai Province. The Mae Klang is an important river in the southwestern valley of Chiang Mai that drains into the Mae Ping River, the main artery of the whole Chiang Mai Valley. The Mae Klang River has its source on Doi Kun Klang¹ at an altitude above 1,500 meters. From this river and the tributaries it is estimated that approximately 25,000 rai (4,000 hectares) are irrigated. Most of this irrigated land is in the lowland zone, as is Fai Muang Mai, but there is small amount of land irrigated in the upland zone as well. Officially called Chomthong, this area is an administrative district comprising a population of 74,907 persons.² Chomthong also refers to a part of the district or a town located in the middle of the southwestern valley of Chiang Mai. The town is

¹"Doi" means a peak in northern Thai language. The Western range running along the Thai-Burmese border consists of many rugged peaks that rise above 1,500 meters. The highest one is "Doi Inthanon" at 2,576 meters.

²Office of Chomthong District, 1981.

surrounded by mountain ranges and paddies, with the Mae Klang River to the west and the Mae Ping River to the east. A recent report of the Multiple Cropping Project of Chiang Mai University notes that the plain between these two rivers is a remarkable pocket of intensive agriculture supported by traditional muang fai irrigation.¹

The map of Chomthong might suggest that the Mae Ping River should supply a substantial amount of water to the region, but only a small part of the cultivated land can actually obtain water from it, and then only for few months of the year. Because of the high banks of the river, canal irrigation cannot be used, and other means of obtaining water from the Mae Ping River must be found. Today, during the dry season, farmers use electric pumps replacing the old bamboo water-wheels of earlier days. Farmers of the Mae Klang Basin however can use various ways to obtain water for cultivation, including deep wells, water pumps, and diversion weirs in the Mae Klang River.

The three irrigation systems that use water from the Mae Klang River are the Fai Muang Luang, the Fai Muang Mai and the Fai Mokala, all now serving areas of approximately the same size: 5,000 rai to 8,000 rai. The paddy land of 32 villages (muban) is irrigated from these sources. Each system was independently constructed and each is managed by a group of farmers who cultivate within the boundaries of the individual system. Water users from all three system, however, consider themselves to be from the same ethnic and cultural background,

¹Gypmantasiri, An Interdisciplinary Perspective, pp. 16, 17, 22, 178 and 179.

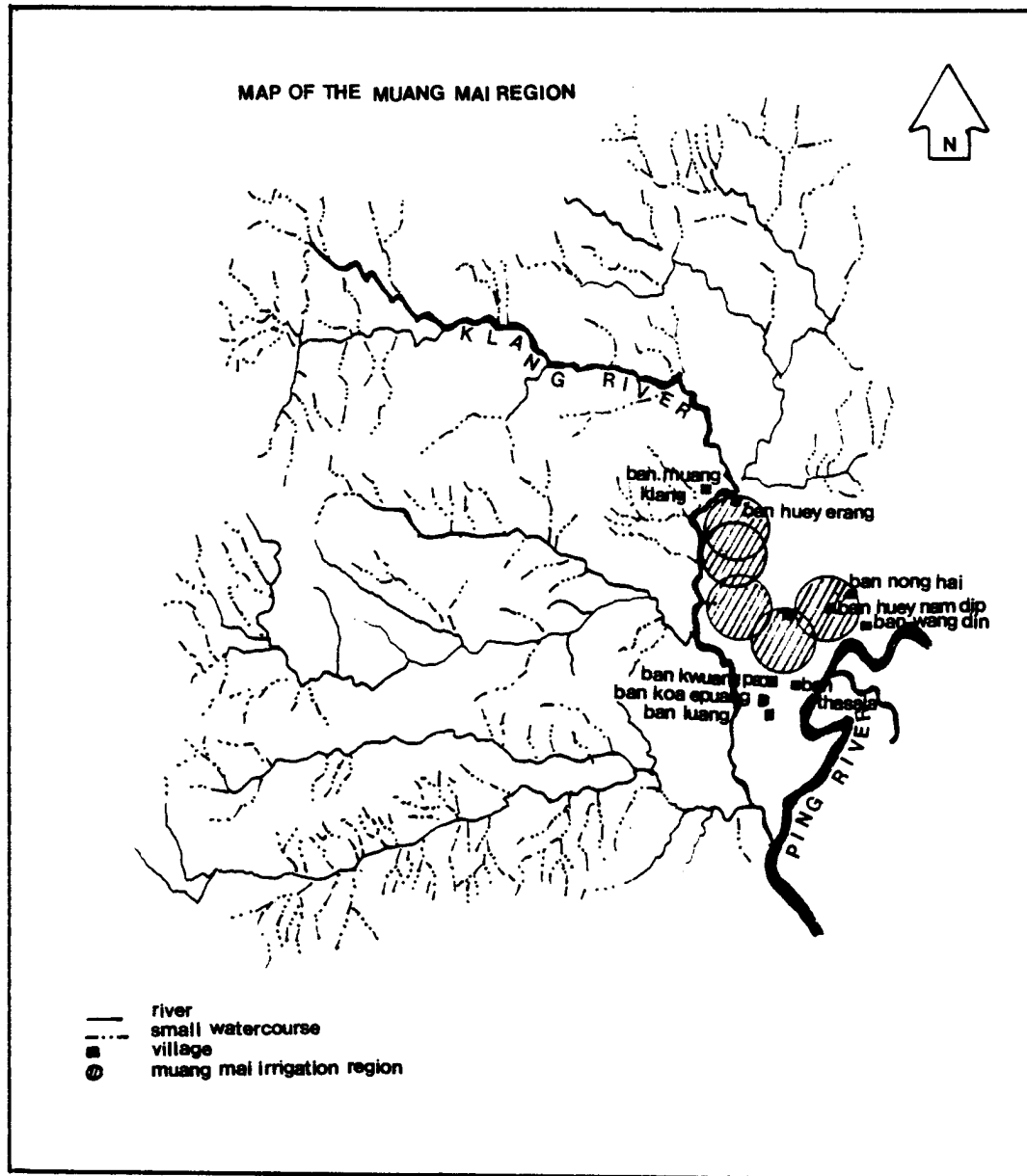


FIGURE 4.1

closely related at a particular point on their ancestral tree. They call themselves Mu Chomthong¹ to indicate their local identity.

Since they all depend on the same source of water, they are brought together by the irrigation tasks that exceed the capacity of any single group, such as allocation of water, canal maintenance and dealing with natural hazards.² They therefore act collectively when necessary. Occasionally - in time of drought, for example - when cooperation among all three groups becomes necessary, all irrigation leaders come together to discuss the problem. Frequently they voluntarily share water between the systems according to what they have agreed upon in the meeting, and it is this that enables them to survive during

¹The feeling and the expression of ethnic and community loyalties are evident in the studies of many scholars like Gehan Wijeyewardene, Michael Moerman, and Jack M. Potter, who believe that the northern Thai ethnic identity is obvious and has been continually maintained until today. Potter says: "The villagers have not forgotten their separate ethnic identity (central Thai and northern Thai; author), established during six centuries of independent existence as a nation. The villagers still speak 'Kammyan,' Northern Thai, which is intelligible, but with difficulty, to a Central Thai speakers. And still, when then say 'Khonthaj' ('a Thai'), they are referring to Central Thai and not to themselves, whom they identify as 'Khonmyan,' 'people of northern Thailand' and, more specifically, people of the Chiang Mai City-state." Jack M. Potter, Thai Peasant Social Structure, p. 31.

²From a conversation with Poh Luang Ta, the irrigation head (huana) of the Fai Muang Mai system, who explained how the leaders of the three systems work together. In addition, in January 1981 the author had a chance to observe a meeting of leaders of the three groups who had gathered to decide on the share of water for each system.

The Royal Irrigation Department (RID) began the construction of the main weir at Muang Mai in 1981 and suggested that all water in the Mae Klang River be diverted into the main canal of Muang Mai. Thus, all three irrigation groups had to agree on a new system of sharing. This project is discussed in more detail later.

the bad years. It has also occurred many times that when conditions have led to disagreement between members of the upstream system and the downstream system, they have generally resolved the problems through a meeting. The natural hardships, the recurrent floods and droughts, as well as ethnic and community ties, unite farmers in taking risks. They share benefits in plentiful years and face difficult times together. There is no doubt that the local people have found appropriate methods for survival within this environment.

These muang fai systems have received assistance from the government. About ten years ago the provincial office assisted Fai Muang Luang and the Fai Mokala. In December 1980 the government approved the funds for a reconstruction project in the Muang Mai system. When the Royal Irrigation Department (RID) started the construction of the main weir at Fai Muang Mai, the leaders of the three systems had to work together closely to allocated water for the main canals of each of their systems, and they met more often.

Although in the case of the three systems on the Mae Klang River there is no formal group constituted as a permanent body to coordinated affairs with each other, and their group leaders reach a consensus about ordinary maintenance as well as in emergencies.¹

¹Henry T. Lewis, in his study of irrigation societies in the Philippines, described a federation uniting several irrigation communities to manage an entire river system. See his "Irrigation Societies in the Northern Philippines," in Irrigation and Agricultural Development in Asia, ed. E. Walter Coward, Jr., (Ithaca, N. Y.: Cornell University Press, 1980), pp. 153-171. For more about the administration of this federation see Robert Y. Siy, Jr., Community Resource Management: Lessons from the Zanjera, (Quezon City, Philippines: University of the Philippines Press, 1982).

An Early Type of Community Irrigation Organization

Fai means weir, and muang means canal. Thus muang fai or fai muang refers to a traditional system of irrigation widely used in the valley communities of the rugged mountain region of mainland Southeast Asia at the junction of the borders of five countries, Thailand, China, Laos, Burma and Vietnam. In referring to a specific installation, people usually add a place name at the end, so that Muang Mai refers to the irrigation system of Fai Muang Mai.

Muang Mai, the most upstream irrigation system of the Mae Klang River, irrigates both riceland and orchards. Altogether about five thousand rai (800 hectares) obtain water from the main weir, distributed through a network of canals. The weir is 60 meters in width, 40 meters in length, and 5.5 meters in height. The canal follows the curve of the foothills and irrigates the terraced fields on the slopes before descending to the bottom of the valley.

The organization of the Muang Mai system and its persistence ✓ for nearly a century, including adaptation to large changes at the beginning of the new centralized administration in 1900 and the period of rapid change in agriculture and marketing around 1950, is obviously a sign of its success. Wet-rice cultivation requires great collective effort and a significant amount of resources. As Beardsley et al. states:

Paddy culture is self-perpetuating in yet another way.
The amount of labor and capital put into the creation of

paddy land provides a continuing incentive to maintain the system.¹

It is hard enough to carry out rain-fed agriculture in the valley, but with the addition of irrigation tasks it becomes even harder. It is interesting to understand the arrangements and procedures of this muang fai organization which have brought success to the efforts of the irrigation group, creating social and cultural bonds among farmers in this local region.

The muang fai is a well-maintained system and an administration entity under effective leadership which receives continuing commitment from its members. As will be discussed in the following sections, muang fai systems appear to be important instruments of adaptation, as Cohen has defined that process:

A population's adaptation is its relationship to its habitat. The concept of adaptation is historical: when we say a population is adapting we mean that it is altering its relationship to its habitat in order to make that habitat a more fit place in which to live, or to make itself more fit to live in that milieu . . .

Thus, when we say that a human group is adapted to its habitat, we mean that it has achieved, and maintains, a viable relationship with its habitat.²

¹Richard K. Beardsley, John W. Hall and Robert E. Ward, "Japanese Irrigation Cooperatives," in Irrigation and Agricultural Development in Asia, ed. E. Walter Coward, Jr., (Ithaca, N. Y.: Cornell University Press, 1980), p. 131.

²Cohen, "Introduction," to Man in Adaptation, p. 3.

Changing Local Pattern of Administration

At the turn of the twentieth century, the relationship between the central Thai government of Bangkok and the northern tributary states,¹ including Chiang Mai, changed toward a new system of tight control under a centralized administration. The government in Bangkok strengthened its power to mobilize resources from the northern states, began the work of reforming the local administration of the provinces, bringing Chiang Mai under control, and established the new structure of local administration at the district and sub-district level.²

The process of administrative reform took about thirty years, from the year 1874, when the central Thai government sent the first Commissioner to Chiang Mai, to the year 1907, when the central Thai government gained complete control over the northern tributary states and established the provincial administration. These changes also affected the rural communities of Chiang Mai in both central and peripheral areas. The changing pattern of administration at the local level had interesting implication for the farmers' leadership in the irrigation organizations, as will be discussed below.

The reformation of the local administration, though perhaps not to be considered an advantage to the local communities in many ways, did provide the circumstances that encouraged adaptation, in Cohen's sense.

¹Chiang Mai, Mae Hong Son, Chiang Rai, Lampun, Lampang, Phrae, and Nan.

²The central Thai government first used the system of thesapiban in 1900, later replaced by the provincial administration or kanpokkrong
Contd.

First, the reformation of the local administrative structure was considered a threat by the wealthy local leaders who secured their income from taxes levied against the farmers. A new group of leaders representing the central government of Bangkok came with full authority to manage local affairs, including the collection of taxes. This pushed the indigenous leaders to seek new sources of wealth, and many of them chose to develop new agricultural communities and to extend their rice fields, resulting in the establishment of new irrigation systems in several regions of the Chiang Mai Valley.¹ This was exactly the process that occurred in Muang Mai. Here in approximately 1880 the local phaya took the initiative in organizing farmers to build the muang fai system. He also became the first irrigation headman of Muang Mai.

Secondly, the emerging local administration at the district (amphoe) and the sub-district (tambon) levels did not include the administration of local irrigation, although other local services were integrated. Moreover, the phaya was appointed as a local agent

guan changwat in 1907. See Ramsey, "The Development of a Bureaucratic Polity," and Prayoonsathien, "The Administrative Reform."

¹Calavan has presented an example from a village of Chiang Mai where a prince named Cao Mahawong founded a community and developed cultivated land and an irrigation system at the turn of the twentieth century. Calavan considers the development of the rice-growing areas evidence of the rice strategy used by the local prince. Similarly, in Chomthong a local native leader sought control of manpower and a new source of wealth by developing the Muang Mai irrigation system and agricultural land. See Calavan, "Princes and Commoners," pp. 73-89.

(assistant nai kwaeng) of the central government and therefore became less involved in the management of Muang Mai. This change in the role of the phaya and the lack of involvement by the new government administration created the need for structural change in the leadership of Muang Mai. The change that occurred was toward development of farmer leaders and increasing participation of water users at the level of planning and decision making.¹

Thirdly, the establishment of the government administrative bodies, such as the district office, introduced indigenous leaders to formal mechanisms for dealing with the situation of local areas not as internal and isolated problems but as issues related to the entire region and even the nation as a whole.

This administrative reform had a significant influence on the establishment and expansion of the Muang Mai irrigation system. To assure the central government's capacity to manage local affairs and mobilize resources from local communities, a new pattern of local administration developed along with a new tax collection system. The new policy of tax collection was intended to introduce a less oppressive system in order to replace the existing one.² Thus it represented a threat to the native leaders, including the leaders in the rural areas, and pushed them to choose between two alternatives: either to rebel against the new system and the presence of Bangkok

¹See Ramsey, "The Development of a Bureaucratic Polity," pp. 276-298.

²Ibid, pp. 106-114.

Thai officials or to seek a new source of revenue, a new basis of wealth and power. One rural leader chose to mount a rebellion known as phaya Pab's Rebellion," in 1889 and 1890.¹

In some areas such as Chomthong, the local leader (phaya) attempted an alternative by leading a group of peasants to develop new agricultural land and to build an irrigation system. The control and ownership on land came to be as important as controlling labor resources; this motivated local leaders to expand irrigated areas and to clear more forest land and bring it under cultivation.

The administrative structure at the district level was responsible for education, health, trade, land, and taxes but did not directly control irrigation. The administration of the irrigation affairs of local communities continued to be under the local irrigation organization until late 1950. When the central government began extensive development activities in agriculture around 1950, the irrigation administration in several local areas was transferred to the central administration under the Royal Irrigation Department (e.g., the Mae Tang Project). An important exception was Chomthong District in the southwest region of Chiang Mai valley; here full control of the irrigation systems remains a local responsibilities.²

¹Ibid.

²Chomthong was a small community, geographically isolated by the mountain chain of the western range; its natural resources had relatively less significance for the central administration than those of the great plains of Mae Tang, Mae Rim, Sanpatong and Sarapi, or even the rich forest region at Chiang Dao and Fang. The royal visits to

Before the administrative reform, in the peripheral regions such as Chomthong a local leader, the phaya,¹ managed affairs with a high

Chomthong recorded in the document of the major temple, Wat Prathat Chomthong, indicate that many ruling kings of Chiang Mai paid visits to Chomthong, but the purpose was clearly religious, a merit-making activity of the king. The evidence of royal visits signifies little as far as the degree of political control over the region is concerned, and in addition these visits were infrequent. One of my informants, Mae Luang, aged 89 years old, recalled a visit of the last king of Chiang Mai as the only event of her lifetime. I am inclined to believe that before the twentieth century Chomthong was probably under but light control from the central administration. Local communities enjoyed their independence to a great degree. Only a small tribute, which later became a fixed share of revenue from land and production, was sent to the city. That is, I believe Chomthong was a peripheral area of the Chiang Mai State. For further detail of royal visits see P. Pariya, Taman Prathat Chomthong (or The Legend of Chomthong Temple), (Chiang Mai, Thailand: Chomthong Temple, 1946).

¹A phaya was a rural leader of the Chiang Mai State (1774-1874) equivalent to the present kamnan or in some areas puyaiban. He had full authority in a particular territory comprising one or more villages and lived on revenue from land and forest products. The position was hereditary; however, the holder of this position had to be officially approved by the king. Annually, a share of revenue collected from the rural communities was sent to the king. The phaya controlled and made decisions in many matters. Chomthong people refer to the phaya as a powerful ruler whose orders had to be followed, whose decision had to be respected by the villagers. Some have misunderstood the phaya to have been a figure of unlimited power, but in fact there were limits to his power. The phaya had to compromise on the basis of mutual benefits. He may have taken a greater share of the benefits, but as long as he needed wealth and manpower he was obliged to show his fairness toward the peasants, as in land distribution. Clearly, local leaders could not afford to have serious conflict within communities, since that resulted in a reduction in population and available corvee labor, since the peasants might decide to leave and join other communities. Although in Ramsey's study the discussion is about princes (chao), the strategy applied by the chao to maintain their power and that of the phaya are somewhat parallel. As Ramsey states, "A chao who made excessive demands on a peasant faced the possibility of losing him to another patron. . . . If abuses became too frequent . . . he could simply pack up his few belongings and move to another area of the North, or even into neighboring country. These factors acted as restraints on the chaos who could not afford mass desertions of

Contd.

degree of independence. The phaya had a number of appointed assistants responsible for various duties such as keeping records, collecting taxes, sending messages, and managing land distribution and water distribution.¹ When the reformation began in 1900, the central government appointed an official called nai kwaeng, who was assigned to coordinate with the phaya in the local areas. Another change in local administration occurred in 1907; the position of nai amphoe (head of the district) and kamnan (head of the sub-district) replaced that of the phaya.

The opportunity to avoid direct interference from the central government allowed local irrigation groups to develop independently, step by step, on the basis of the social relationship of mutual and collective benefit into a more elaborate form of administration. At this particular time in the history of the Muang Mai, an adaptation to new leadership by farmers and the increased involvement of irrigation group members became necessary. As Moore states: "Small-scale changes may be an essential component of persistence on a larger scale."²

peasants." See Ramsey, "The Development of a Bureaucratic Polity," pp. 47-48.

The information on traditional local leadership was obtained during the interviews of several old villagers of Chomthong. A part of the information was from R. Langart, History of Thai Law (Bangkok, Thailand: Thammasat University, 1940), pp. 8-12; and Ramsey, *Ibid*.

¹Former kamnan Pun Srichomthong, a grandson of the last phaya, was one of the informants who provided information on administration.

²Wilbert E. Moore, Order and Change: Essays in Comparative Sociology (New York: John Wiley & Sons, 1967), p. 3.

The adaptations occurred in four ways: a separation of irrigation administration from the formal local administrative structure, the establishment of farmer leadership, grass-roots participation, and a system of democratic voting.

Moreover, the office of the district government or amphoe has given local leaders the opportunity to learn new techniques of management and work styles. More complex procedures in planning, decision-making, meeting, record-keeping, and other activities have been gradually applied to the work in irrigation. The very existence of Muang Mai today is the result of making an appropriate adaptation in some components and carefully maintaining others.

Development of the Irrigation System and Land Distribution

As mentioned previously, changing political control of the northern Thai state and the establishment of a new tax system were the factors which encouraged the local leaders (phaya) to search for new sources of revenue. In the Chomthong area, the local leaders hastened the development of wet-rice fields and irrigation systems. At the end of the nineteenth century, a local phaya named Noi led a group of peasants to construct the upstream weir of the Mae Klang River and a network of canals; later this irrigation system is called Muang Mai. ✓

The canal system was constructed little by little, year by year; digging the whole system of canals took about ten years of continuing cooperation and group effort. Each year the group attempted to go as far as possible and then took a recess to grow rice, with the work

See pages 91-92

resuming again in the dry season. After each portion of the canal was finished, the irrigated fields were shared out (see discussion below). Today, the older generation often tell their children with pride how they worked to bring water to the fields and successfully dug through a rocky hill by hand, using simple tools. The process of canal work and land distribution was repeated again and again, until the whole canal system was completed. The main canal is twenty-two kilometers ✓ long and presently is divided into two sections: the head section (muang tang kao) and the tail section (muang tang pai). The development of each section was carried out with different arrangements.

Developing the Head Section

The construction of the muang tang kao, or the head section, was done between 1870 and 1880, when a group of villagers under the leadership of phaya Noi constructed a weir at Muang Mai and the main canal.¹ They worked continually for years to complete the first section of the canal of approximately twelve kilometers. Each year they were able to finish about two to four kilometers of the main canal and its secondary network within the area, though in some years less was completed. Traditionally, every year the total of the new land for irrigation was divided among those peasants building the canal system.

¹It was the last quarter of the nineteenth century, the period of many important recorded events: the appointment of a Thai Commissioner, the establishment of the new tax system and of the British teak industry, the rebellion of phaya Pab. See Ramsey, "The Development of a Bureaucratic Polity."

The local leader and his assistants had the right to a larger share; the rest was usually distributed equally among peasants.¹

In explaining the pattern of sharing the newly irrigated land, informants frequently refer to a traditional principle captured in the aphorisms di prong bodi prong and kao prong pai prong. These refer to the assignment of land so that each individual receives some plots that are considered good (i.e., di or at the head, kao) and some plots which are less desirable (bodi or at the tail, pai). This clearly suggests that the rules represented a means of attempting to promote fairness in the distributing of land, especially regarding access to water.²

In reality, the leaders did not precisely measure the land and did not allocate exactly equal shares to the peasants because there was a variety of land in different physical positions and terrain; the leader therefore simply assigned plots of which he had roughly calculated the size and quality. Because the work proceeded over several

¹The evidence on this land distribution practice is found in four French historical documents quoted by R. Langart in the book History of Thai Law (Bangkok, Thailand: Thammasat University, 1940); Socialisme dans les Hua Phan by A. Bourlet; Etude de la langue tai by E. Diguët; Le Than Hoa by Ch. Robequain; and Ethnographie du Tankin Septentrional by E. Lunet de la Jonquiere. A customary law among ethnic groups in Southeast Asia indicates that in the past local leaders had full power in the distribution, they could choose a better and larger size plot for themselves and their assistants, and decide on the share for their followers.

²A former kamnan, Poh Noi, or Pun Srichomthong, who is now 71 years old, indicates that the ratio between the share of the leader and the share of a peasant was 2:1 in the case of Muang Mai.

years, and distribution was made many times,¹ the peasants received ✓ plots which lay in different locations and also allowed the principles of the sayings to be enacted. Clearly, this influenced the pattern of land-holding throughout the entire head section of the irrigation system. Muang Mai benefited from the customary rule of land distribution as well as from the development of the water system during the early period of its establishment. Peasants who owned land in several fields of the head section probably had similar access to the water supply, which further encourages equity among members. In all irrigation systems, equity is a major goal, though only a few systems really succeed in attaining it.²

It is interesting that the physical arrangement of the head section of Muang Mai was out in great detail by the farmers from the earliest stages of construction. The canal was completed before there were any claims on the land. This may have positively influenced the formation of cooperative irrigation groups. In the Muang Mai unlike many other irrigation systems the same group of peasants own land at

¹Former kamnan Pun Srichomthong mentioned three sections of canal digging, and he also made it clear that each peasant owned land in several areas due to the long period of canal construction required. The leader, phaya Noi, was a grandfather of kamnan Pun, and this information comes from family history. Kamnan Pun also accumulated his knowledge during the period he held the office.

²For a discussion on "Equity" see Arthur Maass and Raynold L. Anderson, . . . And the Desert Shall Rejoice: Conflict, Growth, and Justice in Arid Environments (Cambridge: M.I.T. Press, 1978).

both the head and the tail portion of this section.¹

Developing the Tail Section

The population of the villages in the Mae Klang Basin grew rapidly during 1910 to 1920; the population growth was caused by natural increase as well as migration. The flow of population from neighboring villages began when the district office was relocated at Chomthong. This population pressure led to an attempt to extend the main canal to create the present tail section.²

The work on the tail section, or muang tang pai, about ten kilometers in length, was around 1930. It was constructed under a contract between a number of villagers, mostly members of Fai

¹The population data were not recorded in any official record before 1910. The statistics of 1910-1911 show 1,216,817 persons in the Payab Region, including Chiang Mai, Chiang Rai, Mae Hong Son, and Lampun. Data for Chomthong District, only are unobtainable. In interviews, old villagers referred to a small community of 30 to 40 houses. The population grew rapidly after the district office moved in. Moreover, the road from Chiang Mai City to Hod District, which was completed in 1936, brought a change in the population of the Chomthong area. From 1950 to 1960 this area experienced rapid growth again when the road from Chiang Mai City to Hod District was developed for all-season use. The settlements expanded into several villages making a town, growing in all directions, but mostly to the north where people could find water. Detail on the construction of roads in northern Thailand is given in the report of the British Department of Overseas Trade, Economic Condition of Siam in 1937.

²See E. R. Leach, Pul Eliya: A Village in Ceylon (Cambridge: The University Press, 1961); and E. Walter Coward, Jr., "Principles of Social Organization in an Indigenous Irrigation System," Human Organization 38:1 (1979): 267-298.

Muang Mai, with a Chinese contractor from Chiang Mai City.¹ In contrast to the first development, most of the tail-section land had already been occupied, although not officially registered. However, the majority of claimants were peasants from the villages of the Muang Mai area; a few were new migrants from neighboring villages along the Mae Klang River.² The development represented an investment by the Chinese contractor, who expected a large expanse of irrigated fields, from 50 to 150 rai, as a reward. The farmers say that one reason for this expansion was the recurrent problem of floods and the damage caused by the sediment along the main canal, which, being only about one meter wide, was too small. Another reason was the need to irrigate newly opened fields and bring them under cultivation. By extending the main canal as well as widening it, they were able to bring more than two thousand additional rai into cultivation.

The distribution of land in the tail section was not according ✓
to the traditional practice used previously by the phaya, but most of the beneficiaries of the tail section were peasants with land in the

¹The contract for canal development made during this period is now preserved by former kamnan Pun Srichomthong of Ban Luang. Additional information comes from older members of Muang Mai.

²Many new settlements occurred during 1930 to 1940, such as, Ban Mai San Toeng, Ban Huey Nam Dip, and Ban Lao Sue Rong. They were composed of peasant families who migrated from the flooded areas. Today the population of Ban Mai and Ban Huey Nam Dip comprise a large proportion of landless farmers who work in some years as tenants but become wage laborers in others.

head section. However, in recent decades land selling and renting especially in the tail section, has become more common.¹ Those who own several plots prefer either to sell or to rent the fields they own in the tail section, so there has been a gradually increasing portion of new members in the tail area.

Muang Mai Irrigation: Engineering Structure

The Muang Mai irrigation system is of the traditional muang fai ✓ type, which controls the water by diverting it from the river into the canal and then allowing the water to flow continually downward from high to low paddy fields. Generally, a muang fai system is comprised of a weir across the stream or river to raise the level of the water to a height sufficient for diversion into the irrigation canals. From these canals, water is further diverted through small ditches into the fields, using secondary diversion weirs constructed across the canals.²

The Muang Mai system provides water for year-round agriculture ✓ to an area of 5,000 rai, covering rice fields in ten villages (muban or ban), including Ban Huey Erang, Ban Muang Klang, Ban Nong Hai, Ban Huey

¹There is no quantitative data supporting this trend. This information was received from the irrigation head, who often mentioned that many of the farmers working in the fields near Ban Mai, in the tail section, were mu samachick mai, or new members.

²Kung, "A Review of River Basins," pp. 52-71.

Nam Dip, Ban Thasala, Ban Kwuang Pao, Ban Koa Epuang, Ban Wang Din, and Ban San Toeng (see Figure 4.1). Members of Fai Muang Mai are predominantly from these villages; they have formed themselves into an irrigation group locally known as "Mu Muang Mai," and they collectively manage the system.

The irrigation structure of Fai Muang Mai itself actually consists of three types of engineering devices: a main controlling structure at the headwork, the main distribution structure, and a secondary distribution network structure which covers the irrigated area for single farm turnout.

Headwork Strucutre

The main controlling structure includes a weir (fai) and a head regulator (pratu nam or pratu pak muang) which controls water at the headwork. Traditionally, the muang fai scheme does not include the regulator, but only a single weir crossing the river at the headwork site. The whole volume of water is diverted through the main canal without a gate to control the water at the intake, with the result that problems of damage and flood occur frequently. The Royal Irrigation Department (RID) has made some improvement by constructing a permanent head regulator. In order to present the operating structure of Muang Mai, a deatiled discussion will follow.

A fai or weir is a major engineering structure designed to raise the water level in the river and to divert the water into the main canal. Traditionally, a fai is constructed with logs and bamboo stakes which are firmly held together. A strip of logs is arranged across the

river as a skeleton for the whole weir body, and then bamboo stakes are driven into the bed of the river on an angle between the logs in two directions to provide a strong woven structure. Additional layers of logs and bamboo stakes are then added. The upper layers are anchored tightly to the lower ones.

When it was first built, probably about 100,000 bamboo stakes and several hundred logs were used to complete the original Muang Mai weir. However, it is estimated that at each annual repair at the beginning of the growing season, farmers use approximately 40,000 to 50,000 stakes and logs.¹ Frequently the flow in the Mae Klang River cause severe damage to the foundation of the weir, a painful experience for irrigation group members. Several times, attempts have been made to replace some parts of the weir with concrete structures, whenever local or government resources are available. However, recently the repaired sections have lasted only a short period. When the Muang Mai organization received provincial government assistance in the form of supplies, they were able to build a concrete foundation for the weir at the downstream site and to construct concrete shoulders on both sides of the river bank.² This is a technical problem because the weir has

¹The estimation is made from the account of the actual material use of Muang Mai kept by irrigation leaders. Although the total record is in some respects incomplete, it is remarkably well done. The leaders (huana) help to work out the estimation.

²Assistance from the provincial of Chiang Mai was given in year 1961, 1967, 1970, 1972, 1974 and 1976. These funds enabled the Muang Mai system to renovate some parts of the structure.

raised as the year have passed. The traditional method of repairing leaves some parts of the structure of the preceding year in the bed of river as new stakes are added on the top each year. The accumulation of sediment on the upstream side of the weir is also of great concern to the Muang Mai organization. The maintenance of the weir requires a considerable amount of resources, including labor, money, materials and technical knowledge.

The main weir is sometimes called fai lak or fai pak muang which means the weir at the headwork site. This is generally considered by local people to be the most important engineering structure, since it performs a major function in irrigation as well as playing a role in annual rituals. Nearby there are a small pavilion or sala pak muang and a spirit house or hoh phi fai, which members always mention as the center of Muang Mai activities, such as meetings, and the site for collecting contributions. The phi fai ritual related closely to the weir is that of the spirit that protects the weir, the canal, and the entire system from all bad conditions and damage. The spirits of the weir, called phi fai, belong to the former irrigation leaders residing in this house after their death. The annual ritual has been continually performed since the establishment of the irrigation system. Still today it draws a large number of members and substantial funds.¹

¹In January 1981 the ritual was again performed. It is believed to have been a special one, because the members expected great changes at the headwork site: the weir structure was to be torn down and the RID was to construct a new concrete weir. At the headwork approximately 250 members, local leaders, and irrigation committees of the neighboring systems came to participate. The cash contribution amounted to 8,000 baht (US.\$380.00).

The pratu nam or pratu pak muang means a concrete regulator, which is controlled by using a steering wheel to adjust the gate. It controls the water level at the intake to the main canal in order to meet the water requirements in each period and to avoid excessive flow. When the RID made a survey of traditional irrigation systems in Chiang Mai in 1962, it recommended that several muang fai system needed permanent regulators to control floods and damage along their main canal.¹ During the rainy season, irrigation leaders check and adjust it more frequently; they usually leave it open during dry season.

It is obvious that the technical problems and physical conditions at the headwork are not as simple as have been suggested. Floods and damage, however, have continually occurred in the fields near the headwork at Ban Huey Erang, even after the construction. Today the regulator is not use, because the current at the intake of the main canal is beyond the control of the gate. This represents a return to the old system, and the regulator is left unused. Muang Mai organization members refer to this as one of the critical technical issues that lie beyond the local capacity for a solution.

Main Distribution Structure

The distributory works of Muang Mai are composed of a main canal (muang), secondary canals (muang soi or muang sai kai), check gates (fai noi), turnouts (toh nam or tae nam), a distribution network (tae nam and wai), and drainage (lai sia nam sia sai).

¹Information obtained from the RID regional office in Chiang Mai.

The muang, or the main canal, is dug through the valley to convey water to both rice fields and orchards. The main canal is usually built at a high elevation, following approximately the 250-350 meter contour line. Consequently, one sees a long continuous line along the curve of the foothills from the Mae Klang River which drains into the Mae Ping River. It is twenty-two kilometers long and from two to six meters wide. Usually, a main canal is called locally muang lak. The main canal is further divided into muang soi and muang noi (secondary or tertiary canals). The entire canal system of Muang Mai consists of one main canal and twenty-one secondary canals.¹ The length of these secondary ranges from 500 to 1,500 meters. Because the farmers commonly run the water from one field to the next, instead of having all the individual farms irrigated directly from the feeder canal.

The structure of the canal (muang), therefore, may easily lead to problems of disputes and conflicts between the head and the tail of the system, particularly during the period of water shortage in the dry season. Together with traditional water rights that exist in most of the community irrigation systems, including Muang Mai, the farmers who own the fields next to the canal can obtain as much as they need before passing the water on to the next farm.

¹These are named as follows: Muang Noi Huey Sak I, Muang Noi Huey Sak II, Muang Noi Tong Huana Gaen, Muang Noi Tongkong Wak, Muang Kew Pukaew, Muang Tong Amok I, Muang Tong Amok II, Muang Ghae Toy I, Muang Ghae Toy II, Muang Ghae Toy III, Muang Huey Pak Wan I, Muang Huey Pak Wan II, Muang Noi Tong Sanklang I, Muang Noi Tong Sanklang II, Muang Tae Makok, Muang Loh, Muang San Pa Puey, Muang Maka, Muang Tong Fa, and Muang Tong Papai.

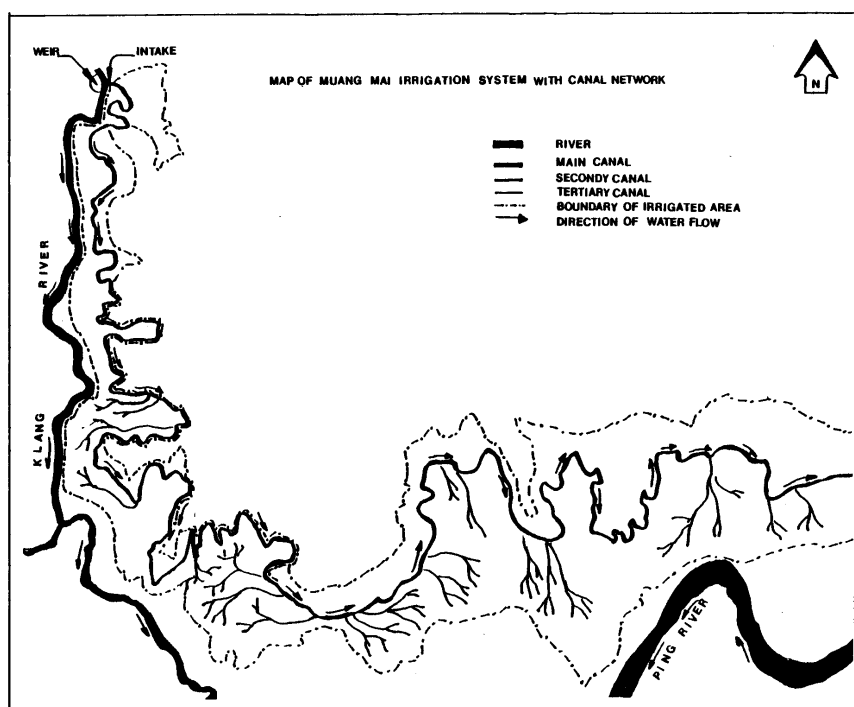


FIGURE 4.2

The fai noi (check gate) is a small diversion structure found along the main canal and secondary canals at the points where water is raised to irrigated high-level fields or is diverted into secondary canals (muang soi). As might be expected, it is simple, the original structures being built of logs piled up across the canal, and is usually of a submersible type that allows water to spill over for the downstream fields. In recent years, most of the check gates have been replaced with concrete structures paid for by the funds from group members and the government. This permanent structure causes some disadvantages to the system, because its height is fixed and it is not so flexible as the old bamboo structure, which can easily be adjusted according to the water level. Toward the tail section, where the level is low, farmers have to build several check gates.

Tae nam, technically called turnout be engineers are located in the canal bank so that farmers can bring water into their fields.¹ Locally, the term tae nam within the system of muang fai (particularly, in the Muang Mai) carries two meanings: 1) a structure used to guide water from the main canal to a secondary canal; 2) a structure used to divert water from a main or secondary canal into the fields. Since a tae nam measures the share of each farmer or group of farmers, there

¹VanderMeer explains: "Irrigation engineers use the term 'turnout' to denote an opening in a canal or ditch bank through which water passes into a ditch or field. The term reflects the outward direction of water flow which is the concern of engineers." See Ganute VanderMeer, "Changing Local Patterns in a Taiwanese Irrigation System," in E. Walter Coward, Jr., Irrigation and Agricultural Development in Asia (Ithaca, N. Y.: Cornell University Press, 1980), p. 231.

may be several of different sizes located at different levels. Some of them are quite large and may supply water to an extensive area. These structures may be constructed with several kinds of material, such as bamboo tubes, concrete pipes, earth, etc. Local farmers divide them into two types: tae taw (tube-shaped structure) and tae wai (weir-shaped structure).

The tae taw is commonly used to controll the amount of water at the intake of fields and secondary canals. It is made of a cheap local material which can be collected from the nearby forest. While farmers have replaced some structures with cement, they continue to use bamboo for the construction of tae taw. Each season when the allocation of water begins many bamboo tubes are used. The only occasion on which farmers choose to use concrete tube is when they need larger sized pipes, especially at the intakes of secondary canals that supply water to a large region. During the dry season, when little water is available, the flow is reduced by simply inserting small-sized bamboo tubes into the larger concrete ones.

The tae wai¹ in the system of muang fai functions as a diversion device rather than as a turnout. Serving the purpose of dividing water for the secondary canals, it is constructed across the main canal in the shape of a weir with two or three channels on the top to regulate the volume of water as allowed by the huana muang (irrigation leader). Locally, in the past they generally used a piece of wood called mai wai,

¹This engineering structure is locally called kiang nam in the San Kamphaeng area which is mentioned in Siriwong, A Comparative Study, p. 36.

which later become a term to denote this diversion structure.¹ Some of farmers feel that it is particularly important to use a permanent concrete wai, because this guarantees the amount of the shares. Also, if the beneficiaries of the secondary canal need more water and wish to widen the channel secretly without permission from the leaders, they cannot do it. The opposite idea from the other beneficiaries is that a concrete wai may inhibit the water when its level in the main canal is very low, during most of the year. The tae wai are built in areas where sediment and blockage by a mixture of branches, leaves, grass and mud occur frequently.

Lai sia nam sia sai means a drainage structure. Generally, it is an opening in the bank along the main canal used to regulate water levels and to drain water off during periods of canal-cleaning activities. There are five of them operating during the period of excessive water in August and September, but they are all closed in dry season. From the lai sia nam sia sai water is drained off into drainage channels or natural streams, which are referred to as rong sia nam. Lai means a particular place, but rong means small water way. We may then conclude that the main drainage system of Muang Mai consists of the opening structure (lai sia nam) and the drainage ditch (rong sia nam). Recently, an RID engineer applied a new sluice design in which the channel is controlled by a gate to replace one of the lai sia nam at a location about 500 meters from the headwork. At the end of February

¹Ibid, p. 23.

1981 when the RID begun the construction project on the main weir, all water in the Mae Klang River had to be diverted into the main canal of Fai Muang Mai, and the sluice weirs were temporary used as diversion structures.¹ The share of water between Muang Mai and the downstream systems (Fai Muang Luang and Fai Mokala) is measured at this gate.

In most places in Chiang Mai, paddy fields of the traditional pattern do not have drainage ditches within each fields. Water is passed from one plot to irrigated the next plot through a hole or pipe at the field dike. Therefore, a darinage ditch or rong sia nam located in the middle of the valley collects water drained off from several paddy fields. In this case, small natural streams usually function as a network of drainage within the system of muang fai. The Muang Mai system utilizes several streams as its main drainages, such as the Huey Lu, Huey Pak Wan, Huey Long Kao, Huey Nam Dip, Huey Ban Lao, and etc. Nearly all man-made drainage streams also function as irrigation ditches to supply neighboring paddy fields. The stream (used as drainage) are dry approximately five months, from January to May; however, they often cause problems of heavy siltage during the rest of the year, particularly in the period of heavy rain. To remove gravel brought by the stream accumulating at the point where the stream and canal meet sometimes requires urgent calls for laborers.

¹The RID construction project at the main weir was approved at the end of year 1980 and the work began in December the same year. The first stage of the work was to demolish the old bamboo structure, but this could not be allowed to interrupt the supply system for dry season cropping within Mae Klang area. The only feasible way is to channel all the water into the main canal of Muang Mai.

On-Farm Distribution Structure

When several small plots obtain irrigation water from the same tae nam (turnout), an individual farmer may construct and lay out the plot independently. This creates great variation in the distribution structures at the farm level. The taw nam or nam hua, which channel water from one plot to the next, usually have various designs, levels, and directions. The most common one is to open a channel at the field dike by simply removing the earth. Some farmers may use a bamboo tube, a concrete pipe, used tin cans, etc.

Operation of Irrigation Water

In general, the rivers in northern Thailand carry ninety percent of their annual flow during the wet season, from May to November, leaving only ten percent or less for the remaining five to six months.¹ Because of the variation in seasonal and annual run-off, the fields cannot be ensured constant availability of water. A large variation in river flow indicates both a shortage of irrigation water at times and excessive flood during the high run-off period. Undoubtedly, the Muang Mai area, sharing similar topography and river flow conditions, has some disadvantages.

The Muang Mai system, a diversion type irrigation system without ✓ a storage structure, depends greatly on the flow from the weir and is subject to seasonal variation at the diversion weir. Thus there is no

¹Thodey, "Introduction" to Irrigated Agriculture in Northern Thailand, p. 7.

question that water is abundant during the rainy season and becomes scarce in the late dry season, between March and May.

Farmers have to face some difficulties in controlling the water, which is excessive in the wet season after heavy rains followed by flood and damage to the main weir and canal. And drought may occur when water in the weir is at the bottom level. The record of Muang Mai shows that flooding in the fields near the headwork in Ban Huey Erang occurs almost every year in the peak period, usually in September. With regard to damage at the main weir and canal, most farmers can recall emergencies that required huge amounts of material supplies and labor. Many times the river has swept the main weir away.¹

Irrigation and Cropping Pattern

✓

Actually, the wet season flows are adequate to supplement rainfall and meet the water requirement of paddy rice, which obviously occupies almost 100 % of total cultivated land. Also, the Muang Mai system enables farmers to grow one or more crops in the dry season, which may be rice or some other upland crops like soybeans, peanuts, tobacco, and garlic as a second crop and mungbeans and vegetables as the third or late dry season crops in some fertile fields. Generally, in the wet season cultivated land in both lower and upper fields or slightly sloped areas is devoted to rice growing. But the dry season

¹According to the records of the Muang Mai, damage which totally destroyed the whole weir structure and the main canal occurred three times, in 1944, 1959, and 1970. This does not count the minor damage to the weir and the canal almost every year.

rice crop is limited to the lower fields and preferably areas of fine textured soils with good water storage capacity. Garlic, soybeans, peanuts, and onion, therefore, are widely grown in the upper fields.

When little water is available, from February to May, the cultivated land is not fully utilized; approximately 50 to 60 percent of the land in wet season crops is used for dry season cropping.¹ This proportion varies from year to year and between the head and the tail area of the irrigation system. In Ban Huey Nam Dip and Ban Wang Din, farmers at the tail section, have to obtain additional water from other sources, such as deep wells and the Mae Ping River, by using electric pumps. They also choose crops that consume less water. In recent years the water deficit has been obvious, and more and more farmers have tried new crops, particularly vegetables and fruits. During the field survey period in February 1981, watermelon and cabbage were widely grown, but the cultivators had to pay high prices for water and for renting electric pumps by the hour. Some of them were successful in these dry season crops.

In respect to shortage of water during the dry season, the Muang Mai organization was very concerned about the need to regulate crop

¹The estimation is based on data from interviews in 30 households of Muang Mai in which half and more of their cultivated land was used for growing rice and other upland crops were raised from December to May. This percentage is likely close to the figure from the Sarapi area, where similar cropping intensification is reported and the traditional irrigation served about 16,000 rai in the wet season and 9,000 rai in the dry season. While data are exceptionally difficult to obtain and do not appear in any official record, we may take as an estimate. The data from Sarapi are presented in Kung, "A Review of River Basins," pp. 52-71.

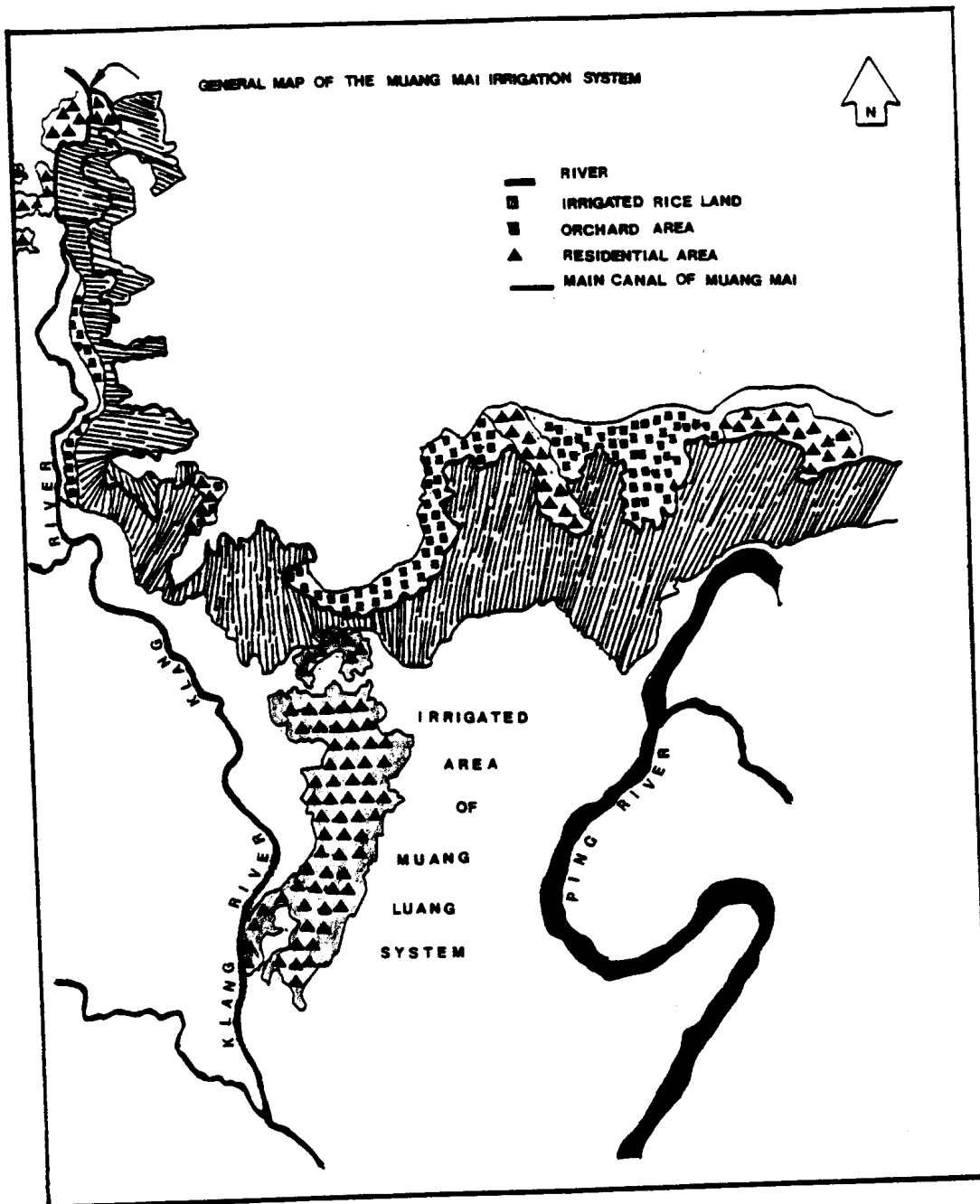


FIGURE 4.3

patterns within the irrigated area, planning carefully for the growing season of the second and third crops. An agreement made between Muang Mai members to control the crop pattern stipulated that a second rice crop is allowed only in the fields on the valley bottom, locally called na lum, which have a high capacity for storing water; other crops like garlic, onion, soybeans, peanuts are supposed to be planted on the higher plots, called na san or na yong.¹ Observation of actual practice shows that farmers apparently grow rice in their lower plots with scattered garlic, peanuts, soybeans, and onion planting on the higher level. In a few cases, when it appeared that the upper fields had been prepared for a rice crop, irrigation leaders advised farmers to change the crop immediately at an early stage of the growing season.

The valley topography with a slight slope connected to the lowlands gives some advantages to the Muang Mai system for bringing water from a long distance from higher fields to the valley floor. The main weir is built at a high elevation, about 300 meters above sea level, so that it can channel water as far as twenty-two kilometers along the main

¹Local farmers generally divide the type of paddy field into four groups, according to differences in topography and accessibility to water and storing capacity: na lum is a low field with good water storage capacity; na hong can be either a low or a somewhat high field that can collect overflow from various directions, usually a small plot surrounded by higher fields in a small-pond shaped area with good drainage; na san or na yong are upper fields usually on a slightly sloped area where water flows past quickly; a na loh is a higher plot at a level higher than the irrigation canal or a field lying above the operating limit of the irrigation.

canal from Huey Erang to Wang Din (see Figure 4.2) and down to the Mae Ping River.

In the Muang Mai system, water is conveyed on the surface in the canals, and then is brought into the fields through a bamboo pipe to flood the paddy land. The main weir diverts water into the main canal, and it is then distributed to the plots nearer to the canal and passes from one field to the next. Water in the main canal is channeled into secondary and tertiary canals, where again water is distributed at the field turnout. The flow from the canal to the fields is regulated by the Muang Mai organization at the turnout by controlling the size of the bamboo pipe. Each individual farmer is free to manage water within his or her fields and between fields.

Pattern of Water Distribution

The Muang Mai system uses two patterns of water distribution continuous and rotational. During the wet season, the organization lets water runs continuously in both main and secondary canals. A main task at this time is to avoid excessive flow and flood. When water supply is small, the organization makes a careful distribution to ensure that most farmers can obtain water in the amount their cultivation needs, using the rotational system at both main and secondary canals.

The irrigation water is released into the fields by two different methods: the first is locally called kin nam muang lak or kin nam muang soi and means direct irrigation of the fields from the main or secondary canals, regulated by the field turnout (tae nam). Under this method farmers have a direct access to the canal, the second is

known as kin nam hua, which means water flowing from the upper fields to the lower ones until it goes to the field drainage. The farmers may use bamboo pipe or simply pierce a hole through the field dike. The nam hua system is effectively utilized in slope areas and on the terraces. Generally, the individual farmers irrigated their fields by using both methods.

Community Irrigation Organization

From a sociological point of view, what is particularly necessary is to define the concepts that will be employed in the later part of this discussion, which emphasizes the fieldwork data of the Muang Mai. The term "community," as used in sociological studies of irrigation has been clearly defined by Coward as follows:

The term "community" refer to the community of water users and not to the residential community or village. Since irrigation systems frequently are hydrologic units that intersect several village boundaries, the irrigation community often draws its members from a number of residential units.¹

In his study of irrigation in Bali Geertz makes the same point:

A sharp distribution is drawn between the settlement unit, the bandjar, or hamlet, and the agricultural unit, the subak, or irrigation society. The organization and regulation of daily social life is severed from the organization and regulation of cultivation; though the hamlet and irrigation society are built on similar principles, they are built separately and function autonomously. We have two sorts of customs, the Balinese say: dry ones for the bandjar and wet ones for the subak.²

¹E. Walter Coward, Jr., "Introduction," in Irrigation and Agricultural Development in Asia, ed. E. Walter Coward, Jr. (Ithaca, N.Y.: Cornell University Press, 1980), p. 65.

²Geertz, "Organization of the Balinese Subak," p. 7

In recent literature, several terms have been used interchangeably to refer to the irrigation organizations: water-user organizations, irrigators' associations, farmers' associations, irrigation cooperative groups, local community organizations, social organizations of irrigators, etc. However, all are used to mean an organization unit performing irrigation tasks within a particular physical boundary of an individual irrigation system, or to refer to several irrigation systems uniting as one water management system.¹

In the case of Muang Mai, as discussed above, the residential unit (muban or village) and the irrigation unit (Mu Muang Mai) are separate collectivities. While the muban or village is a settlement of a number of farm families grouped together and sharing a common residential territory, the Mu Muang Mai is ecologically defined as a group of agricultural fields cultivated by farm families from several villages who share the water supply provided by the irrigation system of Muang Mai and form a single community whose physical boundary lies at the limit of the irrigation flow.

Mu Muang Mai is a local term for an irrigation organization of the Muang Mai system composed of farmers, including both land owners and

¹An organization unit as a federation for managing a whole river system, as in the Philippine case. Lewis, "Irrigation Societies"; and Siy, "Community Resource Management."

cultivators, who work in the fields within the irrigated area and share water from the same weir. Three organizations manage three systems of the Mae Klang River and coordinate the inter-system duties.

Membership in the Muang Mai irrigation community is simply ✓ extended on the basis of ownership or cultivation of irrigated fields. The right to obtain water traditionally comes with the right to cultivate the land and farmers are considered Muang Mai members as long as they work on these fields, with the membership automatically ending when they stop such cultivation. Accordingly, there are several types of Muang Mai members; these will be described later in this chapter.

As they acquire shares of water, they also have the obligation to contribute labor and other resources, and do their part in all work required to keep the irrigation continually functioning. The sharing of benefits and assignment of duties among members are defined according to the customary rules of Muang Mai.¹

Mu Muang Mai consists of farmers from ten adjoining villages (muban). In general, farmers first occupy and cultivate land immediately near their villages and later expand to open new fields farther out, so that they have two or three scattered fields. These fields may obtain water from several irrigation systems, which in turn draws them into several irrigation groups. As a result, we usually find that within one single village (muban) there may exist many irrigation groups.

¹A detailed discussion of Muang Mai customs concerning irrigation duties will be found in Chapter V.

The Mu Muang Mai and muban organizations overlap each other.¹ Like the subak organization described by Geertz and the zangeras described by Lewis, Mu Muang Mai presently exists in the form of what Coward calls a "non-village irrigation association," which means there are water users from various villages at the system level and at the level of the sub-unit or secondary-canal level.² Apparently, the Muang Mai organization of the Mae Klang Valley illustrates a form different from that reported by Sektheera and Thodey, who observed the form in which the members of irrigation terminal units appear to correspond to the villages' members.³ In the Muang Mai case similar characteristics also exist in few sub-units where those sharing water from the same secondary canal (muang soi) are village neighbors. But the pattern of nonvillage

¹M. M. Bruneau has described the organization of the muang fai in Chiang Mai Province. He writes: "These (users) belong to several district villages and communes. For example, a dam on the Mae Taeng permits the irrigation of all or part of the rice fields of 270 users coming from 5 villages. The Muang Luang dam on the Mae Klang is maintained by 700 users living in 16 villages. Neither the village nor the commune (tambon), containing several villages, can serve as the organizational basis for an irrigation system which goes beyond their area or only serves part of it." See Bruneau, "Irrigation traditionnelle." pp. 155-165. See also Siriwong, A Comparative Study, and Tanabe, "Peasant Farming."

²Coward observes that canal-based irrigation organizations can be divided into three types: nonvillage irrigation association, in which farmers at the terminal units and the entire system level come from several villages; pan-village associations, with farmers from one single village working in the fields at the sub-unit level; and association and canal level are from residential units outside the command area. Coward, "Management Themes," p. 209.

³R. Sektheera and A. R. Thodey, "Irrigation System in the Chieng Mai Valley: Organization and Management," Chieng Mai University Journal II, no. 2 (1975).

membership dominates and can best explain this case. Thus, both forms of irrigation organization co-exist within Chiang Mai Valley; the variation is in part related to the differing physical habitat and the field and canal layout of each system. Fai Muang Mai has a single long main canal and a network of short secondary canals (500 meters to 1,500 meters). The villages are adjoining, and the residential neighbors and field neighbors are intermingled. Some have moved to live in other villages but still maintain their fields in the old village. Moreover, the result of changes in land ownership through the years can lead to a pattern of diversified membership at the sub-units of the irrigation system.

Usually, farmers at a sub-unit of a particular muang soi (secondary canal) organize under the name of the canal. For example, the Muang Buak Bong canal, which is 400 meters long, has 21 cultivators who identify themselves as belonging to its irrigation sub-group, "Mu Muang Buak Bong." The Muang Mai organization constitutes twenty-one sub-groups. In comparison to many traditional muang fai organizations and the two irrigation organizations in Siri Wong's study,¹ in which the organizations along the secondary canals are managed by the associate

"terminal unit" means a sub-unit. "Terminal units refer to the smallest section of contiguous farm fields served by single outlet, or turnout, of the irrigation system. They are the most elementary irrigation blocks defined by the physical layout of the system and constitute an important management unit." (Coward, "Management Themes," p. 203) In the case of the Muang Mai, a group of farmers develops around the secondary canal or muang soi, the sub-unit of the Muang Mai system.

¹Siri Wong, A Comparative Study, pp. 41-43.

TABLE 4.1

THE SECONDARY CANALS (MUANG SOI OR MUANG NOI) OR THE MUANG MAI
SYSTEM AND NUMBER OF LAND OWNERS

LOCAL NAME OF <u>MUANG SOI</u> (SECONDARY CANAL)	LENGTH OF CANAL (METERS)	NUMBER OF LAND OWNERS *	LAND OWNERS RESIDENCE	
			FROM ONE VILLAGE	FROM SEVERAL VILLAGES
1. MUANG NOI HUEY TONG SAK I	500	6	V. ** 6	
2. MUANG NOI HUEY TONG SAK II	500	8	V. 4	
3. MUANG NOI TONG HUANA GAEN	1,500	16		V. 4, 6
4. MUANG NOI TONGKONG WAK	1,200	14		V. 3, 4, 5
5. MUANG KEW PUKAEW	1,200	7		V. 4, 5
6. MUANG TONG AMOK I	800	6		V. 3, 4
7. MUANG TONG AMOK II	1,500	11		V. 4, 5, 6
8. MUANG GHAE TOY I	1,500	20		V. 4, 5
9. MUANG GHAE TOY II	1,500	20		V. 4, 5
10. MUANG GHAE TOY III	1,000	8		V. 4, 5
11. MUANG HUEY PAK WAN I	1,000	17		V. 4, 5, 6
12. MUANG HUEY PAK WAN II	1,200	20		V. 4, 5, 6
13. MUANG NOI TONG SNAKLANG I	500	12		V. 4, 5
14. MUANG NOI TONG SANKLANG II	500	12		V. 4, 5
15. MUANG TAE KAKOK	800	15		V. 3, 4
16. MUANG LOH	1,200	15		V. 3, 4
17. MUANG SAN PA PUEY	800	17		V. 4, 8
18. MUANG MAKHA	1,200	25	V. 2	
19. MUANG TANG FA	1,200	17		V. 1, 2
20. MUANG TONG PAPAI	800	15		V. 1, 2
21. MUANG BUAK BONG	400	21		V. 1, 2

* The number of actual water users of each secondary canal may be different because there are a number of tenant farmers. Also, a number of farmers who own land along main canal are not included here.

** V. means an official village number. The village is classified as the smallest administrative unit of the province.

irrigation leaders or puchuey kae muang, the Muang Mai does not have leaders to manage the individual sub-units. The organization at this level is directed by the group of leaders. None of them is definitely responsible to any sub-unit.

The Mu Muang Mai actually is engaged in all irrigation tasks -- in water allocation (kan baeng nam), maintenance (som fai and lok muang), conflict resolution (tadsin lu nam), and ritual performance (piti phi fai). Various types of work groups are organized for seasonal maintenance work, and emergency teams are called up in times of flood destruction and for occasional special work projects, such as joint efforts in the RID construction project. All members are mobilized for the major activities of repairing weirs, cleaning the canal, and the rituals in both wet and dry seasons. The group of cultivators who grow wet-season crops take responsibilities in irrigation work throughout the season just as do those who cultivated during dry season.¹ However, in case of emergencies or construction projects, all members cooperately work to complete the task so that a large amount of resources can be made available.

¹Shigeharu Tanabe reports the muang fai maintenance organization consists of two groups: mu na fon means the maintenance organization of the wet season, composed of all cultivators of that season; mu na laeng is a group of cultivators who grow dry-season crops and have an obligation to work on maintenance as required then. See Tanabe, "Peasant Farming."

Administration of the Muang Mai

Several terms are used interchangeably to designate systems like the Muang Mai organization in which all members are local farmers, water users, and beneficiaries. There are peoples' organization irrigation, local organizations for irrigation, organizations of water users, and organization of beneficiaries. The Muang Mai organization manages its water supply independently under the leadership of a group of farmers who are selected by its members every four years. It is a genuine farmers' organization that is actually a mechanism for managing and regulating the irrigation activities, including all routine and emergency work and special projects. Compared to other maung fai organization within the Chiang Mai Valley, the Muang Mai organization is large and thus manifests a more complex structure with a greater variety of functions.

The Muang Mai organization is essentially comprised of water administrators or irrigation leaders, known locally mu huana, and water users, or mu luk muang, whose roles are clearly defined under the traditional rules of Muang Mai. Among Muang Mai members there is a clear idea of the administrative role of the leaders and the participating role of the members in irrigation activities.

Mu Huana

In general, the leaders, or mu huana, consist of one top leader and four assistant leaders locally known as puchuey. Only the top position is selected by vote; the other four assistants are appointed. They are not representatives of particular groups or zones.

In general, the huana has to be selected by the members at a meeting. A prospective candidate usually has selected his assistants earlier and is ready to inform the meeting of his choice the day he is selected. The nai amphoe, or representative from the district office, is invited to be present and witness the process of selection. One of the assistants (puchuey) has a more responsible position and might be termed the secretary assistant, as his duties including the administrative tasks. A member who is chosen for this position should be skilled in reading and writing and needs a basic knowledge of mathematics and accounting. During his term of service, if an assistant resigns or fails to perform his duties, the huana may appoint a new assistant immediately; he does not need approval from the members. He must, however, call a meeting and inform the members of the new appointment. The Muang Mai organization is a strong executive-type organization.

At the top level there is a group of retired leaders, mu khon tao, who voluntarily serve as an advisory group to the huana. They are not formally selected, but the huana usually introduces them to the meeting as a way of appointing them to this position of prestige.

Between the leaders and the water users, one person, the laam, functions as a messenger to facilitate the flow of information. Five messengers are responsible for the entire irrigated region of ten villages each having a particular zone for their duties. The position of laam is considered a permanent, long-term service, and one who is appointed by the huana continues to work until his retirement or resignation when a new group comes to succeed to the leadership positions. The laam works in the area where he is resident and knows all members personally

so well that he can quickly spread messages about irrigation duties, which often require mobilization on short notice. The puchuey works closely with the laam in getting the messages of the organization to all members.

When the term of the huana is ended after his fourth year of service, a selection meeting is scheduled. As a rule, the huana is actually selected in the meeting and later officially announced by the district government (amphoe Office) to the public.

According to the Muang Mai rules, the kot muang mai, only land-owning members have the right to nominate someone or to propose themselves as candidates and to vote. Generally, all of the members, including the owners of the rice land and orchards and the tenant farmers, are present at the meeting and can propose candidates for the office of the irrigation association. However, the right to vote on these candidates is limited to the owners of rice land.

Theoretically, under this selection system all members are allowed to serve as irrigation leaders. Leaders who fail to be elected to a second term simply return to their membership status.

The longer one has served in the huana position, the more he gains trust and respect from members for his experience and expertise in irrigation work. Most of the informant members of the Muang Mai referred to their huana, who had been in the position of assistant for four years and the position of huana for more than six years, as a man of experience who knew all members and understood deeply the entire Muang Mai system. As they put it, "Huana has worked in Muang Mai for a long time; he knows us all; he knows every inch of the weir and the

canals." Therefore, in practice, when a member is once selected to be huana, he is repeatedly renominated to other terms and thus holds the position until he too old and wants to retire. Similarly, the huana usually reappoints his three fellow assistants and suggests only one new one to be on his staff. This practice of filling the leadership positions is evident through the past 50 years.¹ In select the successor to the huana, it also appears to be the practice to select a leader who has been working as a secretary assistant to be the next huana. The secretary assistant has been well trained in several duties, as sometimes he needs to substitute for the huana in the meeting or at the district office. Moreover, he is a leader whose duties in record-keeping and accounting bring him close the the huana as well as the luk muang (members).

After the selection is made, the Muang Mai organization has to forward a report to the District Office of the government to inform it that a new huana has been selected, which is later officially announced in a government document. The members of Muang Mai also have the right not only to selecte a new huana but also to vote the leader out of his position during his term of service. Though this right is not frequently used, it is evidently known and was exercised by members once eight years ago.²

¹From the records of the Muang Mai on the selection and succession of new leaders. Interviews with the present Muang Mai leader confirmed this practice.

²The record of Muang Mai indicates that at one time a group of
Contd.

The role of leaders in the Muang Mai organization is to administer all irrigation activities, including routine checking, allocating water, supervising maintenance and construction tasks, enforcing rules and regulations, solving conflicts, mobilizing local resources for irrigation tasks, and mediating with the external government and private agencies.¹

In reality, we may not see much difference in the scope and load of duties between the huana and the puchuey, because the huana himself usually participates in all the kinds of activities that others do. But it is well understood among the leaders that the huana is a top authority in making final decisions on all issues and assigning jobs for the puchuey. In general, they work in two teams on the daily checking of canals and turnouts, but each team does not have a particular area under its control and responsibility. The huana may decide ahead of time to join either team; usually he takes turns in order to have a chance to work with both teams in several areas. The huana often says "mu noeng tang kao, mu noeng tang pai," which can be translated as his order for each team to go to different sections of canal; if one takes care of the work in the head section, the other should go to check the

members requested the head of the district office (nai amphoe) to call a meeting for reconsideration of the status of the huana, claiming that his age prevented him from performing his irrigation tasks. The result was that the majority of members voted to keep the huana in the position in January 1975, but later, in December 1975, he voluntarily resigned, after over twenty years of service.

¹The details of the leader's duties can be found in Siri Wong, A Comparative Study; Suraroek, Water Management Conflicts; and Gypmantisiri, An Interdisciplinary Perspective.

work in the tail section. During the time that the members are busy in their fields, the irrigation leaders have to do their irrigation work and also their cultivation. Thus, the schedule has to be flexible so as to fit the individual's farm work. During the peak period of farm and irrigation work, the schedule is decided on a day-to-day basis.

Usually the work of the leaders begins very early before breakfast. The puchuey go to the huana's house or to the office of the Muang Mai organization for meeting in which they briefly discuss what to do, where, and with whom for the day and the week. In addition, the puchuey also take this opportunity to report the previous day's work and any problems to the huana. They adjust the frequency of this routine meeting, which can be at intervals of a day, a week, or ten days. After agreeing upon their schedule, the teams start work around 9:00 a.m. after their breakfast. The process of the regular, daily work of the leaders is as simple as might be expected, but it is orderly, carried out by setting down a plan, discussing it, and then taking action as a response to the daily and weekly situations. This work process is effective because it allows a certain level of flexibility and makes it possible for the leaders to perform the irrigation tasks properly without sacrificing their own cultivation.

However, before any decision is made sometimes the leaders need advice, which they are able to gain easily by visiting the former irrigation leaders. Not infrequently they go to consult with this advisory group or call meeting with them at the huana's house in the evening. Most of these are to discuss request technical experience or ritual knowledge having to do with complex unusual situations, such as

emergency repairs or spiritual issues relating to the Muang Mai.

As was generally mentioned by the members, the former leaders are the wise old men of the organization, but they work voluntarily and are not a part of the core structure of the Muang Mai administration. The role of other local leaders like the kamnan (head of the sub-district or tambon) and puyaiban (head of the village or muban) in the irrigation organizations activities and in coordination with the governmental office at the district level is obviously a key one. Although the kamnan cannot make any decision but performs partly as an advisor and partly as a representative from the government at the local level, he is usually invited to the scene of activity. Moreover, he is frequently requested to assist the Muang Mai leaders to handle paper work at the district government office. The recognition of the importance of the kamnan and puyaiban among the Muang Mai members seems to depend greatly on how actively these persons participate in the irrigation tasks. It is interesting that the service of the kamnan and puyaiban may be widely appreciated by the members at one time but overlooked at another time. The reward system of Muang Mai clearly indicates this, as their reward in terms of "the right to irrigated their fields with no cost" can be withheld by the members' vote at any time.

Generally, there are two general meetings of the organization wherein all members participate at the beginning of each growing season in December and May. At these meetings, the members evaluate the organization's past performance and the officers report to the members on the work of the coming season. This includes a review of all the rules and regulations and a schedule of seasonal maintenance activities.

The Muang Mai organization may call additional meetings at times of emergency or to organize social projects.

Actually, the work days are announced by the laam on short notice, usually a day in advance. When the schedule is fixed, the puchuey sends a message to the laam, who inform all the members. The laam follows the traditional way of making official announcements by visiting house-to-house or by standing at several locations in the villages and shouting the message to the public. It is confirmed by members of Muang Mai that these methods are remarkably successful in facilitating communication between leaders and members and the messages go quickly and effectively to all members.¹

Reward System

The huana and the puchuey all earn equal reward from direct payments by the water users. A contribution for the service of the huana locally called kha nam loh is collected from the water users after the harvest each season. This is appropriately translated as "the price of water" or the "water fee," which may be in kind or in cash. The water users are responsible for paying an amount corresponding to the amount of land they cultivate in the wet and the dry seasons. They pay

¹Paitoon Khruakao has discussed the importance of local leaders as village communicators. In the village, news and information disseminated via the mass media do not reach the rural people so effectively. Foremost among the effective communicators of news and information are the headman and his assistants, the head priest, the school teachers, and other village leaders. His emphasis is that villagers attach high value to face-to-face relations. See Paitoon Khruakao, Thai Society and the Principles of Community Development (Bangkok, Thailand: Department of Community Development, 1963).

one-half taang of rice (7 kilograms) per rai of cultivated land, or pay an exact amount of cash, eight baht per one rai of upland crops (tobacco, onion, garlic, soybeans, etc.). The leaders traditionally divide these fees, each taking one-fifth of the total amount of kha nam loh each season. Since the laam is considered an anchor man linking the leaders to the members, he usually gets a reward for his service in the form of fee exemption nam yok. In actual practice, the present group of leaders decided to allot an amount from their own shares to reward the laam in addition to his right of exemption; each laam got ten to fifteen taang of rice (140-210 kilograms) for each season.

The muang fai systems in Chiang Mai often are categorized according to the type of payment made to the irrigation association leaders. In the case of Muang Mai, people refer to the reward system practiced as muang kae hub jang, which means that the leaders receive a direct reward from the contributions of members in the form of water fees. Thus kae hub jang suggests that the leaders occupy paid positions and are not volunteers. The other type of payment used in the irrigation system is called nam yok, which means that the leaders are free to use water for their land without contributing additional labor or materials. This is the type of reward practice in several irrigation systems.

Actually, the leaders of Muang Mai enjoy double benefits for their services, as they earn both kha nam loh and nam yok. Since a water fee is collected in return for the services of the leaders, and the size of productive irrigation areas defines the amount of fee, this seemingly encourages the Muang Mai leaders to work actively and to

attempt to gain the highest results, to reach the best performance of the organizational tasks, and to gain the members' satisfaction. The huana and the puchuey are also granted fee exemptions for water in their cultivations, which is more than the leaders in other irrigation systems may expect.

Mu Luk Muang

The term mu luk muang refers to the entire group of farmers or water users who own or cultivate within the command area of the Muang Mai system. In order to prescribe the rights and duties of members of the organization it sets out an elaborate system for categorizing members into groups according to several criteria. All members are categorized according to the following criteria: (a) type of cultivation, (b) access to land, (c) season of cultivation, and (d) field location.

With regard to type of cultivation there are two main groups of members, called mu ya na, or rice farmers, mu ya suan, or fruit growers. The first group is further divided into permanent members the landowners, and short-term, temporary members, the tenant farmers. This means that the Muang Mai organization also emphasizes the differences in the farmers' right to work the land. Landowners, or mu jao ti, within the Muang Mai area automatically receive the right to water that comes with the land. This is considered long-term, permanent membership. For mu na chao, or tenant cultivators, the rights and duties last only through their cultivation period. They can only obtain a temporary right to water, but they participate in irrigation activities as required in each season.

Generally, the luk muang participate in all the various kinds of work of the Muang Mai organization, including voting for a leader, reporting on disputes and violations of water use, planning work projects, contributing resources and labor for the maintenance activities, and paying a reward to the leaders. The owners of the rice land as permanent members granted the right to vote on the selection of leaders and are obliged to contribute resources, particularly cash, for the construction and maintenance of the permanent facilities and for the special projects dealing with development of the system. However, the tenant farmers do not have the right to vote and have the right to use water only as long as they continue their cultivation within areas of the Muang Mai land. The owners of orchard land who do not have rice land are also denied the right to vote.

We can see from Table 4.2, that the Muang Mai land holdings range between one rai and eleven rai, with about 50 % holding between one rai and three rai and about 50 % owning more than three rai. Only about one-seventh of the total number (74 families) hold more than six rai. The field data indicate the average land holding is 7.1 rai.¹

¹The total of irrigated paddy fields is 3,525 rai, and the total number of landowners is 498 persons. The average landholding size for the whole district of Chomthong in the report of the Multiple Cropping Program of Chiang Mai Univeristy in 1980, is 7.0 rai.

TABLE 4.2

NUMBER OF OWNERS OF RICE LAND OF THE MUANG MAI SYSTEM
BY SIZE OF LAND HOLDING, 1980

Village Name	Size of Land Holding (in <u>rai</u>)				
	Less than 1	1-3	4-6	6+	Total
Ban Nong Hai	0	36	12	6	54
Ban Huey Nam Dip	0	36	22	12	70
Ban Thasala	0	10	6	2	18
Ban Kwuang Pao	2	70	47	22	141
Ban Hom	0	20	33	19	72
Ban Kwa Epuang	1	26	12	3	42
Ban Wang Din	1	12	4	4	21
Ban Mai San Toeng	0	25	17	4	46
Ban Muang Klang and Ban Huey Erang	0	15	5	2	22
Total	4	250	158	74	486
Percentage	0.8	51	33	15.2	100

Note: Total number of landowners reported in the record of Muang Mai is 498, but the data on land holding for 12 persons were not available.

The Muang Mai organization details duties such as maintenance work, cash contributions, labor and materials, etc., according to whether land is rented or owned, and if the latter, according to the extent of the holding. But no matter how large the land holding is, each land owner has only one vote.

Under the category of mu ya na, or rice farmers, the Muang Mai organization further differentiates members according to the season of cultivation, dry or wet. The dry-season cultivators, mu na laeng, and wet-season cultivators, mu na fon, are generally two different groups of cultivators, and they have obligations to complete all their duties during their period of cultivation. However, both groups have to appear when the organization calls for an emergency work force.

Tanabe found in his study in the area of Nong Plaman that the wet-season group tends to be smaller than the dry-season one. This is illustrated by his figures of 90 members in wet-season cropping and 142 members in dry-season cropping in that area, in spite of the fact that the cultivated area in the dry season is much smaller than in the rainy season. This is because there is an increase in the number of tenant farmers cultivating cash crops in the dry season. The larger mu na laeng membership is mainly due to the number of farmers who cultivate between 0.1 and 1.0 rai in tobacco and soybean crops.

In the case of Muang Mai, the data demonstrate the same general characteristics of mu na fon and mu na laeng with regard to the

¹Tanabe, "Peasnat Farming," pp. 273-311.

difference in their size of membership. Although statistics on the size of farms in wet and dry season are not available and the figures on the membership of Muang Mai are not complete, nevertheless they give us a clear idea of the fluctuations during the year. This needs to be considered with caution, because there appear to be other explanations for variations in the size of membership, which may be related to water availability and to fluctuations in the market price of dry-season crops such as tobacco, garlic, and onion. Moreover, increase in the number of water users may be related to an increase in the number of tenant farmers, and the number of new members due to land inheritance or sale. This is illustrated in the Table 4.3.

Mu Ya Suan, A New Group of Muang Mai Members

There has been a change in the size and composition of the membership in the past few decades due to the expansion of agriculture in the region. Upland areas which had not previously been used have been developed into fruit orchards. It is estimated that about 1,000 to 1,500 rai have become longkong, litchi, and orange orchards. Most of the owners are members of the Muang Mai organization, but some of them are merchants, professional men of Chomthong. These are farmers or town people who can afford the high cost of development and can afford to wait the four or five years for the fruit nursery tree to come into productively. While the paddy fields run along the lower side of the Muang Mai canal, the orchards have been developed on the upper side along the canal and are periodically irrigated by using electric pumps.

TABLE 4.3

NUMBER OF CULTIVATORS IN WET SEASON AND DRY SEASON

1975-1981

Years	<u>mu na fon</u> (wet-season cultivator)	<u>mu na laeng</u> (dry-season cultivator)
1975	374	425
1976	388	531
1977	431	567
1978	447	606
1979	-	518
1980	-	-
1981	-	551

Note: The data are obtained from the Muang Mai's account on labor at the maintenance activities or canal cleaning. The figures for 1979 and 1980 are missing from the record. The data for 1981 were obtained by the author during the survey on labor in canal cleaing.

When orchard development began it was quite easy for the growers to obtain permission from the muang fai to begin using water. This was done on a one-by-one basis. Now, however, as the orchard area has become larger in the last ten years, the procedure for permission to use water has become more strict.

A rule has been elaborated, passed at a meeting called to establish control over water use in orchards. The orchard owners (mu ya suan) can obtain water without seeking permission during the wet season but they have to ask the huana every time they want to water their orchards in the dry season. As compared with the rice land owners, their rights are limited, but so is the scope of their required duties. It is very clear that the Muang Mai organization emphasizes the prior rights of the rice land owners, the frontier group who developed the irrigation system, and thus it gives preference in water use to them. Also, the penalties levied for violations by mu ya suan are relatively heavy in that the fines imposed are higher. Unlike the owners of the rice land, mu ya suan who only own orchards do not have the right to vote. Thus the mu ya suan are considered as Muang Mai members whose membership is permanent but whose rights and duties are defined differently from those of rice land cultivators (mu ya na).

In reality, it appears that most of the mu ya na are also mu ya suan, and most of the mu na fon also mu na laeng and vice versa. For this is hard to draw a clear cut boundary between the categories of Muang Mai members. The records of Muang Mai show that about 78.0 % of the orchard owners are also rice farmers and that all wet-season farmers

cultivate dry-season crops as well. Complete current statistics on membership categories are not available to help in analysis of actual overlapping incidence between these groups. Another important observation here is that even though the membership may be highly overlapping, the rules and requirements for the various categories are different in response to important environmental and other differences.

The categorization of the sub-groups in the Muang Mai organization is more precisely illustrated in Figure 4.1.

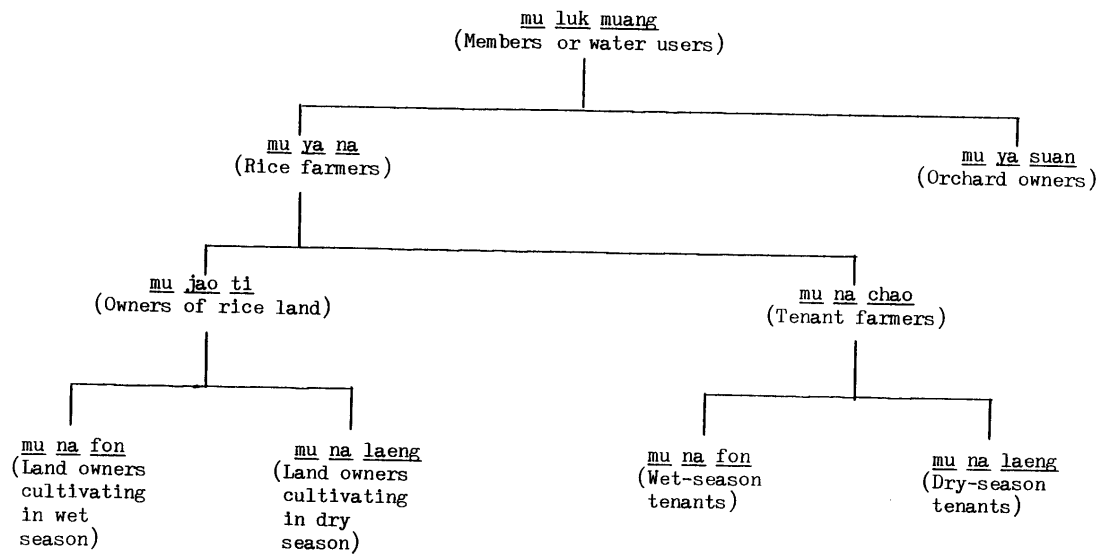
Linkage to The Government Central Administration:
The Recent Adjustment

The existence of local irrigation communities has to be considered in the context of the larger administration system and the articulation between the local and national system. It is apparent that the Muang Mai organization plays a role as an entity interceding with the government in order to maintain a relatively autonomous local irrigation community. Thus in this section there will be a brief discussion on the questions of how the government links the central administration to the local irrigation community, how an indigenous administrative structure is organized in response to the government, and what the change in the role of irrigation leaders and members has been?¹

¹To discuss the local-central relationship the author follows the questions posed in the study of Harumi Befu, "Village Autonomy and Articulation with the State: The Case of Tokugawa Japan," in Man in Adaptation: The Cultural Present, second edition, ed. Yehudi A. Cohen (Chicago: Aldine Publishing Company, 1974), pp. 427-438. The question of the changing role of the leaders in the indigenous irrigation organization in Laos has been discussed by E. Walter Coward, Jr., "Local organization and Bureaucracy in a Lao Irrigation Project," pp. 329-344 in his Irrigation and Agricultural Development in Asia.

FIGURE 4.4

MEMBERSHIP CATEGORIES OF THE MUANG MAI ORGANIZATION



Recently, in an attempt to integrate the local irrigation organizations into the national system, the government, through its local administrative offices at the district level, has been exercising more authority over them. At the same time, there is also an urgent need at the local level to secure some additional resources from outside agencies to maintain and develop the irrigation system.¹ It is interesting to see that the Muang Mai organization, however, has been able to achieve a certain degree of autonomy in its relationship with the government and to maintain local order and cooperation. In effect, it has adjusted its administrative body as well as its work procedures to fit present circumstances.

Fai Muang Mai is a community irrigation system in which a local association of farmers or water users independently performs most irrigation activities in construction, operation and maintenance, and ritual. However, the local organization may need assistance from the government, particularly in technical matters and material supplies. In this situation, both organizations should be coordinated in joint efforts to complete special projects, in which the government usually provides irrigation engineers and construction materials while the local community contributes labor as required. Minor assistance comes from

¹When the southern periphery of Chiang Mai Valley, including Mae Klang Region, was officially declared a National Park about 1950, the access to resources such as bamboo was restricted. Muang Mai members now find it almost impossible to obtain the supplies for irrigation tasks. This scarcity of local resources compels them to seek help from the outside agency.

the central government and other external agencies in three different forms: government construction or renovation of a minor structure; provision of materials, such as cement and sand; cash grants, to pay for labor and materials to develop the irrigation structure; and assistance grants from the government for reimbursement in the case of an emergency.

These types of joint efforts in management of irrigation activities allow the Muang Mai organization to manage independently at the local level and yet coordinate with the government agencies at the district level (amphoe) and provincial level (changwat) as stipulated in each project. These last few decades, the central government has become more active in working cooperatively with the local irrigation organizations in many areas, including the Muang Mai organization, through the national development programs for rural areas and irrigation development projects of the Royal Irrigation Department (RID).

The first attempt to integrate local administration of irrigation into the central administration of the government was worked out in the enactment of the irrigation law called "The Law of Muang Fai and Panang" or "Paratbanyat Muang Fai Panang" in 1935, which was followed by the law of 1939 widely known as the "Law of Peoples' Irrigation" or Paratbanyat Cholapatanraj." This law grants authority to the district government office (amphoe) by assigning responsibility to the nai amphoe (head of the district government) to appoint or demote the irrigation leaders of the local peoples' irrigation systems according to the opinion of the irrigation members. Since the central government does not include the local irrigation administration in the formal structure of the district government or the RID Northern Region

Office, the Muang Mai organization has always operated as an autonomous body. The linkage to the central administration has been through the nai amphoe, with requests and reports from the Muang Mai organization going directly to him and then being forward to the provincial government. Occasionally the Muang Mai organization may get into contact with the RID regional office in Chiang Mai when there is an irrigation development project to be carried out jointly.

The formal structure of the district government which has been presented in a study by Clark Neher indicates that there is no specific division dealing with irrigation management in local areas.¹ Under the district government office, there are two administrative offices, the office of the kamnan at the sub-district level and the office of the puyaiban at the village level. The kamnan's office covers the administrative boundary of from five to sixteen villages.² Today both kamnan and puyaiban are elected by the villagers of the sub-district area.³ The kamnan and the puyaiban are officially defined as semi-governmental

¹Clark Neher, "Perspectives on Development in Two Amphoe of Northern Thailand," AID Report, Bangkok, Thailand, 1969.

²Toshio Yatsushiro, The Village Organizer in Thailand: A Study of His Needs and Problems, (Bangkok, Thailand: USOM, 1964).

³In the past, the villagers voted for the puyaiban or the head of the village, and all puyaiban within a sub-district voted to have one of them as kamnan.

officials with a very broad scope of responsibilities in local communities, including all spheres of government services. Also, they are recognized as representatives of the government for coordinating with the irrigation associations with regard to their duties in irrigation work.

As mentioned above, the administration of Muang Mai is linked to two government agencies, the district government office and the Northern Regional Office of the Royal Irrigation Department. Theoretically, these government organizations also have the authority to intervene with local irrigation activities in various ways. In practice, although the irrigation law of the national government has authorized the district government to administer local irrigation associations through several procedures including the appointment of leaders and approval of the central government development budget, nevertheless the Muang Mai association has continually maintained its autonomy in selecting its huana, in setting plans, and in making decisions in most cases. In attempting to deal with a new kind of relationship with the government agencies, the Muang Mai association has expanded its functions. The functions have become more complex and more diversified. There has been a successful local effort have the needs and problems of irrigation recognized and to get projects funded by the external agencies.

The district government, as such, does not deal with irrigation duties on a regular basis but only in response to emergencies and to requests for financial assistance for the work projects initiated and planned by the Muang Mai organization. Occasionally assistance is allocated from the central government down to the local communities,

as with the annual development budget under its irrigation development policy. Again, in actual practice this development work is jointly managed. Likewise, the coordination with the RID is generally carried out between the association of Muang Mai and the head engineer of the RID. In both ways, the Muang Mai association may propose a special project of construction or renovation and get funding from the RID or sometimes planning by the RID office. Upon completion of all irrigation projects, operation and maintenance become the responsibility of the local water users, administered through the association of Muang Mai.

Khana Kamakarn or a Special Project Committee

To cope with the new needs of Muang Mai and to deal successfully with external groups such as the district office and the RID office the association has invented new arrangements: (1) the creation of a special project committee (mu khana kamakarn) and (2) the use of local elites.

Dealing with development projects and funding from the external, government agencies is considered a new type of job; therefore the Muang Mai organization has gradually made adjustments in its administration to coordinate its work with the district government and the RID agencies. The amount and scope of duties are extended to aim at the cooperation of members as well as of external agencies and to mobilize the resources needed for the attainment of irrigation activities. To deal with the government bureaucratic regulations the leaders of Muang Mai appoint local people who already hold positions in public offices, such as school teachers, temple committee members, medical practitioners,

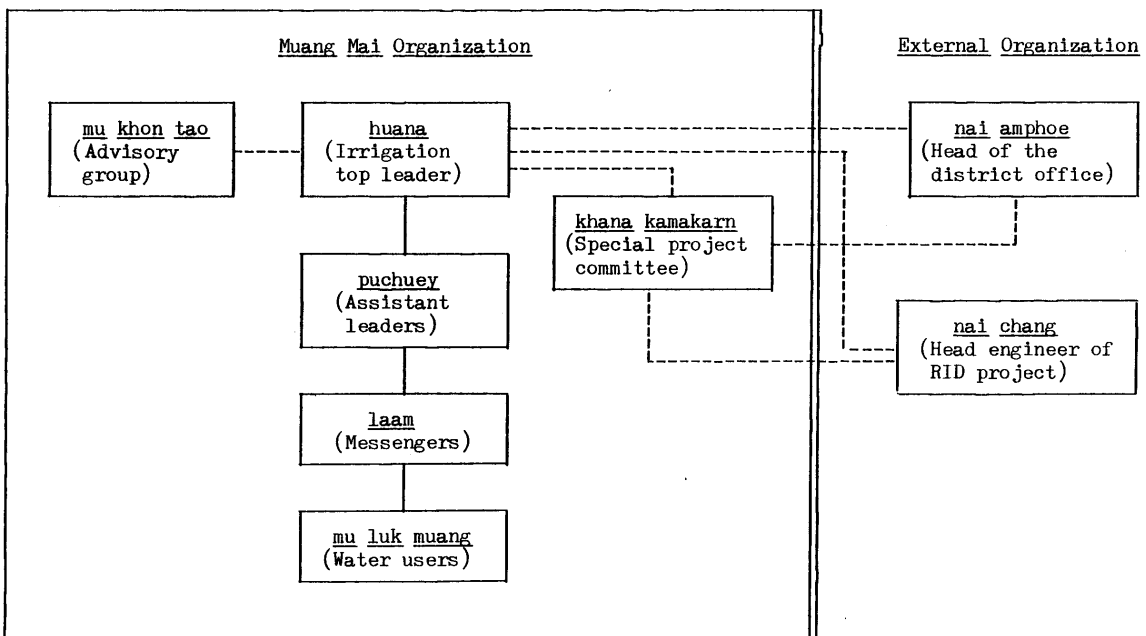
kamnan, and puyaiban to the special project committees of the Muang Mai Association. Usually, the association calls for help from the local leaders, who may or may not be Muang Mai members. This indicates that in recent years the association has accepted some non-member farmers as temporary staff and has added the appointed committees to the core administrative structure.

These committees for special projects work mainly as staff on each task and sometimes serve as consultants to the leaders. They work in coordinating with the core group of leaders, the mu huana, who exercise full authority for planning and for decision making. During the period of work, the committees receive allowances on working days from project funds. They are expected to join and to share their concerns with members in the meetings and at work sites. The huana and the puchuey mainly supervise and check on-going work at all times, and are responsible for coordinating with the district government through out the nai amphoe and the RID agents, with the help of the project committees. The committees are sometimes assigned the job of reporting and keeping accounts, which require a standard form of recording and reporting. Their service term is automatically ended when the project is completed.

The water users, or the mu luk muang, take on an active role as project workers, either paid or unpaid, under the conditions of the individual project. Since most of the work projects are initiated by the local organization and result from the meetings of its members, they themselves primarily cooperate by contributing labor and some of materials when the projects are actually implemented. In other cases

FIGURE 4.5

LINKAGE TO THE EXTERNAL ORGANIZATION



the government agencies provide funds for development projects in rural communities which generally aim at improving the engineering structure of the irrigation system but also create employment to slow down the seasonal migration from rural to urban areas during the summer. In this case all worker earn daily wages through the period of the project.

For the irrigation leaders there has been an increase in the amount and type of their administrative duties in addition to a new set of roles as mediators between the government authorities and irrigation members. In addition to the fundamental tasks of irrigation operation, the leaders (mu huana) have to learn the problems and needs of the local irrigation community and attempt to get them recognized by government agencies such as the district office and the Royal Irrigation Department. When a specific irrigation project is funded and implemented in a local area, the mu huana collaborates with the government authorities to manage all activities and the enforce project regulations and requirements.

Conclusions

The Muang Mai organization suggests a relatively complex form of cooperative behavior among a lowland northern Thai group for the specific purpose of irrigation to serve an intensive agriculture in the southwestern valley of Chiang Mai. As is detailed in the next chapter, the organization manifests a complex arrangement in administration, in categorization of leaders and members, and in task-oriented groups.

This organization arrangement is adapted to the local habitat and to the external sociopolitical factors as well. Where diversified

agriculture has been developed, there tends to emerge a heterogeneous group of water users; therefore, the arrangement of membership is complex. Moreover, the internal structural adjustments of the Muang Mai organization are directly affected by its relationship with and changes in the central administration. As the central government increases its active role in local irrigation, the community organization has adjusted its administrative body as well as its procedures in response to the new circumstances.

We can conclude the following regarding the organizational arrangements of Muang Mai:

- 1) The leadership of the Muang Mai organization is a small group which works cooperatively to manage all activities of the entire irrigation system. The formal leadership structure does not extend to the level of the small sub-units at the secondary canal. There are no representatives at the system level from the particular sub-units.
- 2) The overall leadership illustrates a strong executive pattern.
- 3) Small groups for the purpose of maintenance activities are arranged in two ways: mu muang soi, or the maintenance work group that is organized on the basis of field location and common source (canal) of irrigation water; taa, or the maintenance work group that is arranged on the basis of residence location or common residential unit.
- 4) The categories of membership are defined at two different levels: First, at the surface level, membership is defined according to ecological differences, such as the difference in type of cultivation and according to rights of access to land. Second, at a deeper level,

membership is defined according to the differences in the members' relation to the common created property (the irrigation works). The rice land owners, who are descendants, directly or indirectly, of those involved in the establishment of the irrigation system and who shared the initial investment, are regarded as primary members with full rights and responsibilities.

5) The existence of the heterogeneity (e.g., the membership categories) within the organization is noticeable, but the overlapping in membership categories is high. Integration within the organization is achieved through this overlapping membership.

6) Adaptation of the Muang Mai association toward more diversified functions and a complex structure is a response to the increasingly active involvement of the central administration. This represents an adaptation which is related to the increasingly complex sociopolitical context.

CHAPTER V

MUANG MAI IRRIGATION ACTIVITIES

When people refer to Muang Mai irrigation, a picture of hard work, long hours, and cooperative effort usually comes, together with the successful results that the Muang Mai members enjoy. As a communal, almost self-contained irrigation system, the Muang Mai organization assigns responsibilities to the members. The organization has a wide range of activities which include water allocation, maintenance, ritual performance, and conflict management. The maintenance of this large but vulnerable physical structure especially demands enormous resources of labor.

The characteristics of the physical habitat of the Mae Klang Region, such as rainfall, river flow, topography of the cultivated areas in relation to the canal, etc., clearly define the amount, variety, and frequency of the irrigation work. More precisely, irrigation activities follow a seasonal cycle and are generally composed of wet-season activities and dry-season activities. While the maintenance work is heavy during the rainy period, work on water allocation and the management of conflict and disputes is more frequent and much more diverse in the dry period. The Muang Mai members also understand very well that they have to work harder to clean the canal and remove the sediment in the area of flat lowland fields than on the slopes and in

the higher area. Furthermore, it is also true that the different type of irrigation work demand differences in leader direction and control, in water users' or members' participation, in the use of resources, and in the enforcement of the rules.

All the above four major activities are the routine work that the cultivators have the responsibilities to complete at the beginning of each season. And because the Muang Mai system has the physical disadvantages of recurrent flooding, with destruction of the main weir and main canal, emergency work during the peak period of water flow from September through November becomes an additional necessity almost every year. Occasionally the Muang Mai association may receive assistance from the government agencies on the condition that Muang Mai members either contribute some resources or participate as hired workers.

It is interesting to see how the Muang Mai organization proceeds in mobilizing its resources, organizing its work, and taking its members into action, both routine and urgent. In addition, we need to understand how the Muang Mai organization usually works with the government agencies in the development projects.

The work at different points in time requires different forms of cooperative behavior. The following section is a descriptive analysis in the organization of the work of the Muang Mai irrigation system. The description will illustrate a variation in the arrangement of work groups, in the roles of leaders and members, and in the enforcement of irrigation rules in various irrigation activities throughout the year.

Four Major Irrigation Duties
and Organization of Work

Irrigation duties have gradually blended into the cultivation system as a part of the cultivation work of all wet-rice farmers. They go on continually from the beginning to the end of the cropping season, with the farmers working together in a group at a particular activity that requires a cooperative efforts. However, they sometimes work individually in their fields to water the crops.

The Muang Mai organization engages in four major types of work: water allocation, maintenance, settlement of conflict, and ritual performance. These include six duties: kan ti fai (reparing weir), kan lok muang (removing sediment from canal), piti phi fai (performing ritual of weir spirit), kan paew muang (cleaning out bushes, branches, and grass from along the canal bank), kan baeng nam (allocating water), and kan tadsin lu nam lak nam (managing conflicts and violations).

The following section will be according to the yearly sequence of activities in the Muang Mai organization. The questions here are: What is the activity about? How are the work groups arranged? What are the roles of leaders and water users? and How are the rules enforced?

Kan Ti Fai

Kan ti fai, or renovation of the main weir, is routine maintenance in both seasons practiced twice a year, usually in June and January. It takes about one or two days for the actual repair, but it takes somewhat longer to prepare the materials, particularly the bamboo stakes and logs. The work includes collecting them from the forest and transporting them to the headwork one day before the repair

day. Usually, before the activity day the leaders must notify the members of the requirements and fix the amount and type of materials, but in some years additional supplies such as sand bags and tree branches can be requested for use in controlling the flow on the upstream side of the weir. This is an attempt to use indigenous techniques to maintain the huge physical structure season after season and year after year.

During the actual work all members of the entire system are again mobilized to work at renovation. Generally, the organization of weir maintenance follows the same pattern of kan lok muang by grouping members together into several small groups or taa.¹ Although the arrangement is that farmers from the same village work in the same taa, it is not felt necessary to have the same group of people in the same taa every time. Because the work of renovation includes several types of jobs, such as preparing materials, transporting them, removing silt at the upstream side of the weir, removing the stakes and replacing new stakes, etc., each work group is assigned a particular job.

Thus, we can see that in the activity of the kan ti fai the arrangement of the work group is similar to that of kan lok muang but the distribution of work is done in a different manner. The renovation work is more complex, composed of various jobs. One group is responsible for preparing supplies, another for transporting them to the weir sites, while another drives bamboo stakes into the weir structure.

¹The arrangement of the taa work group is discussed in the next section.

Among the five leaders only slight difference in duties can be observed. The huana and three of the puchuey have similar responsibilities, mostly in supervising work groups, but one puchuey, the secretary assistant or kae laeka, engages entirely in the work of keeping records of the contributions of resources and labor from members. The kae laeka has to speed his work to obtain all the required information, going even faster than he usually does in the activity of canal cleaning, because the size of the work group each day is larger than that in canal cleaning activity.¹ His kind of work brings him into communication with individual members, and he has a chance to build up intimate relationships with them.

The huana and the other three puchuey work together to organize work groups and supervise them at work. As the huana takes an important role as a top decision-maker to whom all the puchuey have to report, they must accept his final decision in difficult situations. But the general scene of work at the weir repeats what we see during the work of canal cleaning: the call of the taa workgroup, the assignment of tasks, the supervision on technical matters, the evaluation of work performance. It is evident that the interaction between leaders and member is informal and face-to-face. The leaders always call a member

¹The mobilization rules indicate a requirement of one man-day per rai of cultivation. The work period of canal cleaning extends several days. Thus, members who cultivate only few rai may choose to come any day for work only to complete their obligations. But when the work period of renovation is short, only about 2 days, all members have to come at the same time; then the distribution of labor each day is varied between canal cleaning and weir repair activities.

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by name, and the long acquaintance between them can be seen from an atmosphere of relaxed conversation about family matters. The members usually call all leaders by a similar term, poh luang.

The leaders also keep checking the work of the members; anyone who sneaks away from work is recorded and fined. The leaders play an important role in protecting the rights of the members, and they prevent violations by some who may seek to avoid their duties. This is similar to the enforcement of the rules that occurs during the period of canal cleaning work.

The technical problem of renovation and reinforcement of the weir structure seems to have been of great concern to the Muang Mai organization in recent years. The problem has become more complex, beyond the technical capacities of the local people. Heavy sediment, erosion, flooding, and lingering drought were the problems mentioned most frequently by the respondent farmers. These are partly related to the destruction of the forests in the watershed area by the highland people.¹ To solve this problem, the central government has passed and appropriate funds for reconstruction of the main weir of Muang Mai as a permanent concrete structure. The work was already begun in January 1981 and will be completed in two years, by 1983. Henceforward the

¹It has also been stated that the lowland farmers contribute to the problem of destruction of the forest in the mountain region by cutting down trees for house building, illegal trade, and, especially, for irrigation construction and repair. This was pointed out in a conference at the Northern Agricultural Planning Center in Chiang Mai in 1981.

maintenance activity at the main weir in the traditional way by the Muang Mai organization will be unnecessary.

Kan Lok Muang

Kan lok muang, or canal cleaning, is an irrigation duty of both seasons beginning usually at the end of May or at the beginning of June in the wet season and in January during the dry season. During this period Muang Mai members have to be on the alert to respond to a short notice to mobilize for the seasonal cleaning of the canal.

This particular task includes removing the sediment along the main and secondary canals of the entire system, and re-adjusting the canal bank. Since the work at the main and secondary canals is scheduled in the same period, most of the members' families have to provide more than one laborer for the irrigation works. With a knowledge of local conditions and of the situations of different members, the leaders work out a plan to call laborers at different sites and times so that the work at both canal levels can be completed at the same time, for they are pressured by the cultivation work and the demand for water in the fields.

In general, the work of cleaning the canal requires two levels of management: one at the main canal or system level, and another at the secondary canals; both are organized by the mu huana. There is a slight difference in the organization of these levels in the actual work, as is discussed subsequently. All work must be planned to fit the duration of the peak period of water demand and of labor demand in cultivation at the beginning of growing season.

a) Organization of Work at the System Level

Of the system-level maintenance tasks, the work of kan lok muang, or the work on the main canal, is considered the big seasonal event for the organization in which all cultivators of the Muang Mai fields are mobilized in a long period of about 10 to 20 days. The work period is usually divided into two sessions: the first session is the work at the tail section; the second session is the work at the head section. Usually there is a short recess of about one week between these two sessions. The mu luk muang, or all water users who are cultivating a crop that season, have to participate in the canal cleaning.

To organize a large group of labor, the huana and the puchuey divide tasks among themselves, and each is responsible for a particular duty and has coordinated closely with the other from the beginning to the end of the work. In the work of canal cleaning the differences in the duties of individual leaders are clearly observed:

- 1) The huana functions as an overall supervisor and decision maker.
- 2) The puchuey designated as the secretary assistant pursues his specific duty or recording hours of labor and materials.
- 3) One puchuey is designated as kae mai wa to assign the amount of work for the members.
- 4) The other two puchuey have the special assignment of kae hong taa as the leaders who decide the work groups.

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Before the work begins it is necessary for the huana to announce the schedule and repeat all the rules and requirements of the particular

job in a meeting at the work site, even though all luk muang presumably know them by heart. It is clearly a tradition that functions to emphasize the importance of the rules and their enforcement and at the same time awakens all luk muang to their responsibilities.

Through the period of canal cleaning, the huana and the puchuey mainly supervise and check the work performance of the work groups. There is clearly a division of labor among the leaders; the huana is a top supervisor who constantly moves back and forth among the work groups to assign, supervise, and double check the job, while the four puchuey take different assignments.

The secretary assistant, the kae laeka, is specifically responsible for record keeping, which includes checking the size of the work force, the presence or absence of individual workers, the size and location of the cultivation, the tenure status involved, and the land owner's name. Since the size of the work group for canal cleaning is large, varying from 100 to 400 persons in a day, the secretary assistant has to work busily all day. As the work proceeds, all leaders have to keep in close communication with the members. As for the secretary, his record can help the Muang Mai association by securing the information for the collection of the water fees and by documenting the members' participation. This process is intended to make an exact record of labor and resources received from each member family. This confirms the fairness members expect and receive from the organization.

Kae mai wa can be translated as a leader who assigns the amount of work for each division or work group. Actually, the work in each canal section is divided equally among the work groups, each of which

is composed of about ten persons. The duties of the kae mai wa include measuring a portion of the canal and assigning it to a particular work group, which has to be done in a sequence, one work group to one portion. Again, the details of the work division show that they are very conscientious about equal distribution of tasks and at the same time carefully make exact measurements that are widely noted by luk muang during the work period. The kae mai wa has to work in coordination with the other two puchuey, who take the responsibility of calling laborers of each work group to work and of supervising them.

Kae hong taa means the assistant leaders who work as key persons in organizing work groups at a particular canal site assigned by the kae mai wa. The leaders organize a work group and assign the responsibilities to the group.

Following a traditional practice, the leaders organize members into small work groups or taa, which are usually composed of ten persons. A taa is organized on a residential basis, by dividing the total number of laborers required each day into a group of neighbors. Apparently this is not only for the matter of convenience but also implies the aim of organizing intimate work groups in order to encourage an efficient labor unit; an active cooperation, long acquaintance, and close contact do in fact make for a cohesive social group. Several work groups or taa are thus woven into the whole structure of the Muang Mai maintenance organization, under the direction of the mu huana and governed by the rules of maintenance duties. The same pattern of taa organization occurs in both wet season and dry season. However, the composition and

size of the wet-season and dry-season groups may be slightly different.¹

Within a taa work group, the members form a close relationship which clearly repeats the pattern of village relations. Since there is a complete overlap between the membership of the taa maintenance group and the village group, members generally identify themselves with both units. Although the taa may be considered a relatively temporary work group, while the work is being done the members are truly conscious of its existence. They often refer to their double identification, saying, for example, that they belong to mu ta noeng, mu wang din, which can be translated as taa group number one, from Wang Din village.

As a cooperative work group, each taa must complete its assignment and collectively share the responsibility. Among themselves, they share a portion of the work in cleaning the canal bottom, with one digging out the gravel while another one carries it to the dump area. The entire canal is divided into several portions which are the responsibility of the different work groups. Probably competing to get a good result, each taa will attempt to complete the job and also avoid censure from the leaders which will embarrass the entire group. These small groups become important components in the functioning of the larger organization. As we can see, the Muang Mai organization is a construction of tight, intimate small groups, some of which are to function temporary within a larger formal organization.

¹This has been previously discussed in Chapter IV.

During the time they work together, the members not learn a technical knowledge from each other and an improve the physical structure of their irrigation works but also develop their relationship with each other. By sharing and repeating the same tasks and becoming oriented to common rules the cohesion of the Muang Mai organization is further strengthened. All taa work under the leadership of the mu huana at the overall level, but within the work groups it can be observed that the older farmers usually give suggestions to the other members and the more experienced guide those who are new to the work.

Since the canal cleaning organization at the system-wide level is large and heterogenous in terms of its residential basis, the work demands a high degree of coordination among the five leaders and strict enforcement. There may be a certain degree of flexibility in the actual role performance, but definitely only minimum deviation can be afforded. Violations such as sneaking off from work, failure to report a sound reason for absence, or intentionally reporting wrong information about the size of one's cultivation can lead to punishment and heavy fines.

Truly, kan lok muang is a highly participant system of activity, with close interaction among Muang Mai members and between the huana and the mu luk muang. The roles of the leaders and the water users are performed and publicly evaluated through the process of maintenance work, particularly canal cleaning in each season.

b) Organization of Work at the Secondary Canal

Each organization of the secondary canal or mu muang soi is responsible for maintaining the canal that supplies water to its fields.

It appears that when kan lok muang begins at the secondary canal level, it proceeds with a relatively less supervision from the group of leaders. The farmers whose fields are irrigated by the same secondary canal work together at the task of canal cleaning following the schedule suggested by the leaders at their convenience and report to these leaders.

Since work at the secondary canals is usually completed within a short period, involving from a half day to two full days, the jobs of most of the secondary canal work groups have been well performed, on time, and the leaders of the Muang Mai system allow the work groups of some secondary canals to work independently. This means that the work groups arrange and schedule the work among themselves and the leaders may or may not be present during the actual performance of the work. However, the leaders have to follow up the job by keeping records on the workers and the performance. In some secondary-canal groups the large work teams need the same amount of supervision as at the main canal, so one or two puchuey set up the schedule and supervise the work group through the period of canal cleaning.

Neither arrangement in the pattern of taa work groups nor a careful division of tasks exists at the level of the secondary canal. All members start work together from the intake of the secondary canal, but as they proceed toward the tail an individual is allowed to stop at the boundary of his or her field, while others have to continue to

work along the canal. Accordingly, the work group gets smaller when the work is close to the tail section of the canal. If the work needs the direction of the mu huana, only one leader is assigned to supervise the work from the beginning until completion. The role of the leaders is all-inclusive, with one being responsible for all types of work, such as supervising, checking, and record keeping. Though the members may come from different residential units, the work group is small, and they seem to identify themselves as a single group of mu muang soi. The mutual needs and benefits from cooperation among the members, obviously outweigh the difference in residence of the members which otherwise might alienate the individuals from each other.

There are slightly different work rules as well as contributions from members at this level, and the amount of labor contributed is not commensurate with the size of the land cultivated, as a rule. Only one laborer from each family works along the canal up to the end of his or her field. Strict enforcement of rules is, however, also kept at this level by the leaders through the system of record keeping and punishments and the repeated recitation in detail of the rules before each season of work. In addition, since the organization is small and the effectiveness of the rules may be supported by informal control among the members themselves, it also may include secret reports from members to the leaders.

Piti Phi Fai

Piti phi fai is the ritual which is collectively performed by Muang Mai members once a year, scheduled after the renovation of the

weir, usually in June at the beginning of the wet season. From its meaning, piti phi fai is the sacrifice of an animal (a pig) and food to the spirit of the weir, under the assumption that successful communication with the phi or spirit can prevent the farmers from the loss of crops to flood, drought, or destruction of irrigation works.

Muang Mai members state that they believe the spirit of the weir to reside at the headwork site in a small house, the hoh phi fai. When questions arise as to who the spirit is, their explanations are not very clear, varying between a guardian spirit and the spirit of the dead of the Muang Mai leaders and of the members. They are intermingled partly due to the beliefs of the local northern people. Kunstadter has noted that the local people of northern Thailand worship the spirit of the artifact House as well as the spirits of the dead, particularly of their ancestors.¹ In the case of Muang Mai people combine the idea of the spirit of a man-made artifact and the spirit of the former leaders.

¹It is interesting that in other parts of Chiang Mai in the ritual as practiced by the muang fai organization, the people worship the spirit of a stream or river rather than the spirit of the weir. Certainly there must be a divergence in the ritual and the interpretation of its meaning. See Siritwong, A Comparative Study, and Tanabe, "Peasant Farming." In this particular case of Muang Mai, the history indicates that an early adaptation of peasant leadership may have been related to the belief in the weir spirit. The local organization was initially led by local lords or phaya who sought legitimacy through the king. At the transition, a new peasant leadership might have used a spiritual element to reinforce their power. The peasant leaders perhaps made an attempt similar to that described by Kunstadter's. When a man named Kham Suk wanted to bring in a new belief of Buddhism and an irrigated agriculture into a Lua village at Pa Pae in Mae Hong Son, he related the new ideas with the the spiritual element. It was a successful introduction of new ideas. See Peter Kunstadter,

Contd.

The activity actually takes place over two days, one for preparation, the other for the ceremony. All members of Muang Mai are expected to be present at the ceremony, and they come to participate in the worship of the spirit in a traditional way. The ceremony involves preparing food including a pig, flour, rice, cigarettes, liquor, flowers, sweets, etc., and presenting these to the spirit at hoh phi fai.¹

For this particular activity, most of the Muang Mai members do in fact come to participate in the ceremony,² if there is an assignment for a work group for this from the leaders, it is an informal one and on a voluntary basis. There is no record keeping, no checking system at the site. The huana and the puchuey participate in the activity in all kinds of ways, both in the days of preparation and in the ceremony. A division of labor between men and women can be observed, with men doing all the preparation of the ritual site, including cleaning and transporting facilities, while the women are usually busy preparing the foods. Seemingly, the members are divided into two work groups male and female.

"The Lua' (Lawa) of Northern Thailand: Aspect of Social Structure, Agriculture and Religion," mimeograph (Center of International Studies, Princeton University, 1965), p. 39.

¹Tanabe, "Peasant Farming," pp. 309-331.

²The conversations with the Muang Mai members indicated that some seem not to believe in the idea of phi fai. However, they participate the ritual, perhaps because they consider their participation in the ceremony as the way to get recognition as members of the organization.

There is one key person called poh piti who directs the ceremony, brings foods and other ritual materials to present to the spirit, and speaks the words of worship. The huana is present as a leading person whom the poh piti mentions as the head of the Muang Mai group coming to pay respect to the spirit of the weir. Also, the merit of the former leaders who have passed away is recalled, as well as the members' gratitude to them. The weir is considered to be the result of the cooperative efforts of the group as well as the leaders' capability.

In conclusion, the ritual of phi fai plays a role strengthening the unity of the Muang Mai organization. The construction of the physical system of irrigation is an achievement in keeping technical order as well as social and cultural order. The function of the ritual is clearly to maintain the internal order of the Muang Mai organization.

Kan Baeng Nam

The allocation of water, kan baeng nam, or, as it is sometimes called, kan pun tae (tae is a turnout), is begun two or three days after the ritual. Therefore the months of June and July are a busy period for Muang Mai members for all activities of the wet season. Actually, the kan baeng nam is carried out twice: in June or July for the wet season, and in January or February for the dry season cultivation.

Since a large amount of water is needed to irrigate land during the preparation, ploughing, and harrowing, before the actual allocation of water begins, the water in both main and secondary canals runs continually at that time and all farmers are free to obtain water in any

amount and at any time they want. The Muang Mai organization administers this period to fit the irrigation and cultivation needs based on its knowledge results. When the canal cleaning begins in the first week at the tail section, the farmers in the head section have a chance to do their ploughing, harrowing, and transplanting.

When the cleaning is completed in the tail section there is a recess of about one week, and some of the farmers in the tail section can plough their fields, because the water is now available in both main and secondary canals. After the completion of the work on the entire canal, the allocation is started from the head section, which gives more time for the farmers in the tail section to have continuous water to finish their ploughing, harrowing, and transplanting. The schedule for all these tasks of irrigation and preparation for cultivation are adjusted to be completed within a period of between four to six weeks.

After the allocation, members freely come to complain or to request adjustment in the size of the tae nam. In addition to a strict routine checking by the leaders and to information about the behavior or water users reported by their neighbors, their complaints are a method of popular participation that assists the Muang Mai system to utilize water efficiently and at the same time to prevent waste.

Kan baeng nam is a long task, including the preparation of the irrigation tube or toh nam, determining the volume of the water shares (or the size of the tae), setting up the tae nam or turnout, and adjusting the tae nam. All this take one or two weeks. Only a small group of leaders and members (water users) work to complete the entire system along the main and secondary canals. Five leaders usually work in two

teams; and the huana joins each team in turn on a rotation basis.

It is sometimes necessary for him to call for help from members, then one or two of them join each team each day.¹

The two leaders in the team coordinate their work and consult each other to determine the tae nam at particular points in order to assure correct decisions. Both are very concerned about their share in this responsibility since later on questions may arise as to whether the allocation for the individual farmers is fair. Usually the members are assigned to work on preparations, such as cutting bamboo, making water tubes of different diameters, and locating the turnout. These are all carried out under the supervision of the leaders. This is a small-group task illustrating a kind of intimate relationship, and the atmosphere is relatively relaxed and informal; one may not even be able to tell the leaders from the members. Actually, during the work of allocation, the cultivators of that particular field can come to watch or even make a request for the amount of water they need. This pattern of interaction and information exchange also helps to facilitate the work and the decisions of the leaders responsible.

¹The members (water users) who come to work during this period of allocation are those farmers who work large-sized cultivations. This is due to the fact that it is obvious that they have not yet fulfilled their canal-cleaning and weir renovation obligations. For instance, the period of work is five days but the requirement is 6 or 7 days for those with 6 or 7 rai of cultivation. This, then, is a chance to complete their obligations.

Kan baeng nam is an important task of the irrigation administrator, the mu huana, because the crucial element is the decision made on the water shares. The ideas of fairness and efficiency are evidently a great concern of the Muang Mai organization: they are carried out by the checking and adjusting of the tae nam. Although the work executed may seem simple, it requires careful judgement at each turnout according to several criteria. The leaders have to ask themselves a set of questions before determining the size and location of the turnout: How large are the plots? What is the level of the land relative to the canal? How well does the soil hold water? How many ways can the field obtain water? Is the field located at the head or the tail of the canal? What type of crops are grown?

Generally, the irrigation leaders assign a different volume of tae nam to meet the requirements of the various crops in each season. We heard local farmers refer to tae nam in other ways, such as tae kao pi for the wet-season rice crop, tae kao doe for the dry-season rice crop, tae suan for fruits, or tae suan na laeng for cash crops of the dry season. Everyone knows the differences among these types very well; for instance, the standard volume of tae kao pi assigned for a particular field is larger than the standard size of tae kao doe for the same field. Of course, it is necessary to share on the basis of what there is as well as what is needed. For times of shortage the water requirement is set at a level that permits the crops to survive when the water supply is scarce, rather than to gain high yields. In each dry season

they aim to secure the survival of the maximum number of fields.¹

In conclusion, the decision on tae nam relate both to the characteristics of cultivation at the field level and to the entire system. First, the tae nam is determined on the basis of the type of cultivation; by the time the leaders begin the allocation they have already been informed about the size and type of cultivation of each field. Also, this kind of information can be obtained easily while the work of kan baeng nam is going on, because the farmers have worked on field preparation, and the leaders know exactly what the cropping pattern is, throughout the system area. Second, the leaders make decisions on the basis of knowledge of the situation of the entire system and on the amount of water supply available in each season. Usually they have to learn the amount of water in the river prior to kan baeng nam, and sometimes they may have to survey the head of the river. In case they expect a scarcity, at an early time the association announces to all members a request to follow the agreement on crop restriction. This means that only the lower fields are allowed to grow rice crops and that all upper areas have to be devoted to upland cash crops. Then in actual practice the leaders strictly check the fields.

¹From the author's observation in February 1981, the actual practice of allocation supports the above statement. The rationale of the practice of enabling survival for the most fields is partly a result of the reward system of the irrigation leaders. The amount they get relates directly to the number of fields (in rai) that can survive. The leaders get two taang (26 liters) per rai. They will not anything from farmers whose crops have dried out. This will be discussed in more detail in the following section.

TABLE 5.1

SIZE OF TAE NAM FOR WET-SEASON AND DRY-SEASON RICE CROP

Size of <u>tae nam</u>	Diameter of <u>tae nam</u> (in inches)	
	Wet-season rice crop (<u>kao pi</u>)	Dry-season rice crop (<u>kao doe</u>)
Very small	1.0-2.0	0.5-1.0
Small	2.0-3.5	1.0-1.5
Medium	3.5-5.0	1.5-2.5
Large	5.0-8.0	2.5-3.5

Note: The diameter of the tae nam is actually defined by the farmers in a local unit of measurement called neaw maung. One neaw muang is equal to one and a half inches.

The differences in tae nam size between tae kao pi and tae kao doe are shown in Table 5.1.

Kan Paew Muang

Kan paew maung, or the duty to clear branches and bushes from the side of the main canal, repeats the same process as kan lok muang, but this is a relatively light requirement which some of the Muang Mai members may fail to list as a seasonal activity. It takes only one or two days to complete the entire canal. The work is usually scheduled for the middle of the season, around October and the end of April.

Since the clearing of branches and grass on the canal bank may not be necessary in some years, the Muang Mai organization make its scheduling and mobilization flexible. Two types of organization are arranged in response to different conditions. In a season when it appears that branches, bushes and grass create a severe problem, the leaders to call all members (water users) out and repeat the same arrangement as for canal cleaning. They call this mobilization radom, which means a call of the entire labor force to finish the work in a short period. The work can be completed in one day.

If the leaders estimate that the amount of work needed is small, the second type of mobilization is used, which means a small work party consisting of the leaders and a small group of members, about twenty to thirty people. They work in teams, like the arrangement for the allocation work. The members who cultivate large-size fields can complete their obligation in this way. The work may be finished in two days. This type of work also needs relatively little

supervision from the leaders, since most of members have the basic skills needed for felling or cutting, transporting and then burning. Nevertheless, the rules employed in this activity are the same as for the other activities and are enforced through the system of close checking and punishment of violators.

Tadsin Yaeng Nam, Lak Nam

One major activity of the Muang Mai organization is the management of conflicts and disputes occurring through the year, and these become more common in the dry season when water is scarce.

The physical structure of the traditional muang fai system almost everywhere, including the Muang Mai system, tends to lead to conflict between the farmers at the head section and the tail section, particularly in the unregulated canals. Partly because of the increasing number of fields and the extension of the canal, and partly because the system does not have field ditches, the flow runs continually from one field to the next, and the farmers in the tail section have a long wait to get water and may begin to fight for it. Aside from the physical disadvantages, the traditional practice that fields near the canal obtain water in the amount that they want and then pass it to the lower fields may create waste and delay along the way. Management at the farm level on the fields that share the water from the same turnout, passing water from one plot to the other, is in the hands of the farmers themselves but the leaders may get involved at this level when a claim or a dispute is reported.

A dispute over water may grow to be a conflict within a small group of members in a particular area. The Muang Mai system has experienced prolonged conflict every dry season in two of its secondary canals, Muang San Papuey and Muang San Pahaew. The first dispute at San Papuey began when the farmers of the tail were anxious to get water at the time they wanted it and secretly shut off all turnouts at the head during the night. This led to an aggressive reaction, partly because the violators were new members of secondary canal group and came from a neighboring village.

Stealing water, or kan lak nam , also occurs more frequently during the dry season, when the water flow in both main and secondary canals is strictly regulated by a rotation schedule. The leaders have set the plan of rotation earlier. Theoretically, they divide the entire system along the main canal into four zones so that water is supplied for seven days in each zone. This means that the water takes three weeks to flow from the headwork to the last zone. The adjustment of either the zone or the period depends on the amount of water available. In fact, the leaders carefully plan, check, and adjust the distribution by attempting to determine the condition of the turnouts, one by one, at both levels of canal. Some of the turnouts of the zone can be closed during the week of delivery if the leaders decide that some areas in the next zone have an urgent need.

There are relatively few cases of violation in Muang Mai. However, violations by the orchard owners are the most frequent, because the priority of water rights is traditionally given to the rice farmers.

During the dry season the irrigation channels to all orchards are turn off, and permission to open them has to be obtained on a case-by-case basis for each water release. When stealing is witnessed and reported, the leaders put a heavy fine on the violators.

These disputes and water stealing are of great concern only within a small group of litigants and leaders. In general, disputes are settled quickly after reports by the huana and puchuey, who define the case according to the rules and decide the fines. In practice, the leaders may decide to what extent they allow flexibility in terms of payment of the fine. Records must be kept on the cases of dispute and stealing.

The leaders have to confirm their authority and enforce the rules. In practice, since Muang Mai leaders and members (violators) have had long acquaintance and frequent contact, they tend to cooperate and express their respect for the rules by negotiation and compromise.

Mobilization of Resources on Routine and Emergency Tasks

In the last section, the activities performed by the Muang Mai organization showed variation in the cooperating groups, with a small organization working together for the allocation of water and dispute settlements, while a large organization of the entire system is responsible for the task of maintenance. The heavy duties such as maintenance of the physical structure definitely require orderly management, especially in the mobilization of resources. As has been mentioned by Scott:

Organizations do not spontaneously emerge but require the gathering and harnessing of resources - - materials, energy, information, and personnel. . . . No organization is self-sufficient; all must secure a continuing supply of resources from the environment, and all must compete for the resources they require. . . . Of all the many resources required by organizations, the most vital are the contributions of its human participants.¹

Few previous studies of irrigation organization have discussed the procedure of resource mobilization, which clearly guides practice in various situations facing the irrigation community, in both routine and emergency situations. From the study of Muang Mai it seems that the association follows an orderly procedure in dealing with irrigation tasks. It is important to discuss the general procedures that the Muang Mai association uses in the mobilization.

Doubtless the procedure of resource mobilization must be highly organized step by step as it aims to collect and manage the various types of resources required for maintenance tasks. Both routine and emergency tasks need effective leadership and the active participation of members, but the emergency tasks require quick response and present a great range of demands for material supplies and labor, while the routine work is almost constant in the amount of supplies and workdays needed.

The leaders' houses, and particularly the huana's, are the offices of the association. The visits of the puchuey to the huana

¹Scott, Organizations, pp. 156-158.

in the morning and evening are the executive meetings; and consensus among these leaders means that the work is about to begin. Nevertheless, not every day is alike, and activity is relatively more intense and hasty at one time and less intense and slower at other times. It is thus of interest to see what the general procedures are and how the procedures of routine tasks differ from those of emergency tasks.

The mobilization of resources is termed by the Muang Mai organization hong haeng ghan, which may be translated as the call for irrigation labor, but is also includes materials, tools, and technical knowledge, and sometimes cash, from each member's family as a contribution. In mobilizing the labor and other resources required to implement the varied irrigation tasks discussed above, the leaders of Muang Mai are able to utilize one of the three following mobilization principles.

Hong Haeng Ghan Au Sen

Hong haeng ghan au sen refers to mobilization of a portion of the irrigation laborers for routine activities such as canal cleaning, weir repairing, etc. This is referred to, for short as au sen. Since the members have the obligation to contribute one man-day for every one rai of cultivated field, they send a family member to work to fulfill the requirement, and they can decide on what day they will contribute. Showing up at work each day is called au sen. There may be a large number of workers one day but a small number the next. Therefore, the work force may vary from less than one hundred to more than three hundred people.

Hong Haeng Ghan Radom

Hong haeng ghan radom is usually called radom for short, and it means a mobilization of the entire work force of all members to work on irrigation work, particularly in an emergency. It is usually called on short notice, and it is expected that the majority of members will come. Although it is stressed that all members have the responsibility to work in an emergency, mobilization of this type is actually carried out on a voluntary basis. No checking or record keeping is done, in contrast to the first type of mobilization au sen, in which strict, exact checking is done. Radom mobilization is occasionally used for the routine tasks when the Muang Mai association needs to finish up work like canal cleaning in a short period. Sometimes when the period of maintenance has been delayed and the canal has been closed for too long, because it is probable that great loss in crops will result, the Muang Mai association may call a radom to complete the work as soon as possible.

Hong Haeng Ghan Hubjang or Haeng Gahn Krongkan

This means a call for a portion of the members to work for pay as hired laborers on the government irrigation projects, which recruit only those who are willing to participate. Usually the project deals with the Muang Mai development and is opened to all farmers who wish to work and to earn cash income. But in practice priority is given to Muang Mai members, which means that the association cooperates with the government agents to organize the work groups.

The Procedures of Work

In resource mobilization using any one of the three principles just discussed, there are several important steps that are typically followed. Discussed below are the following steps:

Planning and Decision Making

Although each of the maintenance activities is different in details of work and work groups, their procedure in the management of resources is similar. All the irrigation tasks have to be planned at the beginning of the crop season. Usually the leaders decide to follow the Muang Mai rules with regard to resource requirements. From past experience they know what amount of resources will be available. But in some years, when they find heavy damage to the weir and canal from the last season, or when an unusual water flow or rainfall is predicted, they attempt to estimate additional amounts and types of resources to be used. Under the pressure of time in intensive agriculture, the Maung Mai association must carefully plan and decide the size and type of labor resource to fit the demands of each task without interrupting the members; agricultural work.¹ In short, the leaders have to plan and

¹Without modern scientific equipment to assist in the forecasting and planning, it is widely believed among Thai people that the farmers in Thailand, as in most places of the world, are those who know best their environment, since the indigenous knowledge and skill have been accumulated by experience and learning through many generations. Growing up in Thai society herself, the author has noticed many times that Thai farmers understand their soil, climate, water resources and seeds to an extraordinary degree. They farm in a way that is appropriate to their ecological setting, but they may not be able to explain this in a systematic way. Although not infrequently they may

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make decisions on schedule about the amount and type of resources needed and how to obtain them.

When the leaders meet at the huana's house before the seasonal maintenace begins to decide on a rough schedule, estimate their resources, and plan their assignments for the following week, the general questions arising in the meeting are what kind of work needs to be done, what part of the weir and the canal require work; whether a particular type of material is needed; whether extra materials and equipment are available (such as concrete, sand, rock, and a tractor), and how many cultivators are expected for the season.¹ The most crucial issue is how and when they can come up with extra resources to repair damage; this may include bringing in specialists or outside equipment. Unusual or urgent events cause involved discussion, and the leaders sometimes call a meeting of the members before any final decision is made.²

fail, due to the rapidly increasing changes of their environment induced by the outside world, the point is not whether they fail or succeed. Rather the significant point is that it should be widely recognized by scholars that the indigenous tools, knowledge, and methods exist, and these farmers choose among the available alternatives to solve their problems. Though in facing some situations the farmers may simply apply traditional ways, they are yet quick to adjust or change in response to changing situations. They are not stubborn, naive, irrational, or resistant to change.

¹The author had a chance to observe the meeting of leaders before the canal cleaning of the dry season in 1980. The huana and the puchuey held a meeting for about two hours in the evening which included a discussion of a rough schedule and the needed materials and labor.

²For example, once the leaders planned to use a bulldozer and cement to renovate the weir's foundation. They called a general meeting, with the result that each member family agreed to pay an extra assessment.

Since maintenance work is considered a routine task in which the leaders' knowledge and skill are widely recognized, all members usually accept their decisions about the schedule and resources to be used, even when they call for extra contributions. The decisions and schedule are flexible and are based on the leaders' consideration of what they can expect of most farmers throughout the area.

The plan and schedule for an emergency have to be relatively more rigid to permit fast mobilization. In order to get labor and resources, the leaders usually call the farmers from the nearest villages so as to get as many as they can in a short period. They may ever call for labor at night to check damage and do a quick repair. In the case of severe destruction, the plan to call the entire labor force, or radom, is followed, but no meeting of the members is held.

Organizing Resources and Record Keeping

Soon after the plan and schedule are set up, the leaders proceed to get in contact with the members and announce the holding of the meeting and the collecting of resources. When it is a question of routine maintenance, the puhuey give the messages to the laam, who notify the members about the mobilization. The meetings are usually held twice a year, at the beginning of each work season. The meeting not only functions to unite all members and to emphasize cooperation among members, but it also helps the Muang Mai association to keep up with the current situation and to adjust the proposal plan and schedule. The kae laeka, or secretary assistant, usually comes up with the list of cultivators and resources. Collecting the materials must be done the

day before the renovation at the weir site, which means that all members must start working before that to prepare bamboo stakes and logs, which they usually obtain from the forest nearby. Usually they are told the amount and type of resources needed, including labor, materials (bamboo stakes and logs), tools (knife, axe, shovel, basket), and sometimes additional cash. When the work day comes, the kae laeka keeps an account of labor and material contributions from each member.

Resource mobilization requires a record in detail of what the association has been able to obtain and how much has been used in each task. Besides checking on members to establish whether they have fulfilled their obligations, the kae laeka records the exact amount of contributions in order to guarantee fairness in allocating responsibilities among members. The account of resources is kept by the kae laeka for each routine maintenance. In an emergency the labor account is not strictly kept, but the materials are considered as supplies that the association must carefully record. Since the association does not have time to collect the materials needed in the usual way, they obtain bamboo from the area near the work site and reimburse the owners for it.

In general, the association has three types of records: a memorandum, an account of activities and resources, and an official report to the government agency, i.e., the district office (amphoe). The kae laeka is mainly responsible for writing a memorandum of the meetings, and recording emergency maintenance, to be kept as a Muang Mai record. Also, he has to work on several types of account, such as the main account of resources in routine activity, an account of revenues and expenditures, and account of fees and fines, and an

account of any special project in cooperation with the government agencies. The records are presented to the members at the meeting or at the members' request. Lastly, the association reports to the district office on the result of its activities each season. All these records are made from the stage of planning through the completion of the activity.

Directing and Participating in Actual Work

During the period, the management of resources means the direction of leaders and the participation of members to complete the task. It is in this period that the irrigation leaders exercise their authority in organizing the entire labor force and utilizing an enormous amount of materials in order to maintain the irrigation structure. The rules emphasize that all members have to follow the orders and decisions of the leaders, and those who are absent or sneak away from work have to be fined. Direct, face-to-face communication between the leaders and the members during the actual work encourages unity and confirms the leaders' authority and rules about the groups' rights and duties. In an emergency call for repairs, the workers must come equipped with their tools and the leaders usually put tight controls on the work group, making decisions, and giving orders immediately, with no attempt to seek consensus. This procedure -- which includes planning, organizing, and directing the actual work -- is generally concluded with in one day or a few days at most. In contrast, the routine work follows the rules, step-by-step, and needs to be discussed and agreed on in the general meeting.

Reviewing Work and Resource Use

After the completion of the work, the leaders meet to discuss what has been done; in particular, the kae laeka has to review the account of resources and to send notices of fines to the members who failed to participate in the work. In the case of a radom in an emergency, the leaders do not have a record of labor contributed, so they simply learn of the absence of some members and warn them about this wrongdoing. Those who are absent usually also receive a kind of informal sanction from other members, such as their friends field neighbors, if they continue to shirk their duties.¹ Reviewing work and resource use is thus an obligatory concluding step in the procedure of resource mobilization. Not only does it help leaders and members to learn the situation facing them, but the accumulated experience facilitates problem-solving in the future.

To conclude, there are some contracts in the way the Muang Mai association carries out its different tasks. First in urgent situations the work is carried out intensively, with the leaders planning and making decisions to call for labor at once, sometimes at night. They also attempt to finish the work as soon as possible. Work on routine maintenance is less intensive. The association proceeds through four steps one by one and may extend the schedule over a long period to accommodate the cultivation work of its members.

¹A number of Muang Mai members mentioned u-hue ai or wa toh, the attempt to embarrass the members who avoid their responsibilities in the emergencies. This is a direct face-to-face critique.

Second, during emergency tasks, there is quite highly centralized control by the leaders. The decision of the leaders, particularly of the huana, is considered as final; the call for assistance is an order from authority that all members have to follow. But for normal work the members may raise questions at the meeting and may suggest changes in the schedule or in the resource requirements.

Third, there is a higher degree of flexibility in the rules for emergency tasks. The possibility of modifying the rules about requirement of resources is kept open in response to the situation. The leaders may call whichever members are ready and get materials and tools that are available without notifying them in advance. Details of checking and record-keeping are not carefully kept. In contrast, during routine maintenance the size and amount of the resource contribution must be recorded exactly in conformance with the rules.

Procedures in the Irrigation Development Project

The Muang Mai association also cooperates with the government irrigation agency in certain irrigation development work. Sometimes the technical and material supplies from its members are not adequate to deal with an increasingly complex problem, particularly a technical problem. Then it is necessary to seek additional resources and technical help from the government. However, the Muang Mai association manages its irrigation work with a relatively high degree of independence, with local initiative and local leadership.

Generally, the work of a special development project of Muang Mai involves local initiative, local leadership, and involvement of the

local irrigation association from planning through to completion.¹ Usually the Muang Mai association can obtain government funding in one of two ways: In one the association follows the general procedures for routine and emergency work but ends up with a deficit and requests assistance from the amphoe district or RID office. In the second case, when a major development of physical structure is required, such as the reinforcement of the weir foundation or the reconstruction of the entire structure, the Muang Mai association sets up a plan and sends a proposal to the central government through the RID, with other local leaders, experts, and politicians assisting the association to go through the

¹An example from the records of the Muang Mai association for 1975 to 1980 is the special project for constructing the main weir, which was funded by the central government through the RID. Although the record is not complete, the interviews with the Muang Mai leaders and the RID engineers during the field work showed that the project is highly participatory work. The idea on the development of the weir came from members of Muang Mai. The leaders proposed a construction project to the central government for the first time in 1974, and the association made several attempts to get the project funded by government agencies such as the RID, the Office of the Prime Minister, and the Committee for the Development of Northern Region for several years. The project was finally approved in 1979. Although the engineering design was mainly draws up at the RID office in Bangkok, the design was based on a survey and consultation with the Muang Mai leaders. The Muang Mai association, at the early stage, also gathered a large contribution (about 20,964 baht, which is about 20 percent of the land cost) from members to purchase land at the headwork site. When the construction begun at the end of 1980, the author observed the discussion between the RID engineers and the Muang Mai leaders on technical concerns and material supplies, as well as sources. Also when during the construction the team prepared the headwork site and the flow in the main canal had to be adjusted, the RID engineer consulted and asked for permission from the Muang Mai leaders.

bureaucratic procedures. In this way the Muang Mai association was successful in obtaining government funds for the development project of the main weir 1980-1983.

The Principles of Resource Mobilization

Muang Mai members always consider resource requirements of four main types: (1) labor, which includes human energy and the worker's knowledge; (2) tools, including knife, axe, shovel and bamboo basket; (3) materials -- are bamboo stakes, logs, sand bags, etc.; and (4) cash. The requirements on resource contributions from members vary in type and size. Also the contribution cannot be considered as fixed, for the amount of required depends on the amount of work in that particular year. For example, a farmer who cultivates 3 rai may have to work at canal cleaning for four or five days if the leaders have decided there must be second round of labor to finish the work quickly. In other cases some of the farmers may contribute less than the amount required. Usually mu ya suan are required to contribute only cash in times of emergency and for special projects of repair or construction. Similarly, the responsibilities assigned to mu jao ti are to contribute cash from time to time when an emergency or special project requires some capital. In contrast, the mu na chao, or tenant farmers, have to contribute various kinds of resources and participate in all irrigation tasks. However, they are paid when they are employed on a government project. They are seldom asked to contribute only when an unusual repair must be done.

TABLE 5.2

TYPE OF RESOURCE REQUIREMENTS IN IRRIGATION ACTIVITIES

Category of membership	Sub-category of membership	Irrigation activities	Resource requirements
<u>mu ya suan</u> (orchard owner)	-	Emergency and special project	Cash
<u>mu ya na</u> (rice farmer)	<u>mu jao ti</u> (riceland owner)	Emergency and special project	Cash
	<u>mu na chao</u> (tenant farmer)	Routine, emergency and special project	Labor, materials and tools

The size of resources required from each category is not equal but varies with the share in initial investment by the rice farmers, who consequently receive priority and also contribute less than the fruit growers. The latter have to contribute almost double the amount of cash when the Muang Mai association mobilizes its capital resources for a special project. The assessments are generally applied to the fruit growers according to the size of their cultivation in one of three categories: between 1 and 5 rai, over 5 rai to 10 rai, and over 10 rai.

Now, concerning the size of the resource requirement, we also see a difference between the farmers of the head and the tail area. Differentiating clearly between tang kao, the head, and tang pai, the tail, the Muang Mai association requires more workdays from the tang pai group because of the initial contribution of the tang kao farmers. The tail section of the canal is a newly expanded area, and the farmers there enjoy irrigation water from canals long established by the former group. The rules state that each farmer of the tail has one man-day at the tail and one man-day at the head section in the canal cleaning work, if he or she cultivates one rai. This means, in fact, that the farmers at the tail contribute two man-days per one rai, in contrast to one day per rai for the other group.¹

¹The work on canal cleaning is divided into two sessions: the work at the tail, and the work at the head section. Farmers of the tail must participate in both sessions, working one day in the first session and one day in the second session for every rai cultivated.

As was mentioned previously, the rules are strictly enforced during the routine activities; there is checking by the leaders and punishment. Those who threaten the rights of the other water users by stealing water have to pay a fine. The leaders assign the fines according to the size of the tae nam, or share of water, with the heaviest rate for the large-size tae nam. The fruit growers, who are considered to be stealing water irrigated their orchard without permission from the leaders, must pay a heavy fine of between 500 and 1,000 baht (compared the fine of the large-size tae nam rice farmers, which is 500 baht).

On the other hand, if members fail to participate during the mobilization or fail to bring the tools or materials required, they pay a fine according to the number of days or items absent. The rate is 20 baht per day and 5 to 10 baht per item of equipment or material.

To sum up, the resource mobilization is based on the following principles:

- 1) The principle of fairly sharing duties and obligations is the basis of the mobilization. The muang Mai organization decides the size of each member's resource requirement in terms of workdays and materials according to the size of his or her cultivation, or, more precisely, the size of his or her irrigated land. As the saying goes, "one rai, one labor, one day." Thus the general rule is that water user who cultivates the same amount of land contributes the same amount.

- 2) However, the principle of priority or seniority of membership is evidently emphasized by the organization due to the concern with the initial contribution (investment) of the prior groups of

farmers, -- for instance, the application of different rules to the rice farmers and fruit growers and to the farmers of the head and of the tail.

3) The principle of resource availability clearly guides the rules on the type of resources required. The organization generally mobilizes resources which are available from the groups who own that particular type of resources. For instance, the fruit growers and rice land owners are generally required to contribute a large amount of cash, while tenant farmers are basically requested to provide labor, materials, and tools.

4) The principle of appropriate exchange between rights and duties, or between benefits and obligations, for each member is emphasized in the resource mobilization. The system of water allocation of Muang Mai does not aim to share an exactly equal proportion to all water users but to share the amount so that the cultivation in each field throughout the command area will be able to survive. The Muang Mai irrigation system has an elaborate way of determining the share of water. In addition, the share of duties is defined by the size of irrigated land. Certainly, it is the exchange between the benefits and obligations that the water users feel appropriate and fair. Neither exactly equal size of share nor exact balance in quantitative terms is a true concern of the Muang Mai organization. But it clearly has a fair and appropriate exchange of rights and duties.

CHAPTER VI

THE UPLAND COMMUNITY IRRIGATION SYSTEM OF THE NA PAE:

ORGANIZATION AND ADAPTATION

The Na Pae community irrigation system is one of five located along a small river, the Mae Pae River, named after the mountain "Doi Kun Pae" farther south in Chomthong District. The same main road that brings us from Chiang Mai City to the Mae Klang Basin leads to the Mae Pae Basin. There a cluster of rice fields and several residential communities are out of sight from the road in small upland valleys. Because of its small size and only recently developed irrigation agriculture, the Mae Pae Basin and the irrigation systems in the area are not well known to the people of the Chiang Mai Basin. Only in recent years, starting in 1965, have the farmers of the Mae Pae Basin begun marketing dry season crops like red onions, peanuts and soybeans through the local traders from Chomthong and the city merchants.

Fai Na Pae, Fai Hong Puey, Fai Muang Luang, Fai Suanbuak Kun, and Fai Nakob are the five traditional muang fai irrigation systems on the Mae Pae River. In total these diversion weirs and canals irrigated about 3,500 rai of paddy fields in 7 villages (muban). Fai Na Pae, the system in this study, is the oldest one, built upstream at a elevation over 500 meters to feed about 400 rai belonging to 80 farmers of the village of Ban Pae Luang. The weir is a bamboo structure 20 meters

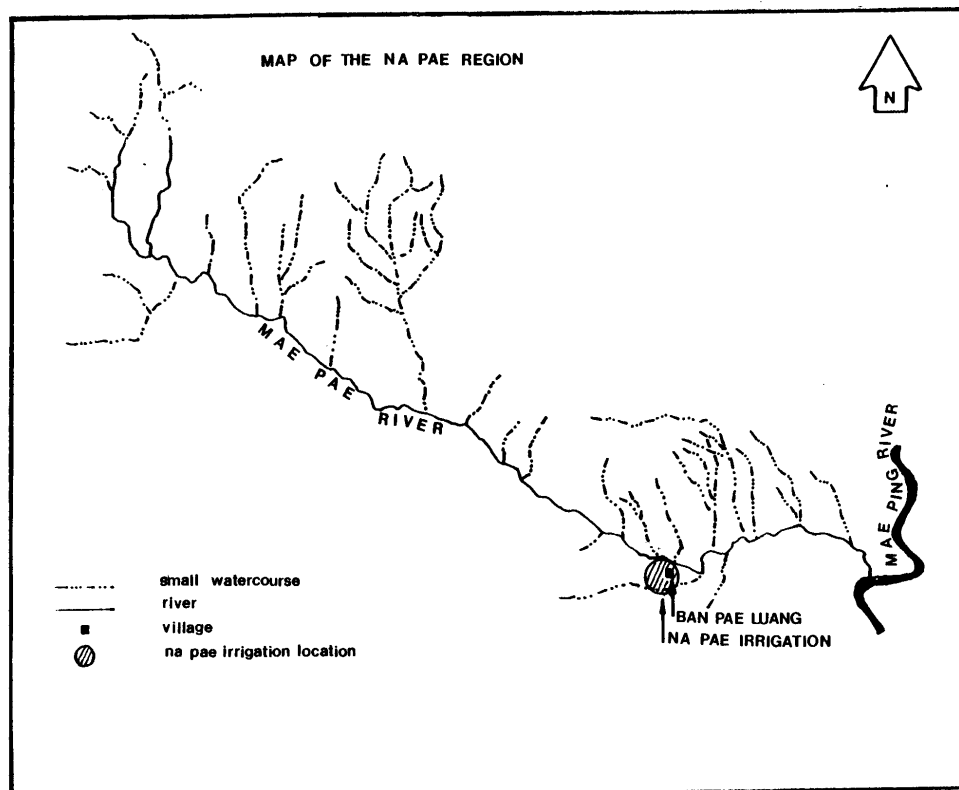


FIGURE 6.1

in length, 10 meters in width, and 5 meters in height, and the main canal runs downward past steep slopes at a 20 to 25 degree angle to the scattered rice fields. Fai Nakob is the last downstream weir before the Mae Pae River drains into the Mae Ping River.

As in other Lua villages, in the past the people of Mae Pae Luang practiced swidden agriculture and rotated their cultivation from field to field. This system of upland agriculture involves one year of cultivation followed by a fallow period of seven to ten years. The system is quite stable, and field users, and their heirs, expect to return to the exact same field each time the cycle is repeated.¹ The establishment and development of the weir and canal system and wet rice agriculture began about seventy years ago (1910's) at Ban Pae Luang. These early developments were definitely no simple task for the former generation. By hiring a local engineer as well as a number of workers from a lowland community of Chomthong who understood the muang fai irrigation techniques to assist in the construction of weirs and canals, the people of Mae Pae Luang gradually learned the way to control water as well as irrigated agriculture.² Several communities of the

¹Mae Pae Luang is a village of descendants of the upland Lua. They engaged in slash and burn cultivation of upland rice using the same practices as did the Lua at Ban Pa Pae in Mae Sariang District studied by Kunstadter. Kunstadter, "The Lua' (Lawa) of Northern Thailand," pp. 32-44.

²From the interview with Poh Luang Yawichai and Poh Ne of Mae Pae Luang, who were small children 4 or 5 years old at the time of the first construction in the 1910's and who participated in the second period of the construction to extend the canal when they were about 17 years old.

southwest of Chiang Mai had accepted the practice of irrigated agriculture as early as the late 19th century.¹ This was a significant period in the flow of technology as well as of social and cultural ideas, which moved from the lowland people to the upland Lua in this region, who little by little assimilated the lowland culture.

The operation and maintenance of irrigation systems is much easier when the weirs are built at the high elevation of over 500 meters and the canals run on a steep slope. Rapid flow and firm canal banks help to reduce the problem of silt along the route to the rice fields. The management of the water system seldom requires the cooperative efforts of all five irrigation organizations. Also, in May and June each irrigation system needs only wet-season maintenance work. Like the other four, the Na Pae organization works independently to operate and maintain its irrigation system. Questions concerning the sharing of water between the upstream and downstream system, which rarely arise, are discussed by the leaders in informal talks upon request. There are no regular meetings of the leaders of the irrigation systems along the entire river. In essence, five irrigation

¹Kunstadter quotes from Hallet (A Thousand Miles on an Elephant) and also reports that irrigated agriculture has been practiced by Lua mountain dwellers in villages such as Ban Boh Luang at least since the 1880's, and probably for longer than this. The Lua and Karen in eastern Mae Sariang District, however, began making irrigated fields around 1930. See Kunstadter, "The Lua" (Lawa) of Northern Thailand."

organization under local names as separate bodies manage five irrigation systems. When questions of water management arise between two groups they find a solution. The intersystem activities of the entire river have never been organized under a cooperative effort of the five irrigation groups on a regular basis.¹

Early Adaptation of the Na Pae Irrigation Organization

Irrigation systems are not traditionally found in Lua communities anywhere. These systems are a new adoption of technology, a new organizational arrangement in agriculture with related rituals from lowland northern Thai communities acquired during the transition period at the beginning of 20th century.

Kunstadter notes in the conclusion of his research that "obviously the Lua have not lived in isolation, and their present-day culture reflects contact with many people over the years."² Socially, culturally, economically, and politically, the Lua people in most

¹From general conversations with the leaders and retired members of the five irrigation systems it seems that no administrative body, either in the form of a federation or of some other coordinated body, to manage the entire river system exists. All five systems, in similar ways, explain that there are no serious conflicts among the five irrigation communities. Through the leaders any problem can be easily solved. Since not very much maintenance needs to be done, cooperative work between the systems seems unnecessary. The five irrigation organizations have worked together only once on a government development project under conditions set forth by the central government.

²Kunstadter, "The Lua' (Lawa) of Northern Thailand," p. 49.

communities have changed to become like the lowland northern Thai, so the community of Ban Pae Luang probably can be considered one of northern Thai as today they completely identify themselves as northern Thai. Each Lua community has made the transition from a small independent community with a simple political organization under leadership of a local headman through having a connection with the central power of the Chiang Mai State to presently reaching the status of a local unit under the government of the central Thai Kingdom.

Before the twentieth century, the Lua community of Ban Pae Luang, like many Lua communities, was traditionally granted a charter by the king of Chiang Mai State establishing them as the principal supporters of a Buddhist temple (the temple is now called Rajwisutaram). As the khaa thaat wat, or slaves of the temple, Lua had the duty of paying land rent to the temple, maintaining monks and temple, and sending tributes to the king.¹ Moreover, several historical documents indicate that the Lua communities that are old settlements in the hill areas have been recognized by other hill ethnic groups as claimants to the ownership of hill lands and collectors of taxes for the king.²

¹The king of Chiang Mai State granted the position to the Lua and inscribed it on a silver plate as an official document to indicate to the local lords (phaya) and princes (chao) that these Lau were slaves of the temple, and thus nobody could mobilize them for work under any circumstances. Ban Pae Luang village today still preserves this inscribed silver plate, but it is not usually shown to outsiders. However, the translation has been published recently by Wat Pak Nam, a major temple in Bangkok, and it became available to the public in 1977.

²See Kraisri Nimmanahaeminda, "An Inscribed Silver-Plate Grant to The Lawa of Boh Luang," Journal of Siam Society: Felicitation Volumes of
Contd.

At the period of an administrative reform in the beginning of the twentieth century, the government of the central Thai kingdom also attempted the abolition of the slave (phrai and thaat) system. In addition, the central government refused the claim to the Lua land, and required Lua people to pay tax. Although the Lua enjoyed the new status and were free from obligations, they had a great loss in political and economic control in the upland areas.¹ The Lua no longer had rights to the swidden fields and did not serve as the tax collectors in the upland areas.

These political and economic circumstances encouraged the development of irrigated agriculture. First, the new status of Lua as no longer khaa thaat wat (slaves of the temple) provided incentives for them to invest in land and irrigation development. Second, the pressure to abolish the traditional Lua leadership, as well as their historic dominance of the upland communities, mounted by the government of the central Thai kingdom, which replaced the Lua headman with a local leader as puyaiban and imposed taxes upon Lua led to the development of the Lua economy and irrigated agriculture. Third, the government of the central Thai kingdom approved the claim to wet-rice fields while it

Southeast Asia Studies, 2 (1965): 233-254; and Wat Pak Nam, A translation of Inscribed Silver Plate of Wat Rajwisutaram (Bangkok, Thailand: 1977); See also Hallet, A Thousand Miles on an Elephant; Kunstadter, "The Lua' (Lawa) of Northern Thailand," and "Subsistence Agricultural Economics"; and Walker, Farmer in the Hills.

¹Kunstadter, "The Future of Upland Tribal People."

ignored their rights on swidden land. Although it was difficult to develop wet-rice fields and irrigation in the upland area, the Lua needed to find a legal right to their cultivated fields.¹

At the beginning of the 20th century, many Lua communities adopted irrigated agriculture as well as the social organization and ritual practices of the lowland northern Thai. Ban Pae Luang village brought in irrigation and wet-rice cultivation between 1910 and 1920.

Since the Na Pae irrigation system was relatively small, serving only 150 rai and seventeen members in the early days, the administrative structure was simple, directed by two leaders, the huana and the puchuey, who were responsible for the entire organization. At the present, the two irrigation leaders are usually relatively independent in their work but they generally consult the puyaiban when they need cooperation from all the irrigation groups for a large mobilization and or a special construction project.

The traditional leader or headman of the Lua community, who sometimes also led in religious activities, was a political-religious leader who had full authority to administer all kinds of community affairs. The official has now been replaced by a new type of leader, the puyaiban. The puyaiban has recognition from the central government, and has the necessary qualifications for working with the district government. For example, he can speak central Thai and knows how to deal with the bureaucratic work from the district office.

¹Ibid.

In Ban Pae Luang, an adaptation of new village leadership gradually occurred between 1890 and 1910.¹ Toward the end of that period, villagers tended to recognize the need to have a leader who could carry out official duties in coordination with the government agency.

Since all members of the Na Pae organization are from Ban Pae Luang village, the irrigation leaders find that their relationship with the office of the puyaiban can help to facilitate irrigation activities and the mobilization of resources from the members.

As a result it appears that the irrigation organization of the Na Pae system is partly under the leadership of the puyaiban, who seems to have sufficient influence to intervene both directly and indirectly in irrigation matters.²

To sum up, the irrigation organization of the Na Pae system, an introduced element from the lowland community, has been transferred to and established within Ban Pae Luang community. An adaptation throughout the last seventy years has occurred in the trend to blend into the administrative structure of village.

¹In Ban Pae Luang at the turn of century the first three men selected as puyaiban were rather old men who led in political and religious activities following the traditional type of leaders among Lua communities.

²When the Na Pae organization needed to get assistance from the government agency and to mobilize cash and labor for the special repair and construction project, the irrigation leaders needed to get support and final agreement from the puyaiban, who later took the proposal to the district office. This information was obtained in conversation with the puyaiban and the irrigation leaders.

Irrigation and Land Development

Today, people of Ban Pae Luang live and dress like northern Thai; they are Buddhists, grow wet-rice, and do minor swidden cultivation in small areas. To convert themselves to wet-rice farming required an arduous effort and the cooperative efforts of the people in the community to construct rice fields on the slopes and to build weirs and canals to supply water to the fields. The system took many years to establish and has taken many years to expand both the canal system and the area of cultivated land. With the limited resources of the region and with population rapidly expanding almost to the full carrying capacity of both water and land, people now seem to have difficulties with scarcity of resources, and in some years suffer a deficit in their subsistence living.

The swidden agriculture of the Lua at Ban Pae Luang requires the rotation of land-use practices and a fallow period. It is reported that the Lua are relatively good conservationists and are knowledgeable about the vegetation and forests of their hill environment. Their cultivation is carefully carried out to avoid the destruction of the forest and the watershed area.¹ Their understanding about the environment is combined

¹Kunstadter notes: "the place of cutting is determined by many beliefs. The Lua? do not cut the virgin forest for their fields: the believe the virgin forest is the home of powerful spirits, who would be offend if the tree were cut. They also prefer to cut fields where the trees are not so large. Preservation of virgin forest areas may also serve to provide seeds for reforestation, as a game refuge which is never burn over, although the people are not explicit about this function. Fines are assessed for cutting in tabooed area, and the money is used for the purchase of sacrificial animals." See Kunstadter, "The Lua' (Lawa) of Northern Thailand," pp. 34-43.

with the traditional agricultueal rules and rituals, which are usually expressed in elaborate ceremony through their cultivation cycle.

The document or inscribed silver plate granted by the King of Chiang Mai City 400 years ago indicates that a number of Lua and their lands belong to the Buddhist temple. Each family cultivating in the area decided upon by the village leaders had to pay rent in kind and perform services for the monks.¹

In the swidden system, the fields are chosen and then allocated by the village leader and the old men of the community. Since the Lua rotated land and the fallow period was about nine years, the fields are usually located in several areas; new allocations are made every nine years. It is a traditional practice that the leaders first select their fields, and then the other families go back to their old fields. The leaders have to control and make suggestion with regard to the re-allocation of land among families that have changed in size. How large the area of cultivated land is seems to depend on how laborers come

¹From the translation of the inscribed silver plate of Wat Rajwisutaram (Ban Pae Luang), published by Wat Pak Nam, 1977. The original plate is preserved by the people of Ban Pae Luang who, every four years, pay it respect and perform a religious ritual focusing on it. The author has been told that there are only two men of the village who know where this silver plate is kept, and it is prohibited to the outsider. This may be related to the fear that the commercial value of this antique may bring thieves to the village. Many Lua communities have lost precious documents. In Pa Pae ("The Lua" (Lawa) of Northern Thailand"), people lost their silver plate in the fire which once swept the village. As an exception, the villagers say they have permitted one prestigious, well-known scholar, Kraisi Nimmanahaeminda, to observe the sacrifices dedicated to the silver plate. Permission and invitation to do this have been given to the author, but this will be for the 1983 ceremony.

from the families, or how much exchange labor the families can afford.¹ At Ban Pae Luang, the allocation in the past followed this pattern, except that the villagers had to pay rent in kind to the temple.

At their transition to irrigated agriculture, after the people of Ban Pae Luang had been set of obligations to the temple at the order of the northern King, the families took the fields where they worked every year and started paying a land tax to the government. One old man, an innovative farmer, organized a group and hired lowland experts on irrigation to construct a weir and canal around early twentieth century. Each land owner member of the pioneer group begun to develop rice fields little by little, using the irrigation system and wet-rice agriculture.² So, the amount of the land owned depends on the ability of each family to develop irrigated fields. The traditional practice of allocation was abandoned, and there was no practice of reallocating additional land for the family that grew larger.

When a number of new families was added, the need to develop new fields and to extend the canal became apparent. The first developers, a group of seventeen families, assumed the right to allow extension of the canal. The canal was extended to six kilometers in length so as to supply water to approximately 400 rai of rice fields and cash-crop fields.

¹Kunstadter, "The Lua' (Lawa) of Northern Thailand," p. 34.

²The description of land and irrigation development comes from general conversations with 8 old men, age between 69 to 87, of Ban Pae Luang.

Once a field has been cleared and placed under irrigation, it becomes the property of the man who clear it. It can be registered in his name at the district office and then mortgaged, rented, or sold, and is obviously thus in a completely different class of property from the swidden farming areas.¹ Reportedly, only five families of Ban Pae Luang own irrigated fields in both the head and the tail sections of the canal. The farmers at the head section are all the descendants of the pioneer group, while those at the tail section are young new families. The new families, however, are closely related kinsmen to the first group.

All the irrigated land belongs to the residents of the one single village of Ban Pae Luang. Since land and water resources are limited, and are reported already developed to their full extent, the size of each holding is relatively small, between two and seven rai. There is little variation in holding size (only one family owns as much as fifteen rai).

Na Pae Irrigation: Engineering Structure

The basic technology of the muang fai irrigation system everywhere is alike: it is a simple structure of diversion weirs and canal networks. The only differences seen are in the details of the diversion structure along the canal and at the field ditches. The topography of the river basin is one major factor that gives variation in design and material used, but the technique is that of controlling the river flow

¹Kunstadter, "The Lua' (Lawa) of Northern Thailand," p. 40.

through gravity flow which leads the water from the high level to the lower one. The irrigation technique is much simpler in the hilly or upland areas than in the flat areas.

The irrigation system of Na Pae is also divided into three levels of controlling structure: the main controlling structure or headwork; the main distribution structure; and the secondary distribution network, a single farm turnout. Since the engineering structure in Na Pae is typical muang fai one as explained in the previous chapter, the following description will be brief and will emphasize only the variation we can observe in this particular area.

Main Controlling Structure

The main controlling structure of Na Pae consists of a main weir (fai), the gate at the intake of the main canal (pratu nam), and the spill way (lai sia nam). Since the weir was developed in recent years, its structure is built half of bamboo and half of concrete. It diverts water into the main canal, which goes about two kilometers and then divides into two branches to serve 400 rai. The Na Pae people also call the weir fai and use bamboo stakes and logs in construction and repair. In order to make the base firm, they use rocks of various size lined up across the river on the upstream side in order to slow down the current, and at the downstream side in order to reinforce the foundation of the weir. The Na Pae weir needs repairs annually in June, before the wet-season crop is undertaken, but requires a relatively small amount of resources.

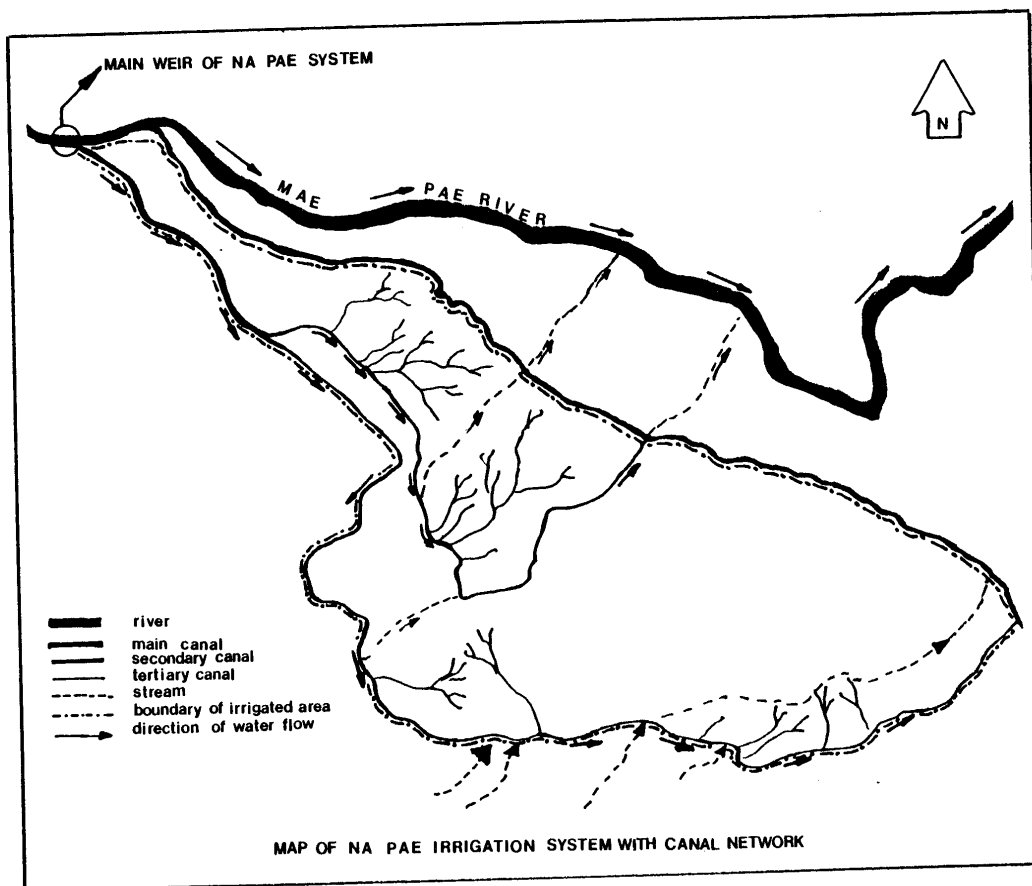


FIGURE 6.2

The pratu nam, or main gate at the intake, was built under the RID project to control the volume of water running through the main canal. In the traditional muang fai irrigation, without a control device at the intake, the diverted water runs freely, and it very often destroys the canal banks after the heavy rain comes. With the control gate there is no need to repair or replace materials every year; this is a standard model concrete gate.

This gate is usually opened up to the maximum level during the dry season and partly closed at various levels as needed in the rainy months. It is still used effectively today.

To avoid excessive water at the upstream side of the main gate, a channel about 1.5 meters wide in the canal bank was opened to let water spill over and flow back to the river. This is main structure at the headwork called the lai sia nam.

Main Distributory Structure

After the water is diverted into the main canal, it is channeled by division structures at several locations until it reaches the rice fields. The size of the main canal is 0.80 to 1.00 meter wide, the secondary canals are between 0.50 and 0.75 meter wide. These canals are considered relatively small, but the canals going downhill can bring water to the tail section about six kilometers distant. The main distributory structure of Na Pae is composed of the muang yai (main canal), the muang noi (secondary canal), Kiang nam (division structure), ta-ang nam (turnout), and nam loh (drainage ditch). The distributory structure has the same design and functions as do the muang fai systems in other

places, but the terms are slightly varied, according to local usage and the original name used by the lowland community from which people adopt it.

The canal network of Na Pae goes downward to feed rice fields on the slopes and in the small valley; then like a tree, its branches continue into smaller units, reaching out to everywhere people can develop land for cultivation.

The main canal or muang yai of this system actually does not function as a delivery canal leading directly to the rice fields, but serves only to bring diverted water from the hill downward and splits into branches of secondary canals, which further divide into smaller ones. It goes about two kilometers and break almost equally into two secondary canals (muang noi). The two secondary canals are constructed on a higher contour in order to irrigate the fields at the lower levels. Because the canal bank is strong and built firmly with rocks, Na Pae members seldom have maintenance problems. However, in some sandy areas where the bank easily slips, there has been trouble before the bank was repaired with concrete.

The minor canals toward the tail of the network are usually short, some of them bring water to only a few plots of about one-half to one rai and are locally called muang tong. These are recent extensions to small pieces of land that individual farmers attempt to develop little by little, year by year. However, the rules of Na Pae do not allow members to request an increase in their share of water, and the initial allocation is considered as final, as the relatively fixed proportion of water for each family that the system can provide.

However, it is evidently worthwhile to try to develop new plots. Sometimes one can see dried rice fields left unused during the cropping season.¹

Where the water is divided into two streams, a kiang nam functions to divide the flow. Generally farmers use a piece of wood set across the canal against the current; the water flows through open channels in the upper part of the wood. The size of the water share is controlled by the width of the channel at the kiang nam point. Since the wooden kiang nam can last only a few years and frequently need replacement, the Na Pae organization has rebuilt most of them as permanent structures.

The most important distributory structure is the ta-ang nam, or turnout. This structure is also a measure of the water shares and therefore of the duties in irrigation activities that each member has, as the rules describe. The ta-ang nam is made of wood. Instead of an open channel on the upper part, it is cut through the middle with a square hole proportionate to the share of the individual farmer or the share of several farmers who use water from the same turnout. Here, particularly within this irrigation system, once the allocation of water has been decided and the size of the turnout or ta-ang nam determined, it is considered as permanent and can hardly be changed under any

¹The leaders of Na Pae explained that many member farmers have attempted to bring more land into cultivation because their families grew larger in the last fifteen years, while the available water resource from this small river has already been shared out to its full capacity. It is almost impossible to add new rice fields unless they develop a storage technique to control the flow during the rainy season.

circumstances. It was noted that the last allocation was made fifteen years ago and that this continues to be the final share for members today.¹ Those members who want to extend their rice fields must be willing to do so at their own risk.

The water drained off from the fields usually goes back to the river. The farmers dig a narrow drainage ditch at the end of the slope to collect all the used water from the rice fields and direct it downward to the river.

A Single Farm Turnout

In the Na Pae irrigation system, a group of irrigated fields sometimes shares water from a single turnout or ta-ang nam. The farmers let the water flow through the open channel from one field to the next. The farmers simply punch holes through the field dike when they want water and close the channel when they have enough.

Operation of the Na Pae Irrigation System

The cultivated region within the command area of Na Pae irrigation is mostly upland fields 400 to 500 meters above sea level. The rice fields have been developed in a terraced field pattern with the field dike about 8 to 10 inches high to keep the water for a long period as is required for wet rice.

¹The irrigation headman of the Na Pae system, Poh Kumma Wongwarin, gave the information on the decision on ta-ang nam.

Although wet-rice cultivation is relatively a new technique and a new way of life for the people at Ban Pae Luang, by now they have become more secure and confident in dealing with the problems of wet-rice cultivation. The Lua people eat rice as their daily diet but have abandoned the variety of upland rice, or kao rai. A variety widely grown today is a new glutinous rice type with high productivity per rai. It was developed recently by the Northern Rice Experiment Station in the district of Sanpatong, and so is known locally as kao sanpatong, and was introduced to Ban Pae Luang in the 1960's.

What we can observe in general today is that the agricultural system is mixture of wet-rice and swidden agriculture. The people of Ban Pae Luang grow rice in the developed wet-rice fields on the slopes and narrow valleys surrounding their village and grow some upland crops in the forest fields. Actually, member farmers engage in a double cropping system: in the wet season they grow rice in irrigated fields and cotton, pepper, and vegetables in the forest fields; in the dry season they cultivate cash crops in the irrigated areas and take cattle to the hill fields. They rotate cultivation in order to utilize both types of field constantly throughout the year. In recent years a number of people have developed new permanent fields at the upper side of the canals in order to grow onions and peanuts during the wet season too. This means that these people have brought more land into irrigation by carrying water to these fields.

The Mae Pae River, from which water is utilized by five small irrigation systems, is a small water course that is almost completely dried up during April and May. Thus, it can only serve small area,

about 25 to 30 percent of the entire irrigated area, for the second crop in summertime. The Na Pae is able to serve comparatively more fields than can the other irrigation systems because of its location at the head of the stream.

The member farmers of the Na Pae have agreed among themselves to arrange their crop pattern to deal with the problem of water scarcity. Under the new development program in agriculture, many new cash crops or dry season crops have been introduced to the Mae Pae River Basin, and more and more farmers have become interested in growing crops such as red onions and peanuts since 1965. However, only 25 to 30 percent of the cultivated land is actually under dry-season cultivation in Na Pae region, and member farmers of the upper canal, muang sen bon, and of the lower canal, muang sen lum, have to take turns alternating cultivation between red onions and peanuts.¹ If the farmers of the upper canal plant red onions, this year they have to grow peanuts the next year, and vice versa.

Besides crop arrangements, in dry season the Na Pae organization also manages the rotation of water between the head and the tail sections of both branches. Since the water is channeled from the top of the slope to the bottom, the flow goes rapidly from plot to plot. It

¹The estimation on dry-season crops is based on information from general conversation with irrigation members. The informants report that rotation in the cropping pattern has been made recently to solve the problem of water scarcity.

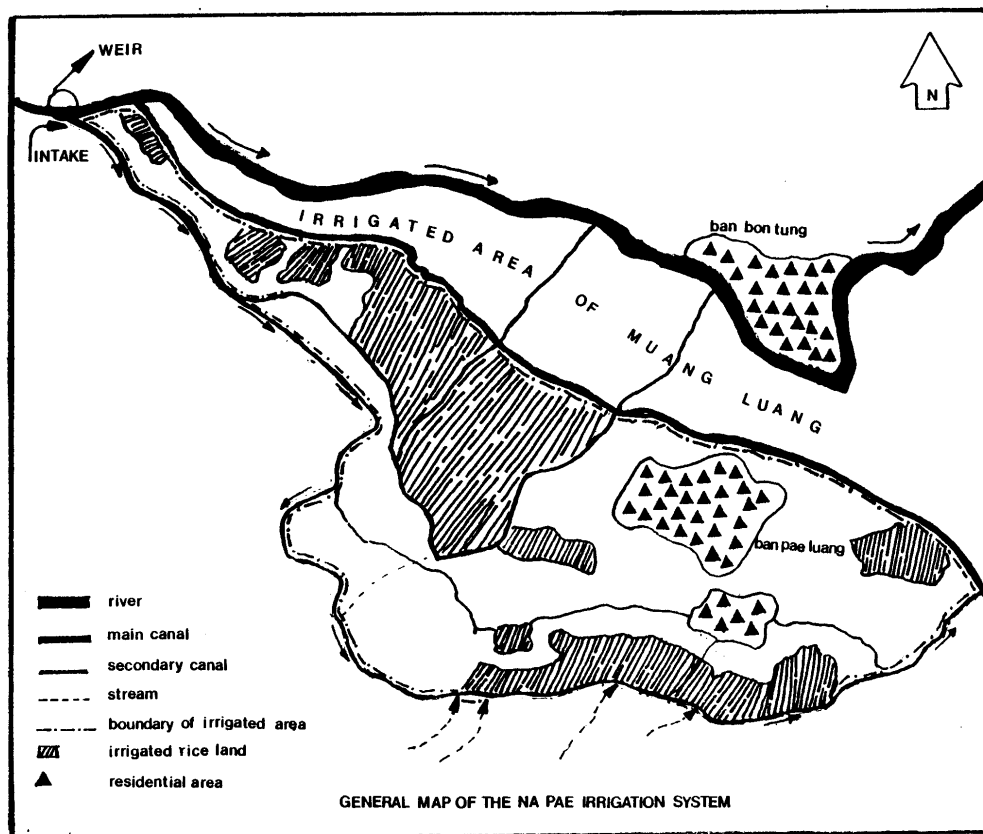


FIGURE 6.3

usually takes only a short period to irrigate the fields in the narrow valleys; sometimes the water reaches the tail section within one day. The distribution of water has never become a serious problem during the rotation period. The rotational rule allows six days in each section, which is comprised of between 100 rai and 120 rai.

When the water in the river is abundant, between August and October, the Na Pae association lets water into both the main and secondary canals continually and everyone can enjoy plentiful water. The work of each farmer during this period is to check for the proper level of water in the rice fields and to drain off excess water. Thus, we see the Na Pae system uses both types of water distribution: continual flow during the wet season, and a rotational schedule in the dry season.

Management of water in this area is carried out on two levels: the control and sharing of water from the canals are duties of the Na Pae association, which arranges the contribution to all plots and sets up an irrigation schedule; at the second level, the work within the fields, and between fields which share the same turnout, allocations depend on the individual farmers or groups of farmers, who agree to rotate water-use among themselves.

The Na Pae Irrigation Organization

The Na Pae irrigation community has grown from the small pioneer group of seventeen members at first establishment to eighty members today. Since the irrigation techniques have been transferred from low-land communities, the arrangement of the Na Pae irrigation organization

also borrows from the practice in that area. Member families are those who own or cultivate within the command area of the Na Pae system and have the right to share water as well as the duty in irrigation maintenance. All of members of Na Pae come from one single village named Ban Pae Luang; thus this group organized for irrigation activities identifies with both their residential and irrigation communities.

The organization of Na Pae is widely know under the local name Mu Na Pae. Not infrequently this term is used interchangeably with Mu Ban Pae Luang, which means the people of Ban Pae Luang Village, because people consider that all members of the Na Pae organization are villagers of Ban Pae Luang. Nevertheless, not all of the people of Ban Pae Luang cultivate in the area of the Na Pae irrigation system, and some of them utilize water from more than one muang fai system. In circumstances not related to irrigation, people prefer to identify with their residential community.

The irrigation organization is not traditionally rooted within the community of Ban Pae Luang, but is a new introduced arrangement which groups people on the basis of their cultivation within the irrigated area. Ban Pae Luang was primarily a community practicing swidden cultivation where relationships were strongly based upon kinship and ethnicity. People moved around, did not have permanent ownership of land, and accordingly tended identify with their residence, kin group, and ethnic group.

Ban Pae Luang is settlement with a long history as an ancient community of a special group of temple slave Lua. While they were traditionally tied to the temple, they considered themselves independent

from all other local authorities, princes, and communities. As a matter of fact, internally, they have built up a tight relationships among themselves. They always are proud to call themselves members of Ban Pae Luang. As a result, the Na Pae irrigation organization, or Mu Na Pae, has never organized itself as a distinct group, independent from the residential organization, but rather has defined both organizations as the same.

The farmers who cultivate within the area irrigated by a secondary canal -- the upper canal, or muang sen bon, or the lower canal, or muang sen lum -- are responsible for maintaining that canal. Thus, there are two mini-units usually called mu sen bon and mu sen lum. Both small groups work under the direction of the leaders of the system level and follow the same rules and schedule. Although they are separate groups, independent leadership does not exist at this level.

Under the Na Pae rules, all member farmers have to share responsibilities in constructing, operating, and maintaining the irrigation system and in performing all rituals as a corporate group. Since the irrigation system is small and has never been threatened by a natural catastrophe, it requires relatively little work; one good maintenance effort a year is able to keep the system in good working condition. The huana and the puchuey lead the work groups in repairing the weirs and canals and taking out sediment in the canals. A few location along the canal have persistent problems of sand slides and leaking, but when people repair the canal bank with cement the problem is permanently

solved.¹ They engage in three types of irrigation activities, usually spending only one day at each activity: weir repair, canal cleaning, and rituals. The tasks of the Na Pae organization are lighter than those of many irrigation groups.

Within the area of the Na Pae system, second cropping in the dry season is practiced and depends mainly on water from the Na Pae system. In the Na Pae organization the group of farmers who cultivate both wet-season and dry-season crops are the same people, and they work on their own land; thus they are not two separate groups. They all unite as Mu Na Pae and engage in double cropping and grow rice for family consumption and cash crops for the market.

The Administration of Na Pae Organization

The rules of the Na Pae organization call for a simple administrative structure which includes two irrigation activities. The leader called kae muang, known widely as kae, is the top authority and decides on routine affairs of operation and maintenance. One assistant, or puchuey, helps in the administrative work, such as calling the meetings, deciding on the schedule of activities, supervising the actual work, setting disputes, facilitating the operation of the weir and canal, representing the organization to the government agencies, and working cooperatively with the local head man (puyaiban).

¹The members recall an emergency many years ago, when the canal was leaking and all members were called on short notice. They made temporary repairs and later completed the work using cement and large rocks.

Both the kae muang and puchuey have to be publicly elected by the majority of members from the meeting every four years. Each member of the Na Pae organization has the right to vote and be a candidate for leader as long as he or she owns or cultivates irrigated land. All members of the Na Pae organization are land owners and have similar rights and duties. The right to land and water is traditionally transferred by inheritance from one generation to another and also by selling of land. As has been mentioned earlier, the Na Pae irrigation system is a single-village system; none of members comes from outside, because the ownership of land has been kept within the village until today. Thus, members of Na Pae are closely related to each other in various ways, as kinsmen, residential neighbors, field neighbors, etc.

The selection of kae and puchuey is held at the temple, where the village leader or puyaiban assumes the position of chairman of the meeting. As the representative of the local government, the puyaiban usually announces the rules of selection, counts the votes, and approves the result of the meeting in the process of legitimizing the new irrigation leaders. Members suggest a few names of candidates and vote, one vote to a member. Two leaders are chosen at the same time, one to be the kae and the other to be the puchuey.

Up to the present the Na Pae organization has been under the administration of five kae. When a leader wants to resign, he informally notifies the puyaiban and other members by announcing the news in the village. The resignation is then accepted by the members and the puyaiban in a meeting.

there have never been young leaders until the most recent selection; the practice among Na Pae members clearly illustrates that they prefer to have kae aged over sixty years old due to their strong tradition of seniority and to the active involvement of the old people, who usually act as consultants for all local affairs. The newly selected leaders, who have been in the position since April 1981, mark a possible trend in irrigation leadership. The members of the Na Pae organization have realized the need to have leaders who know how to cooperate with the government representatives and the agencies at the village and district level and, in particular, to consult with the puyaiban. Thus, there has been a shift from the traditional leader type of a wise man who is knowledgeable in irrigation techniques, with special qualities in spiritual and religious affairs, to a new type of leader who combines the ability to manage internal duties with maintaining the relationship with the external government organizations.

Since the irrigation leaders have a wide range of duties, including planning and decision making, supervising work, and sending messages to members, both the kae and the puchuey generally are able to take turns or to replace each other in all duties. Sharing approximately the same amount of work, they arrange it to fit their cultivation schedule in each season. No apparent differences exist between the role of the kae and that of the puchuey in the actual carrying out of irrigation activities. No final or absolute decision has ever been made by a single leader: the work is the result of a consensus between them.

Like the other members, the irrigation leaders are water users and have the obligation to contribute resources according to the size of

Their share of water. Being village and field neighbors to one another, the irrigation leaders and members clearly have a close relationship. Moreover, the irrigation maintenance activity performed once a year rarely emphasizes the leadership role of the kae and the puchuey. The distinction in roles between the irrigation leaders and water users is not great enough to make them feel separate from each other as authority figures and followers.¹ The local term to designate water users is seldom used in general conversation or in the meetings. Instead, more often they use luk hua, to mean persons who are mobilized to do public work and irrigation maintenance in both routine and emergency periods.² Sometimes an official government word, such as samachick, or members, is used.

Being a water user involves both rights and duties, sharing a portion of the benefit and a portion of the work. Though the Na Pae organization does not require water users to pay fees, the cost of using irrigation water is paid back by members in contributions of resources, including labor, materials, cash, and tools; and in case of violations the water users have to pay fines. All the water users have similar rights and duties. All members are land owners living in a single

¹In the case of the Muang Mai organization, at both theoretical and practical levels, the members make a clear distinction between the mu huana, or leadership group, and mu luk muang, the water users group.

²The term luk hua is a general term used for corvee labor in public work; it does not identify the people as water users or member of an irrigation organization.

village, and it is precisely this that makes the simple arrangement of the Na Pae organization possible.

The system of rewards is usually defined as kae nam yok, which means that irrigation leaders earn direct rewards in term of the right to use irrigation water without additional work or obligation to contribute resources.¹ The kae and the puchuey, though they are elected positions, are voluntary and do not receive rewards in the form of cash or other income. This system is distinct from the kae hub jang, in which the irrigation leaders earn a seasonal income in kind and in cash from water users.²

All in all, the Na Pae organization has gradually increased in membership but not complexity. At the technological level of the local areas, water and land resources are among the constraints on the development of the Na Pae system, as well as on growth in its membership. The entire region of the Mae Pae River Basin does not seem to attract outsiders either to move in or to invest in any related economic activities. People have developed a double cropping system, but it is at an early stage that may not keep pace with population growth. The cropping system is not yet divesified; if it were the irrigation members would be a more complex group. The Na Pae organization today

¹In case of emergency, the leaders though earn an exemption have to contribute the same amount of cash that other water users pay.

²During a conversation between kae Kuma and the author one day, the leader complained about the hard work of his irrigation responsibility, which was not rewarding to him in terms of either income or prestige. He felt so tired that he wanted to retire. He did resign in April 1981, and the election of a new leader was held the same month.

illustrates a type of simple local administration in irrigation.

Linkage to the Central Administration:
The Recent Adjustment

The Na Pae organization was primarily established as an independent local body for the purpose of managing the communal water system. Under the leadership of the farmers, the organization takes full responsibility in irrigation activities. Nevertheless, it is apparent that the management of Na Pae has been gradually integrated into the administrative network of local government in the practice of day-to-day affairs of the village.

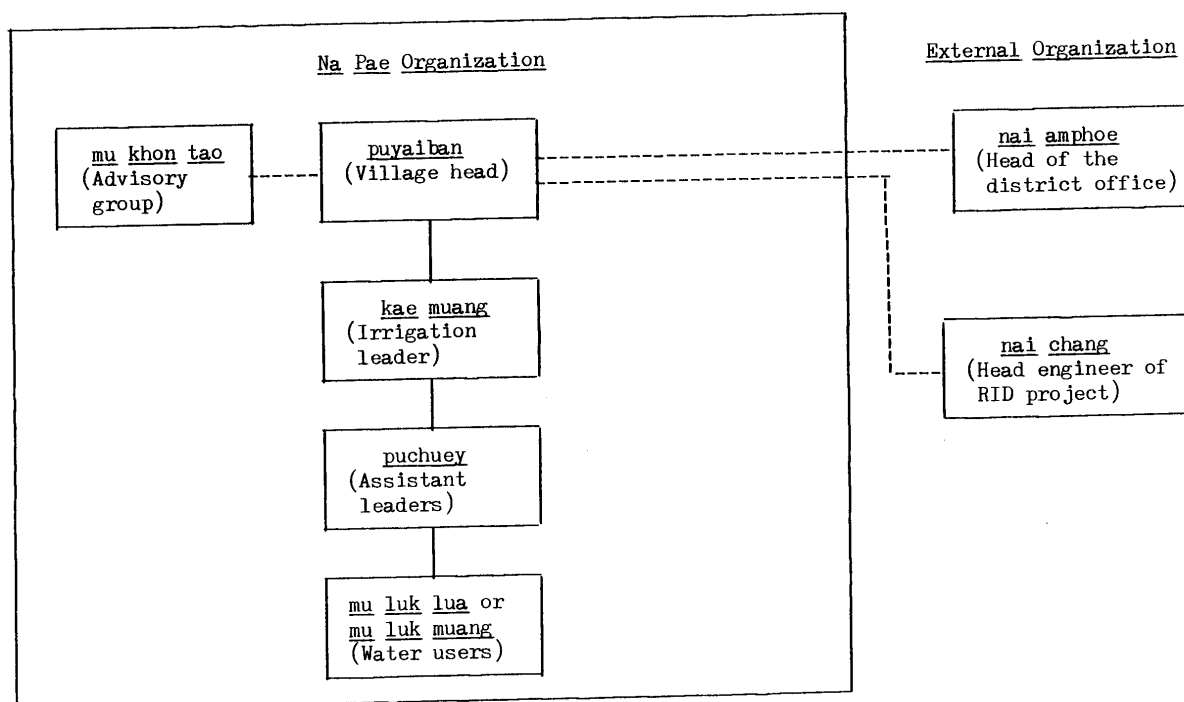
Though it rarely occurs in a remote and poor region like Ban Pae Luang, the government irrigation agency (RID) assists in the development of the physical structure of the system, such as a project for the construction of a main control gate for the intake canal.¹ This kind of government project is not open to the direct involvement of the Na Pae organization. The plan and decisions are made early in the Royal Irrigation Department (RID) office in Bangkok, and the construction is carried out by engineering team from the regional office of the Royal Irrigation Department in Chiang Mai City.

Since its early adaptation led the Na Pae organization to link to the office of the puyaiban, who is able to directly or indirectly influence irrigation affairs, the work which dealing with external agencies and the government bureaucracy falls almost completely to the

¹The traditional muang fai system does not have control gates but lets the water run freely through canals to irrigate the fields.

FIGURE 6.4

LINKAGE TO THE EXTERNAL ORGANIZATION



puyaiban. Additional work requiring dealing with the bureaucracy becomes the responsibility of the puyaiban. When there is a problem, the irrigation leaders generally request help from the puyaiban, who will inform the district office.

there is probably no factor pushing for change within the irrigation organization toward more complex or sophisticated forms. The new situations and the linkage to the central administration do not seem to pose direct problems for the existing irrigation administration. However, a recent adjustment that has become apparent is that of declining support for the traditional leaders and the trend toward selecting a new type of leader as irrigated chief.

CHAPTER VII

THE IRRIGATION ACTIVITIES OF THE NA PAE ORGANIZATION

Ban Pae Luang, whose people of common ethnic and cultural identity have traditionally been tied to a Buddhist temple, a thaat wat, has been isolated from neighboring villages. Its people have developed and continue to maintain a close interrelationship, and they have built up their community as a highly united local system. In deed, public tasks such as the construction of a temple, road, well, or bridge as well as family tasks like building houses and agricultural activities are managed locally with the cooperative effort of the villagers. Each family learns and fulfills public duties and tasks and exchanges labor and other resources with other families. Now that the community has adopted irrigated agriculture, irrigation activities have become a necessary part of the public obligation that the villagers, as irrigation organization members, have to share. The early adaptation of the Na Pae organization has some definite advantages; the organization of irrigation activities which has been adopted is supported by the existing practice of a traditional cooperative group, and irrigation members rapidly learn to take up their responsibilities in irrigation work, entering their new roles as warer users.

Na Pae farmers seldom mention irrigation activities as separate from their other agricultural work. It is simply understood that canal cleaning and weir repair are to be completed before preparation of the fields and transplanting of the wet season crops. The annual activities bring villagers to work side by side. After talking with them about this we get the feeling that the farmers consider irrigation activities rather simple and enjoyable work.

Since the Na Pae irrigation community is relatively small and remote from the city center and the RID regional office where the government's development plan and decisions on irrigation are made, this system has been left out of the annual budget for several decades. Only a small government project at the intake gate represents official assistance to the village. The Na Pae organization manages all irrigation activities on the basis of local initiative and resources.

Since the Na Pae system is a small-scale operation, there is relatively little work to do. Moreover, the location of the weir at a high elevation and the fact that the canal branches go downhill helps to reduce the frequency of routine checking and to keep maintenance a minimum. The maintenance of this system is done once in the wet season; this is usually sufficient to keep the irrigation system in good condition throughout the year. The minor repairs and cleaning needed in the dry season in some years are not considered as part of the annual work routine but as special tasks in which all members have to assist.

Emergencies caused by the natural river flow are rare; members of the Na Pae organization could recall only one instance of the damage

caused by excessive water in the main canal, within the last seventy years. It seems then, that emergency work for repairing or cleaning is an unusual event in this community, routine work is light, and special projects are infrequent.

The Na Pae organization usually mobilizes all its members to work together in all irrigation activities. No matter what type of irrigation work is to be done, all members cooperate so as to complete the project as soon as possible. A relatively simple work group arrangement, with less elaborate rules than that of Muang Mai is used. The variation in size and composition of the work groups for the different irrigation activities is so minimal that we may assume that the same group of people participate in almost every situation. The leaders (the kae muang and the puchuey) are unlikely to exercise heavy control and direction, but function as supervisors who always give suggestions rather than orders to members.

Generally, six work activities must be performed by the Mu Na Pae in their annual routine: repairing the weir (kan ti fai), cleaning the canal (kan lo-ong muang), performing the ritual (bucha phi kun nam), allocating water (kan pun ta-ang), clearing the canal bank (kan paew muang), and resolving conflicts (tadsin lu nam). In this irrigation community the share of water is relatively fixed and water violations seem to be absent, so some of the activities, such as allocation of water (kan pun ta-ang) and the settlement of disputes (tadsin lu nam), may not occur each year.

Major Irrigation Activities and Organization of Work

The irrigation activities begin at the end of May before the wet-season rice cultivation. Every year the sequence of events is the same, so that the members know exactly when the activities will be carried out and what kind of materials and tools they have to prepare ahead of time. Each family that cultivates within the irrigated area is responsible for providing labor, tools, and materials.

Generally, the muang fai irrigation organizations of lowland communities clearly define the rights and duties of each individual member. The size of contribution assessed varies with the size of cultivation (in rai) or with the size of water share (in local units called ta-ang).¹ Therefore, farmers who cultivate in large-size fields contribute a larger amount of resources than those who cultivate on small-size fields. In contrast, the Na Pae organization actually requires each family to share equal responsibility, no matter how large or small an area that family cultivates.

Tables 7.1 and 7.2 show that in the case of the Na Pae organization, the size of family land holdings and size of water share (ta-ang nam) do not vary greatly among members. Moreover, as mentioned above,

¹The Muang Mai organization defines the members' obligations according to the amount of land they cultivate, but in Siriwong's study, the muang fai organizations determined the size of each member's contribution by size of water share. Each member has to provide one person to work one day if he or she gets one ta-ang of water share. See Siriwong, A Comparative Study.

the physical structure of the Na Pae irrigation system requires little work to be done. The weir repair usually takes only one day and needs only a small amount of materials. Therefore, the Na Pae organization tends to define members' obligations (workdays and resources required) in a simple way. People therefore use the traditional rule of general public duties that each family provides one laborer (ban noeng khon noeng) to participate in each activity until the work is completed. Each mobilization is well understood as a call for all families to participate.

Kan Ti Fai

From past experience, members have learned that they should start collecting bamboo for the renovation of the weir early, because in recent years bamboo has become scarce around the village. Each year they have to go further into the mountain and then transport it back home. Then they make bamboo stakes and baskets and clean up and sharpen their tools. Clearly, a significant part of the work has been completed even before the announcement of the schedule. When the season comes, the involvement of the family in irrigation work is well organized. Each member in the family knows his or her duties at every stage; when the father is sick or engaged in other work, his responsibilities are taken over by a son. Irrigation duties are woven into the daily life of the farmers there.

The weir of Na Pae usually consumes approximately 4,000 bamboo stakes for renovation every year. Since the nature of flow in the Mae Pae River is usually calm in the wet season and sluggish and almost

TABLE 7.1

DISTRIBUTION OF HOUSEHOLDS BY SIZE OF HOLDINGS*

Size of holdings of rice land (<u>rai</u>)	Number of households	Percentage
Less than 3	27	33.8
3-5	44	55.0
More than 5	9	11.2
Total	80	100.0

* Total irrigated rice fields is 256 rai, and average size of land holdings is 3.2 rai.

Source: From the interviews with the leaders of the Na Pae organization in January, 1981.

TABLE 7.2

DISTRIBUTION OF HOUSEHOLDS ON SIZE OF WATER SHARE* (ta-ang nam)

Size of water share (<u>ta-ang</u>)	Number of households	Percentage
Less than 2	61	76.3
2-3	15	18.7
More than 3	4	5.0
Total	80	100.0

* Total number of water shares is 115.5 ta-ang, and average size of water share is 1.45 ta-ang.

Source: From the interviews with the leaders of the Na Pae organization in January, 1981.

dried out in the dry season, there is only one round of maintenance work in wet season activities. One day in May is scheduled as the kan ti fai day, which includes uprooting the broken part of the weir, driving in new bamboo stakes to reinforce the structure, and cleaning away the gravel from the river bottom at the upstream side of the weir.

Throughout the year, from time to time, the kae muang and the puhuey must inspect the physical structure. The command area of Na Pae is small and compact, approximately within 45 minutes walking distance, and everything that happen is known throughout the village within a few hours. The leaders usually do not have to do routine work too often and work in response to member's reports case by case. Their work becomes more active when the season of activities starts, especially in the days of renovation and canal cleaning. In the kan ti fai, the role of the leaders is to call for laborers, organize work groups, supervise technical matters, and check on the quality of the work. As for the status and authority of the irrigation leaders of the Na Pae organization, their legitimacy comes from the members who select them and is confirmed by the puyaiban and nai amphoe. Without the threat of conflict or misuse of water, or of natural disaster from floods, there seems to be no mechanism to reinforce their authority. The role of leader is consequently limited. In the activity of kan ti fai we see little social distinction between the irrigation leaders and the cultivators. Rather than acting as authorities or administrators, the leaders act as co-workers with special responsibilities of supervision.

The group members, duties are to bring anything required in the way of materials and tools and to work at the weir repair until

the others that; they work continually until the leaders call a recess break. Apparently the atmosphere is pleasant, one of a corporate work group where people understand their duties and take responsibility for them.

The kae muang and puchuey have similar duties, together giving suggestions, checking on work, and solving any technical problems. While the work is going on, all members have the opportunity to report, complain, and voice their concerns on the issue of water. The relationship between leaders and members is clearly of an intimate, person-to-person type. Since the Na Pae organization does not have a meeting except in the case of urgent or special jobs to be done, the renovation of the weir as the first activity of the season is regarded as the first formal meeting of the entire group of deal with all kinds of questions. When they work side by side or sit together at recess time, conversation and discussion easily follow.

In summary, the Na Pae organization is truly composed of people from a single village who are residential neighbors, fields neighbors, kinsmen, of one ethnic group, co-religionists, and from the same cultural-bond group. In repairing the weir the entire group of about eighty members forms a large corporate group. The arrangement of smaller groups or sub-unit is accordingly unnecessary. The people simply maintain a primary relationship following the traditional practice of chuey kan ya,¹ or working together to complete a task. The actual

¹Chuey kan ya is used for public and family work which requires cooperative effort. Generally, the villagers say that chuey kan ya can
Contd.

renovation usually takes only one or two days; everyone, therefore, participates from the beginning to the completion.

Kan Lo-ong Muang

Canal cleaning is another of the activities of the Na Pae organization. All members are responsible for keeping the canal in good condition through the cropping season, but the farmers clean the canal only once a year. Kan lo-ong muang usually combines the work of cleaning the canal bed with repairing the banks and small check gates. This requires one or two days for the entire canal system.

The general structure of the canals of Na Pae resembles a tree, with the weir at the base and with a large trunk that divides itself into smaller branches. The work starts from the intake of the main canal at the weir site or head and proceeds toward the branches or smaller canals. When all the workers arrive, they start cleaning the main canal, but as they move toward the secondary and tertiary canals, the size of the work group is reduced because some of members who cultivate plots along the completed section are allowed to leave. This means that the work group grows smaller the further it moves toward the tail section. Finally it is composed of just two or three people when work nears the last few meters.

Because of the members experience and cooperative spirit, the leaders seldom have to warn workers about their quality of work and

finish a job within few minutes. Everybody works bit by bit, and together they easily complete a big job. Then the work is not to difficult for anybody.

techniques. The organization uses informal group control, including criticism and gossip among members, rather than a practice of strict checking. The leaders do not keep either check lists or accounts of labor and other contributions. Nevertheless, if any wrongdoing happens, the information soon reaches the leaders. The members described the fines to be imposed for various violations, as relayed by the older generation; but they declared that such problems have never occurred in the Na Pae organization.

The Na Pae organization arrange the work of canal cleaning (kan lo-ong muang) in such a way that the farmers at the head section carry a lighter burden than those who cultivate at the tail along extended sections of canal. The mobilization principles clearly emphasize the initial investment of the first group of farmers who developed the irrigation system.

Bucha Phi Kun Nam

The ritual of the Na Pae organization is performed only after the members have finished their maintenance duties and have released water into the fields. Generally, this ritual takes place in June.

Bucha phi kun nam can be directly translated as "worship to the spirit of the water source."¹

¹Kun nam means a source of river or stream. Today the idea seems quite mixed up; the present generation of Ban Pae Luang speak of the spirit of the river source as an all-in-one spirit combining those of the source of the river and of the weir.

Traditionally, the ancestors of the people of Ban Pae Luang worship several spirits of nature, including the water source, for which they arrange a special ceremony every year.¹ In the old days they sacrificed a cow to this spirit. They killed the cow and presented raw and cooked meat, liquor, and several other offerings at the river. Then the members joined in a big meal made of all these combined offerings. Today sacrificing a cow has become too expensive, so people offer chickens to the spirit as a substitute. This ritual is now a complex synthesis which appears to combine the old Lua belief in the spirit of the river with the new idea of the weir spirit which the lowland people must have taught to Na Pae members.²

Today the ceremony is held at the weir site. Na Pae members construct a temporary, small structure (a wooden platform about 1.0 x 1.5 meters atop a big pole) in the middle of the river. Various offerings of food and drink are arranged on the board and are presented

¹Kunstadter discusses in full detail the beliefs and religion of the Lua. They worship spirits of nature and physical artifacts, such as a forest, a mountain, a river, homes, etc. For more detail see Kunstadter, "The Lua' (Lawa) of Northern Thailand."

²The weir is a new physical artifact, but one somewhat smoothly blended into the old belief in spirits among the Lua. Siriwong describes in her study the ritual of the spirit of the river among the people in a lowland village of Sankamphaeng, Chiang Mai. As was mentioned earlier in this study, the ritual indicates an interaction between two or more cultures in the northern Thai region, especially in the Chiang Mai Valley, where people have a long history of diversified culture and ethnic background. The unanswered questions on beliefs and change in this area are interesting topic for further research by the experts in this particular field.

to the spirit. Generally, these are chickens, a bottle of liquor, rice, flowers, and other things. The ritual formally begins when the irrigation leader, the kae muang, lights a candle and joss sticks and talks to the spirit; this takes only five to ten minutes. The ritual emphasizes paying respect to the spirit. The ceremony is ended after a long process of preparing and having a meal.

While the ritual tends to emphasize the power of the spirit of the river source, it touches only lightly the importance of the weir spirit and the related element of the leader's power. The kae muang leads the ceremony, but it does not seem to be an activity to confirm his own power. Rather he is a medium to communicate with the spirits. The weir as a symbol of the ability of previous leaders appears not to be a deep concern in this community.

In the actual ceremony, each family (including the leaders' families) contributes one chicken. All food must be eaten up by the group at the site before they back home. The ceremony usually takes about half a day, and most people also take the opportunity to work in their fields on this day, which is viewed as an auspicious one for beginning cultivation.

The ritual points out the significance of cooperative efforts among members and the unity of the group. Members who share the same source of water also share the sacred meal and the subsequent obligations.

Kan Pun Ta-ang

A ta-ang nam is a structure designed to control the amount of

water irrigating the fields. The fields served by a ta-ang nam form the smallest unit of the system and may belong to one or more farmers. Therefore its actual size varies according to the number of farmers sharing the same ta-ang nam. In the system of Na Pae, ta-ang nam also means a unit of measurement of water, with one ta-ang approximately equal to two square inch of opening in the ta-ang nam. For example, if a particular ta-ang nam structure at one location has a 6 square inch opening, people say that this ta-ang nam is composed of three ta-ang nam. It may provide water to one, two or three farmers.

Socially and culturally, ta-ang nam also indicates the share of duties of each individual farmer. The rules of the muang fai irrigation system prescribe that a share of one ta-ang of water means that the farmers has to contribute one man-day on each irrigation activity. Since a majority of Na Pae members receive the same share of water and only a small number of members gain larger shares,¹ the Na Pae organization actually applies the traditional mobilization rules, since each family unit shares equal responsibility.

Although when the irrigation system was constructed everyone received an equal share of one ta-ang, the number of ta-ang increased each year as more cultivated fields were added when farmers developed new areas. A farmer who at first received one ta-ang (one unit) would get more when he cleared new land. The leaders traditionally decided on the allocation of water, the ta-ang nam, for each member. It was

¹For detail in the distribution of water share (ta-ang), see Table 7.2.

widely known who got how much water, and this was translated into the measurement unit, so an individual farmer might say that he or she received one ta-ang or more. The allocation, or pun ta-ang nam, was considered important, and the kae muang and puchuey took a major role in making decisions here.

Since the irrigation water has now already been allocated to members to its full capacity, the role of the present-day leaders in water allocation is limited. The number of ta-ang nam is almost permanently fixed, and the farmers hold their fixed share. Technically, if the leaders do not rearrange ta-ang nam seasonally, this form of physical structure allows a relatively high degree of independence for each individual physical unit or ta-ang nam from each other.¹ The role of the leader in water allocation is apparently reduced, and their routine decision seems unnecessary.

Kan Paew Muang

Kan paew muang is the job of cleaing the canal banks in September. This is necessary because most of the canals are constructed through an area of thick forest, and the banks become hazardous during

¹This is distinct from the system of Muang Mai, where the allocation and adjustment of water shares are rearranged every season. The flexibility in the size of tae nam (or ta-ang nam) creates a relatively high degree of interdependency among the physical units. An increase in the size of one tae nam directly affects the size of all other tae nam in the entire system. The form of this physical structure requires the leaders to coordinate the shares for the entire system. The leader's role in allocating water illustrates the authority of Muang Mai leaders.

the rainy months. The leaders call for a work group to work along the entire canal system. This activity repeats the procedure and general atmosphere of kan lo-ong muang. Members must bring their own tools, but there is no requisition of materials. Usually the work takes only half a day.

Tadsin Lu Nam

Tadsin lu nam is translated as settlement of disputes. In this activity, the ideal role of the irrigation leader is to protect rights and maintain justice among the members or water users. The leaders has to take on the responsibilities of inspector, witness, policeman, and judge in cases of water disputes, conflict, etc. However, it is accurate to state that there has never been any serious problem in water use over the last seventy years, although some small debates between field neighbors which must have been resolved by the farmers themselves were mentioned by members as minor problems.

The Na Pae system has some advantageous arrangements in its physical and organizational structure which have influenced the maintenance of internal social order. The irrigation system is relatively small and compact. The current usually flow at a good pace so that farmers at the head and the tail can obtain water for their cultivation on time. In addition, all farmers are people of Ban Pae Laung; this makes for a homogenous characteristic within a group of field neighbors and of water users through the entire system. Arguments which might happen, therefore, can be cooled down relatively easily.

Mobilization of Resources in Routine and Emergency Tasks

The persistence of the Na Pae irrigation system is an indication of the achievements of this local organization. To fulfill all irrigation activities, the Na Pae organization depends mainly on success in the mobilization of local resources. Through development projects government agencies sometimes provide funds for construction and repair of the water-control devices. In such projects, the local people also contribute labor and material resources to combine with the government's funds. However, a major proportion of the Na Pae organization's resources is from the local community.

In general, resource mobilization in irrigation works appears to be parallel with the traditional practice of calling village labor for other public works. A well known local institution called hong pai kan¹ is used for mobilization in both irrigation works and other public works, such as construction or repair of the temple and roads. Hong pai kan is used in both routine and urgent situations, for both slow and fast-paced jobs. The farmers recalled that only once had an emergency occurred when the entire group of members was called to help. It was a break in the main canal, which required transporting heavy rocks from the river to reinforce the bank. Though the problem has not yet occurred with a secondary canal, as far as can be known from the interviews, the leaders indicated that this would be responsibility of the

¹Local terms used by the Na Pae organization are different from those used by the Muang Mai organization. Kan means a work, so the term, hong pai kan refers to a call to work. In the case of Muang Mai, people use the term, hong haeng ghan which means a call for labor.

farmers who shared the particular secondary canal.

The Na Pae organization manages the task of resource mobilization which usually includes three steps: (1) planning and scheduling, (2) organizing resources, and (3) actual work activities. It is interesting to observe how the organization manages this work. We proceed to the discussion of these items one by one in the following paragraphs.

Planning and Scheduling

In the Na Pae situation, which is always predictable, the leaders prefer to follow familiar scheme of work, scheduling resource requisition, etc., in maintenance work. Irrigation activities, like cultivation work, always have a routine seasonal schedule which the farmers usually follow. Since the maintenance jobs have to be finished completely before field preparation, the leaders know approximately the right time to call the members to work. The members hurriedly prepare materials and tools ahead of time when they realize that the month of work has come. As we might expect, deciding the schedule of activities from Na Pae is simple, since it tends to repeat the usual routine. When the leaders feel it is the proper time, they announce it.

In a different way, if there were emergencies, there would need to be careful planning to obtain resources, especially if the organization had to raise funds for major repairs. The estimation of the cost would be translated into requirements from each member.

Organizing Resources

Since there is no official messenger position, the kae muang and the puchuey are themselves responsible for spreading the news about activities. When members hear about hong pai kan, they understand what is needed in terms of materials, and the materials are assembled at the weir site the day of the work, but neither the names of the members nor the quantity of materials they brought are recorded by the leaders.

In an emergency when the organization needs some extra resources, particularly cash, the leaders have to collect cash from members as early as possible. Then they are able to buy supplies and equipment for the repairs. In dealing with these extra resources the kae muang and puchuey must make a careful account.

Actual Work

When the work day comes, each family must be ready to provide one laborer to work until the job is done. Traditionally, the head of the family will undertake the responsibilities of pai kan jai (going to work in irrigation activities). Young men of the family may take turn while he is working. While people work, they exchange information and consult each other about problems of water, fields, and crops. They also learn by doing the actual work.

Summary of Principles of Resource Mobilization

There are no written rules in the Na Pae community, only a statement of regulations learned by heart from generation to generation. The rules of Na Pae indicate a mixture between lowland community ideas and the traditional rules of Ban Pae Luang.

The villagers of Ban Pae Luang share similar ethnic, cultural, social and economic characteristics. The family is considered as the unit of resources, and public duties are distributed equally among families. Traditionally, the mobilization (hong pai kan) is a call for a village-wide work group to work in both routine and emergency situations. This mobilization is based on the principle of equal shares.

The mobilization for irrigation tasks is based on the principle of equal distribution of duties, too. All Na Pae members have the obligation to provide laborers, materials, and tools. Each family is required to contribute the same amount. Each has equal duties in irrigation work.

In the canal cleaning activity, all members have to work together beginning from the head of canal. As the work progress toward the tail section, the farmers who have completed the canal section next to their fields are allowed to drop out. The farmers who cultivate toward the tail section of canal thus have to work more.

Generally, there are two principles to be stated as follows:

- 1) The mobilization of resource is based on the general principle of equal share. All duties are allocated equally to each family.

- 2) The principle of seniority in membership is the basis for resource mobilization. The work of the original group who established the irrigation system has to be valued; the organization emphasizes initial investment. The farmers with fields at the head section work less than the group of farmers at the tail section, since these latter are seen to have contributed less to the system.

CHAPTER VIII

SOCIAL ORGANIZATION OF COMMUNITY IRRIGATION IN NORTHERN THAILAND

In recent decades sociological investigations, including theoretical and empirical studies of organizations, have developed rapidly to keep pace with increasingly complex social phenomena. The relationship between environment and social organization, or the analysis of organizations at the ecological level, has had a particular attraction for many sociologists. In an attempt to discuss and integrate existing theoretical perspective about organizations, Scott has pointed out the significance of the sociological studies that emphasize the interdependence between organizations and environment. He says:

Every organization exists in a specific physical, technological, cultural, and social environment to which it must adapt. No organization is self-sufficient: all depend for survival on the types of relations they establish with the larger systems of which they are a part. . .

With the help of the open systems perspective, we see these topics as inseparable: how an organization relates to its environment - indeed, what its environment is - is greatly influenced by the organization's structural features; and the characteristics of the organization's structure are strongly affected by the organization's environment. External forces shape internal arrangements and vice versa.¹

¹Scott, Organizations, pp. 17 and 133.

This approach is more fruitful than the attempt to explain social organization without a true consideration of its relationship with its environment. To study a specific type of organization, the irrigation organization, Coward has recently suggested that an ecological approach be applied in order to understand the reasons for the behavior of particular irrigation groups. He cites the ecological perspectives of some scholars who hold that there is an important interaction between the social and cultural system and its environment:

A major premise of the ecological perspective is that human groups relate to the environments in which they operate - both the physical and natural habitat and the sociopolitical milieu - through the mediation of "socially organized activities aimed at satisfying the requisites of collective survival." It is this socially organized relationship between the group and its environment that ecologists refer to as the group's adaptation.¹

In this study, I attempt to investigate the social organization of a community irrigation system within an environmental context. Since the relationship between an organization and its environment is a two-way relationship, too complex to be summed up in a single study, to be realistic, the scope of such research should be reduced to a manageable range.

¹Coward incorporates ecological views from E. R. Leach, John W. Bennett, Michale Micklin, and Yehudi A. Cohen. He proposes an ecological approach to explain the existence of irrigation organization or the variation in irrigation behavior of groups. E. Walter Coward, Jr., in "Irrigation Development," p. 21.

An organization is an active collectivity that is in a process of exchange with its environment. Although at a theoretical level it is clear that the relationship between an organization and its setting involves a two-way movement,¹ at the operation level I will attempt to emphasize the influence of the local habitat and the external sociopolitical environment on the structure and behavior of the organization. More precisely, the focus will be on the importance of the environment as it affects organizational arrangements and procedures. Some of the variables are included in the analysis of organization-environment relationships.

The analysis in this chapter will attempt to answer a set of questions: What is the pattern of social organization in the community irrigation system of the Chiang Mai Valley? What are the environmental conditions under which the organization exists? How does the organization adapt to differing environmental conditions? These questions require both historical and comparative analysis in order to depict the organization within the time context as well as to explain similarity or variations in organizational form.

From the preceding chapters it is clear that I have extended my research beyond the case study to comparative analysis, and that I have

¹There is a group of social scientists who have produced some interesting studies emphasizing organization-environment relationships. They have developed a new approach called the "resource dependence approach," which views the organizations as active, and capable of changing, as recipients of the action of environments. See Scott, Organizations, pp. 115-117 and 179-206.

also gone further back in time to the late nineteenth century. Since there are several studies in northern Thailand that have provided rich data on the traditional irrigation systems and their organization, a cooperative picture will be drawn from these available cases of Bruneau, Potter, Tanabe, Siriwong, and Suraroek.¹

The Establishment and Development of Muang Fai
Irrigation Communities

Muang fai irrigation is type of community irrigation system that is extensively used to supply water for both lowland and upland cultivation in northern Thailand. It has been reported that over two thousand such systems are presently in operation in Chiang Mai,² distributed throughout the valleys and the mountain areas. The physical boundaries of each local irrigation community are, of course, clearly defined as the are within the limit of water flow. The water user group is also clearly defined as those who work together on the farmlands within the command are of a specific system.

In this section, I will discuss four points:

- 1) The state or the central administration has been involved in local irrigation management for several hundred years. However, the

¹See Bruneau, "Irrigation traditionnelle"; Potter, Thai Peasant Social Structure; Shigeharu Tanabe, The Irrigation System in Nong Paman A Lanna Thai Village in Northern Thailand (Kyoto, Japan: Institute of Asian Studies, 1976), and "Peasant Farming"; Siriwong, A Comparative Study; and Suraroek, Water Management Conflicts.

²Suraroek, Water Management Conflicts, p. 111. She reports 2,039 systems utilized within Chiang Mai province. The report of the Multiple Cropping Program of Chiang Mai University for a different area including
Contd.

Establishing Muang Fai Irrigation Communities in the Past

In spite of the fact that there is quite an amount of good historical material about northern Thailand, it does not give much information about the way of life in the villages. Most of documents deal with walled cities, kings and warfare among the northern Thai lords. A record of the first establishment of the muang fai irrigation system and irrigation groups in this region has not been found anywhere, and materials describing the early history of the system are limited in number.

"Northern Thailand" as used in this study corresponds approximately to the area of the Northern Thai Kingdom, with its capital city at Chiang Mai, which had a history of some 600 years but has been under the control of the Central Thai Kingdom since 1874, when the first Thai Commissioner was sent to Chiang Mai. The establishment of the centralized administrative system of the Bangkok government marked a period of dramatic change. At that time many new muang fai irrigation communities emerged and further development of the existing systems was carried out in many areas.

From documents of the laws of King Mengrai many scholars have decided that this indigenous system was first established in this region approximately six hundred years ago.¹ In attempting to reconstruct how

¹Kraisri Nimmanahaemenda, "Irrigation Laws of King Mengrai," in Ethnographic Notes on Northern Thailand, Data Paper No. 58, ed. by L. M. Hanks, J. R. Hanks, and Lauriston Sharp (Ithaca, N. Y.: Cornell University, Southeast Asia Program, 1965).

the muang fai irrigation system and its organization emerged we may consider what Cohen says about the relation of man and environment:

Populations must adapt to the realities of the physical world; they must do this not only in terms of acquiring a livelihood, constructing shelter, and designing clothing, but they must maintain a proper "fit" between their biological makeup and the pressures of the various habitats in which they seek to live.¹

Similar characteristics of natural and physical features in several parts of the Chiang Mai Valley make it seem likely that the first muang fai irrigation communities arose in several basins where settlements and the practice of wet-rice cultivation. Particularly in the areas where rainfall was unreliable and the river current was rapid, people had to cooperate to build up dams to control the water. They had to be able to create, maintain, and adapt their relationship with the local habitats. In areas where there was different natural habitat and where people had some other alternatives, such as wells and water wheels, muang fai irrigation tended to develop later.

Several factors spurred the establishment and development of the muang fai irrigation systems. The basic one, of course, was the need to survive, to grow rice for food. Population growth encouraged the expansion of the existing systems and increased the size of the cooperative groups. Also, at some periods in history the economic and political situation became a major factor promoting the development of irrigation and agriculture. It is interesting to learn that before the formation of the Lanna Thai (Chiang Mai) Kingdom and his conquering the neighboring Mon State, King Mengrai used corvee labor to construct a canal

¹Cohen, "Introduction" to Man in Adaptation, p. 2.

about thirty-four kilometers in length. The role of political and economic factors was very obvious in the early period of the centralization of the Central Thai government. Many local leaders of northern Thailand responded quickly to the threat of political control from the Central Thai Kingdom. Prince Mahawong, a close relative of the Chiang Mai king sought a new base of power and wealth in the small villages nearby the city, and developed irrigation and rice agriculture.¹ Also phaya Noi, the local ruler of Chomthong in the far south, attempted by the same strategy to establish the new irrigation community of Muang Mai, together with a group of farmers. Moreover, when rice became a market crop and an export product in the early twentieth century, new muang fai irrigation organizations arose and old ones grew in size. The irrigation technique spread through the Chiang Mai Valley and on to the upland communities.

The emergence of muang fai irrigation was not limited to the area of the Chiang Mai Valley but also developed in other valleys particularly at the junction of Thailand, Burma, Laos, China and Vietnam, but several factors particularly encouraged the establishment of muang fai irrigation throughout this valley. These were the population growth, warfare, threat of external political control, abolishment of slavery and granting of permanent land ownership, and the introduction of commercial agriculture. However, neither do all of these factors

¹Calavan, "Princes and Commoners," pp. 73-89.

influence equally the process of adaptation nor do they play active roles at the same time.

The State's Role in Local Irrigation

The role of the state or the central government in local irrigation affairs is a matter of interest. The involvement of the king, from the evidence of the irrigation laws of King Mengrai, has led many scholars to rush to conclusions about the extensive power of the central government. Social scientists who have conducted research in northern Thailand have often given us the idea of a powerful central administration in the old Chiang Mai Kingdom, with an active role in rural affairs through the network of royal kinsmen and the king's appointed officials. There are many questions with regard to this interpretation: How did the central administration exercise its power in rural areas? to what extent? in what kind of local affairs? What was the territory of the central power? If we search for answers carefully, we find something different. It is rather misleading to assume that the central government of King Mengrai or of his successors was extensively engaged in local affairs, especially in the irrigation of the entire Chiang Mai Valley. It is obvious that the role of state in the local affairs of the central zone (the city center and the immediately surrounding villages) was not the same as in the remote areas at the margin of the state (in the present districts of Chomthong, Hod, Fang, Mai Ai, Mae Chaem, Phrao, Sa-moeng).

Potter draws this conclusion from the work of Daniel McGilvary:

The Chiangmai Valley irrigation systems have long been under the direction and control of a central state authority. The Laws of King Mengraaj mentions royal officials whose task it was to oversee the operation of the valley's irrigation systems and to see that they were maintained properly. The heads of the local systems under the old Chiangmai kingdom were men living in the countryside who were somehow connected with the royal family of Chiangmai, either by distant kinship (real or putative) or as appointed officials.¹

However, historical evidence indicates that during this period many independent cities and small towns governed by local rulers existed throughout the valley.² Probably there were some local leaders who were related to the royal family or appointed to rural areas near the city, but it is rather misleading to assume extensive power and involvement of the government in the local affairs of the entire valley throughout a period more than six hundred years. Any interpretation of the involvement of the state in local irrigation should indicate the difference between the central areas and the remote areas. The irrigation management of the central part of the valley, especially the area surrounding the city, was under active administration by the central government; but because of their geographical marginality, the areas of Chiang Dao, Fang, Mai Ai, Chomthong, Hod, and Phrao and their irrigation

¹Potter, Thai Peasant Social Structure, p. 82, citing McGilvary's A Half-Century Among the Siamese and Lao (London: Fleming H. Revell Co., 1912), p. 195.

²Hallett made this observation during his travel through the Chiang Mai Valley in the late nineteenth century, mentioning the ruins of several small walled towns. See Hallett, A Thousand Miles on an Elephant, and also Burling, Hill Farms and Padi Fields.

were fully controlled by local organizations and local leaders.¹ This difference can also be observed in recent decades, as the government's involvement in local irrigation affairs in the two parts of the valley is clearly different.²

Persistence of the Muang Fai Organization

An irrigation group forms when people attempt to obtain water from a river or stream for their fields and begin constructing a weir and a network of canals. In some areas, farmers do not build a weir, but simply use an earth dike constructed parallel with the bank to divide the flow into the main canal. Thus, one type of muang fai irrigation system is composed of either a main weir and main canal or a main canal that diverts water directly from the natural water course to

¹Andrew Turton, in explaining the system of "social estates" of Chiang Mai Kingdom, has made clear the difference of control over peasant villages in the central areas and in the remote areas. It was because of direct control of peasant villages near the city that all peasants - they were classified as phrai, or free peasants - were mobilized to work on public work projects annually. In the remote areas, the peasants were phrai suai, required to pay only a certain amount of forest products. With the geographical barriers and difficulties of transportation and the non-existence of central government representatives, the local leaders must have enjoyed a certain level of independence in the administration of local affairs. See Turton, "Northern Thai Peasant Society," p. 272.

²The studies of northern Thailand by Bruneau, Potter, Tanabe, Siritwong, and Suraroek have shown the government's role in the routine activities and special development programs in these areas, and the difference is obvious. However, the involvement of the government in the remote areas such as the distant districts of Fang, Mae Chaem, and Hod has been become more active in recent years because of the threat to national security from the Communist Party of Thailand.

be distributed further to several minor canals.¹ After the completion of the irrigation system, the maintenance crews have to work on both routine and emergency tasks, since the weir is only a temporary structure and sediment accumulates rapidly along the canals. Moreover, in some areas flooding occurs frequently. Without question, the group needs to maintain a long-term commitment to each other and to cooperate with each other closely.

The muang fai organization is necessary to execute all major irrigation tasks. All farmers who cultivate within the irrigated area of a specific system organize themselves to work cooperatively in order to complete the tasks in allocation, maintenance, conflict resolution, and the performance of rituals. The rules define clearly the differences between the leader's role and that of the members. Rights and responsibilities are shared. Usually, each organization has a name taken from the name of the main weir and canal. Therefore, we find that

¹The meaning of the muang fai system must be clearly defined in term of its basic physical structure. It is unclear how Siri Wong defines a single muang fai irrigation system, since, the data presented in her first case (the system of the head area of Mae On River) represent ten diversion weirs along the river, while the data of the second case (the system of the tail area) indicate that there is no main weir, but a main canal with eleven small weirs along the main canal. In this case, the research has compared data drawn from different levels. The data in the first case consist of information about ten small irrigation systems, in ten different communities, while the data of the second case belong to a single system or one community. The administration of ten independent organizations has been compared with that of one large organization that itself includes eleven sub-organizations. For this reason Siri Wong concludes that the administrative body of each canal at the head section works independently, while that of the tail section works under the direction of the top leaders. See Siri Wong, A Comparative Study, pp. 41-43.

farmers in the Chiang Mai Valley identify with the name of their irrigation organizations.

The mu muang fai generally consists of water-users from several villages. Such a group may vary in size from less than ten members to more than one hundred. At the lowest level, the farmers who cultivate within a particular irrigated area supplied by a single canal usually form a small irrigation unit, and several small units from several canals then group into a larger unit. Every unit of a specific irrigation system serves as a maintenance work group for canal cleaning and weir repair. Each shares a proportion of the work on the main weir and on the canal from which the group obtains water. The entire muang fai organization manages the irrigation system through a group of elected representatives. This administrative body is responsible for decisions and manages to accomplish all irrigation tasks and to enforce the rules on all members.

The irrigation community grows larger when more land comes under irrigation and more farmers work within the command area. The existing system is extended and new canals are connected to the existing ones as far as the flow permits. However, after expansion reaches a certain point, a number of farmers begin to form a new irrigation community - a new cooperative group. This usually occurs when the irrigation system has already been utilized to its full capacity, or when a new residential community or village emerges. At present we see a continuing process of new establishment and of expansion of irrigation groups in

the Chiang Mai Valley.¹ The new communities are of course established on the basis of traditional muang fai principles.

Arrangement of Muang Fai Irrigation Systems

Today we can observe a basic pattern in muang fai irrigation systems. The community irrigation systems that have existed throughout Chiang Mai Valley for several hundred years are well recognized as belonging to the muang fai type. This certainly indicates that all muang fai irrigation systems share some basic components of physical structure and functions. Every system comprises similar engineering structures: weirs (fai), canals (muang), small weirs (fai Noi), diversion structures (wai or kiang nam), turnouts (tae nam), and drainage canals (lai sia nam or hong nam sia).² Each structure has a specific function in relation to the others, and all of them work together to perform the functions an irrigation system requires. From observation, we find that most muang fai irrigation systems have a similar pattern which resembles a tree: the trunk or main canal splits into branches, which continually divide into smaller branches. As the irrigation system is developed, the canals are gradually extended to the

¹Siriwong reports that in the area that she studied extensions at Muang Ko Kok and Muang Ko Koi has been recently made (ibid., pp. 16-17). I was told by a group of farmers in Ban Pae (in the Na Pae system) that they were seeking a source of water in order to build a new muang fai irrigation system for newly developed land.

²Christain Taillard has described three techniques of traditional irrigation found in Laos: groins or small weirs, submersible dams, and non-submersible diversion dams. These techniques are similar to those of the traditional muang fai irrigation system in northern Thailand.

Contd.

full limit of the flow, just as a tree develops into its full growth. On the basis of gravitation the irrigation water is distributed through the networks of canals from high-level fields to low-level fields.

Bruneau has classified the traditional muang fai irrigation found throughout Chiang Mai Valley into a mountain type and a plain type.¹ In more detail, Tanabe has classified muang fai irrigation systems on the basis of their geographical and hydrological characteristics into three types: valley and alluvial fan type, alluvial plain type, and integrated type. The valley and alluvial fan type is an irrigation system serving highland and upland areas in small tributary valley on the slopes of the hill. It is similar to what Bruneau calls the mountain type. The alluvial plain type and the integrated type are equivalent to Bruneau's plain type. However, Tanabe indicates that the integrated type is usually located on a main river where water is most abundant. It can collect additional water from several small irrigation systems.²

In the areas of upland and highland fields, since the muang fai systems usually serve narrow tributary valleys and terracing fields, they are mostly small-scale operations. There are usually several small

For more detail see Taillard, "L'irrigation dans le nord de Laos."

¹Bruneau, "Irrigation traditionnelle," pp. 155-165.

²Tanabe, "Peasant Farming," pp. 95-105.

dams on the same stream, each operating independently to feed an isolated field. These are Bruneau's mountain type of system. Bruneau did not provide us with the approximate size of irrigated fields of this type; however, Tanabe has reported that the irrigated fields of the valley and alluvial fan type vary between one hundred rai and one thousand rai.¹

The "plain type" of system uses a relatively large dam built of bamboo and wood. Many of these have now been replaced by permanent concrete dams. Tanabe estimates that what he calls the "alluvial plain type" serves between one thousand rai to ten thousand rai and the "integrated-headwork type" covers more than ten thousand rai.² In a larger valley, where villages and farmlands are agglomerated, several irrigation communities may cluster together without any space in between.

Although the size and canal composition of muang fai systems may vary and they may be constructed of bamboo, wood, or concrete, they always have a tree-like pattern. Whether the canals are made entirely of earth or partly of concrete or stone, they must be designated to channel water to the fields by creating a continuous flow from higher to lower levels. On the plains, though when first constructed the irrigation systems are rather small, people gradually extend their cultivated land, taking the irrigation canals as far as possible. The irrigation system thus gets larger, and, as the canals develop more branches, the system grows denser. Thus the muang fai system in the

¹Ibid, p. 98.

²Ibid.

lowland plains area forms a complex system like a tall fully formed tree. In contrast, a muang fai system in the hill areas, where the cultivated land is limited, usually supplies water to just one small, narrow valley with terraced fields and it can be compared to a small, thin tree because it is composed of few branches with a less complex canal structure.

The contrast in form between the mountain irrigation systems and those on the plain gives some understanding of the differing irrigation practices of the people in the two areas. We have data from twelve irrigation systems: five cases are the alluvial plain type; seven cases are the valley and alluvial fan type.

A Comparison of Twelve Muang Fai Irrigation Organizations

We may look at muang fai organizations from an ecological perspective, considering their arrangements and procedures as an adaptation or a response to the local habitat and the external influences of the regional and central government.¹ Since there have been several studies of the Chiang Mai Basin, this research will observe the pattern of muang fai organization and the variations that exist and then explain how the environment affects the muang fai organizations.

¹As Scott explains, "The organization as an arrangement of roles and relationships is not the same today as it was yesterday or will be tomorrow: to survive is to adapt, and to adapt is to change." Scott, Organizations, p. 119.

Although the studies from which the data are drawn are clearly based on different theoretical frameworks and approaches, they all emphasize the social organization of irrigation in the Chiang Mai Basin. Moreover, these studies were conducted in many parts of the basin and were completed within a few years of one another -- i.e., the research at the Mae Ping River (Potter, 1975), the Mae On River (Siriwong, 1979), the Mae Sao River and the Mae Chaem River (Suraroek, 1980), the Mae Rim River and Mae Raem River (Tanabe, 1981), and the Mae Klang River and Mae Pae River (author, 1982). It is appropriate to attempt a systematic comparison between them because they present strong grounds for generalization. Moreover, some important conclusions have been left out from the analysis of these studies, and they will be reinterpreted here for use in my comparative framework.¹

We will now look at the data of twelve muang fai irrigation organizations to see some similarities and variations in their organizational arrangements and procedures. Comparisons will be made with regard to organization, administration, leadership, membership, arrangement of work groups, leader-water user relationships, allocation of rights and duties, and the link to the central administration.

¹We cannot assume that what has not been written about in some studies does not exist in the studied areas. As Potter points out, "often when an anthropologist fails to mention a structural features such as a neighborhood, for example, one cannot necessarily conclude that neighborhoods do not exist in his community; if he is mainly interested in religion, ritual, or economic decision-making, he simply may have failed to describe them, or may not have noticed them." See Potter, Thai Peasant Social Structure, p. 149.

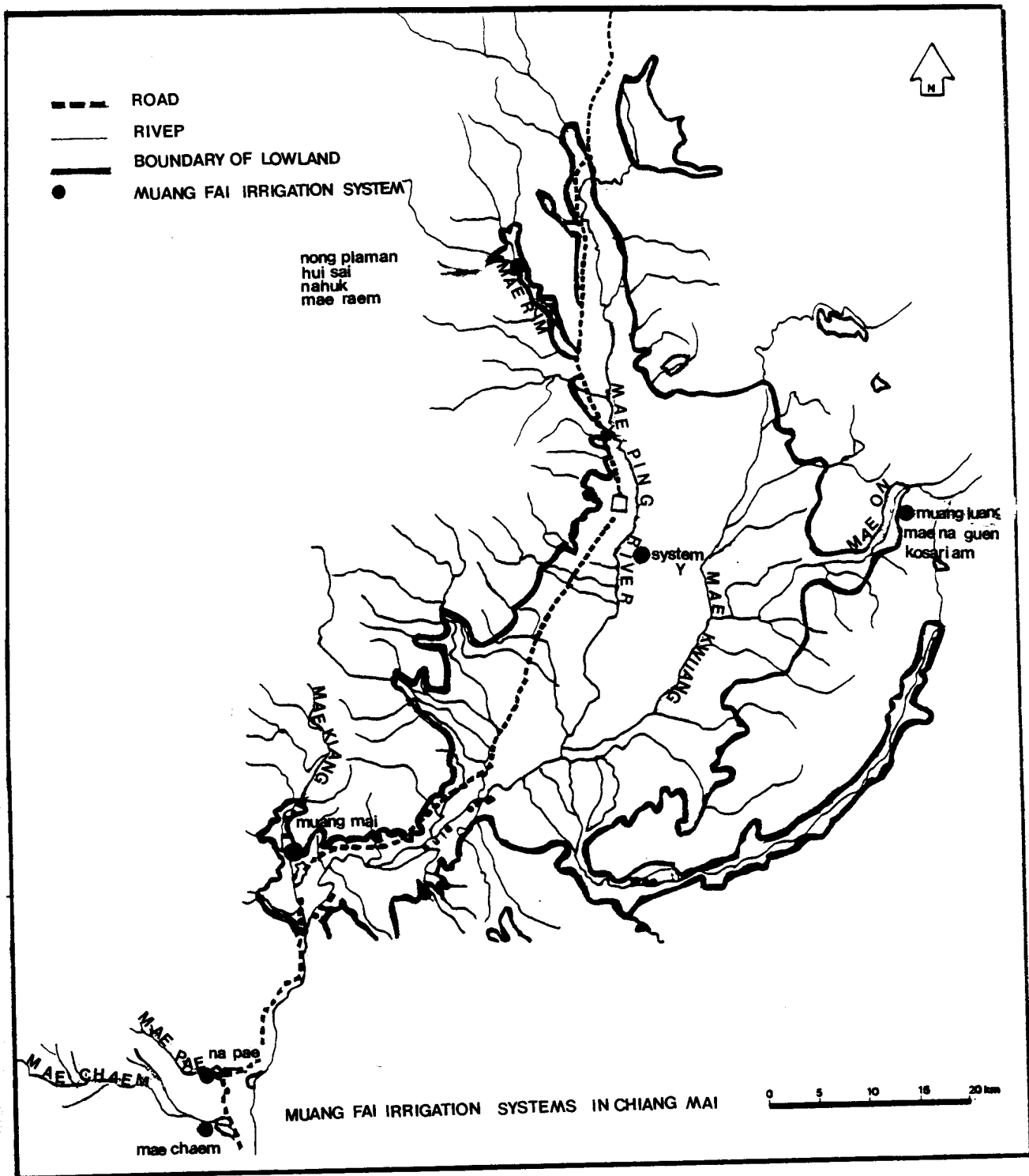


FIGURE 8.1

Arrangement of the Muang Fai Organization

The analysis of the organizations of the twelve muang fai systems shows five important points:

1) The muang fai organizations are formed on the basis of field location and common canals. The location of fields along a specific canal defines the group identity as well as the rights and duties of each farmer or each irrigation sub-unit.

2) The organization of muang fai system is usually composed of farmers from several villages, and very often from several sub-districts or tambon. It usually exists as a extra-village system that cuts across the boundaries of local residential units.

3) The muang fai organization is usually made up of several sub-organizations which develop around the secondary canals.

4) The organizational arrangement follows the pattern of canal arrangement and segmentation.

5) Variation exists in the degree of complexity in the muang fai organizations depending on whether they are of the upland or tributary valley type or of the plains type.

a) Field Location and Common Irrigation Canal

The muang fai organization develops around the canal where people cultivate their crops and share irrigation water. All twelve muang fai systems emphasize location of fields and the common source of water or canal as the basis for determining membership. The organization is a collectively which includes those farmers who own or cultivate the fields of a particular muang fai system or canal. Each member

defines himself or herself as in an irrigation group under a specific name and shares with others the water rights and duties of system maintenance. Although many farmers of the muang fai irrigation system are related to one another in some way, through kinship or village bonds, the members of the organization are liked together on the basis of common field and canal location. Coward has suggested the term "canal-baed organization" in order to emphasize the importance of recognizing that the irrigation organization is not necessarily formed along village lines. Instead, these organizations are established along canal lines, of which the physical boundaries are defined by the limit of the irrigation flow (see Table 8.1). The number of water users varies among the twelve organizations, with 1,600 in System Y, 600 in the Muang Mai system, 80 in the Na Pae system, and only 28 in Mae Na Guen.

Since the membership is based on field location and use of a common canal, this includes both landowners and tenant cultivators. Tenant cultivators may choose the fields they want to cultivate. They can choose the same location for several years, or they may change fields every years. There may be a movement of water users between sub-units of the same irrigation community, or between neighboring communities. We should also note that the size and composition of irrigation groups can fluctuate year by year, but in reality the mobility that occurs is rather minimal, because there are more or less limiting factors.

Firstly, geographical proximity seems to be an important reason for the location of farmers' fields. The pattern of the northern Thai

TABLE 8.1

TWELVE MUANG FAI IRRIGATION SYSTEMS OF CHIANG MAI BASIN

Name of irrigation system	Type of irrigation system**	Irrigated area (rai)	Number of water users (households)	Availability of irrigation water	Number of village in command area	Type of village arrangement
Potter (1975)						
System Y	Alluvial plain type	-	1,600	-	16	Adjoining
Siriwong* (1979)						
Muang Luang	Valley and alluvial fan type	1,010	88	Plenty	4	Relatively segregated
Muang Mae Na Guen	Valley and alluvial fan type	132	28	Plenty	2	Relatively segregated
Muang Mai	Alluvial plain type	6,761	481	Scarce	10	Adjoining
Suraroek (1980)						
Mae Sao	Alluvial plain type	1,500	-	Plenty	4	Relatively segregated
Mae Chaem	Alluvial plain type	3,700	-	Scarce	7	Relatively segregated
Tanabe (1981)						
Nong Plaman	Valley and alluvial fan type	600	60	Plenty	3***	Relatively segregated
Huai Sai	Valley and alluvial fan type	400	29	Plenty	3	Relatively segregated
Na Huk	Valley and alluvial fan type	300	8	Plenty	3	Relatively segregated
Mae Raem	Valley and alluvial fan type	350	16	Plenty	3	Relatively segregated
Author (1982)						
Muang Mai	Alluvial plain type	5,000	600	Scarce	10	Adjoining
Na Pae	Valley and alluvial fan type	400	80	Plenty	1	Relatively segregated

* Siriwong has studied eleven irrigation systems of Nam Mae On, but only three systems have complete enough data on the organizational arrangement to be used for this comparison. The Muang Luang and Muang Na Guen are located upstream; the Muang Mai Kosariam is located downstream.

** Tanabe's classification. See Tanabe, "Peasant Farming," p. 98.

*** Although the water-users came from three villages, a majority of them came from Chiang Mai Village.

village in particular appears to be that of a residential community surrounded by paddy fields.¹ New villages emerge at the periphery where the villagers have previously built their field huts. Obviously, people tend to create paddy fields at convenient distances. Similarly, tenant farmers tend to choose field nearby.

Second, a long-term relationship between a landowner and a tenant-cultivator (which may be considered a kind of patron-client relationship) may also encourage tenants to choose certain fields.

Third, the rental rate depends partly on productivity -- a good or bad harvest in previous years. Tenants have the opportunity to bargain.

Fourth, working continuously in one place makes the farmers feel more secure and confident. They understand the amount of irrigation water in that location, the quality of the soil, and so forth.

Fifth, as the farmers work in one place they build up relationships with field neighbors and identify themselves with the group. This identity, in turn, influences their decision to remain.

Also, the size and composition of the muang fai organization will probably fluctuate between seasons. In traditional practice, landowners generally cultivate their own fields in the wet season to produce rice for their families' consumption and allocate only a small proportion of the land for their tenants, who are usually kinsmen or long-time tenants. In the dry season, only a proportion of the

¹Potter, Thai Peasant Social Structure, p. 149.

irrigated area can be efficiently utilized for rice, so the landowners may cultivate other crops or rent out the fields. Moreover, cash crops such as soybeans, peanuts, garlic, onions and tobacco, which are not for the consumption of the household, are usually cultivated in fields of relatively smaller size. The result is that there are more tenants in the dry season than in the wet season. The dry season group tends to be larger than the wet season group. Thus, we expect the size and composition of the muang fai organization to fluctuate between the seasons.¹ Recently, Tanabe has noted the variation in size of the muang fai organization between the seasons, he indicates that the dry season group tends to be larger than the wet season group.²

However, when the same group of farmers work in both wet and dry season, we can expect that the size and composition of the irrigation groups will seem to be fixed and will not vary between the seasons. In this situation, the farmers generally blend into a single group. They do not differentiated themselves into two separate groups as wet and dry season farmers. This is the situation we observed at Na Pae, which is a relatively simple arrangement.

¹To obtain figures on this variation is obviously difficult. However, the information from interviews with more than thirty landowners of the Muang Mai system indicates that most of them cultivate all the irrigated land they own in the wet season, and that more than half of them rent out fields in the dry season.

²Tanabe, "Peasant Farming," pp. 274-277.

The variation between the wet and dry season groups is more obvious in the Muang Mai organization and the four organizations in Tanabe's study. Usually, all landowner farmers and tenant farmers who work in the wet season also work in the dry season. There are a large number of landless farmers (for example, in the two villages of the Muang Mai area) who work as wage laborers during the wet season and become tenant cultivators in the dry season. Moreover, in an extended family, everyone works and shares in the first rice or wet season crop. A young couple who work on a parent's land generally lease some fields to earn on their own during the dry season.¹ Thus we see that the farmers identify themselves as belonging to two groups. This illustrates a relatively more complex arrangement. Information on this type of grouping is not available for the other six organizations.

The sale and inheritance of land are also important factors in the change in the number of landowners and in the overall structure of organizational membership. In recent decades there have been many studies of land sale, inheritance, and fragmentation, as well as landlessness.² Changes in land ownership influence the size and composition

¹The families living close to the author's house in the village of Chomthong follow this practice, with the young couple renting land and working to earn cash.

²Moreover, water users very often mention about the land transactions in their area. In addition, two villages out of ten in the Muang Mai command area are newly established; most of villagers are migrants from the flooded plain along the Mae Ping River and do not own land in irrigated area. They are tenant farmers and wage laborers. See also Turton, "Northern Thai Peasant Society."

of the muang fai organization. It will be interesting in future research to observe the change within each group of cultivators and the mobility between groups, which may affect the organizational structure of muang fai system.

It is my observation here that studies have tended to treat the irrigation community as a fixed, static group and to report figures of size and composition as being definite. It is more useful to point out the dynamic nature of the irrigation groups. While these groups maintain basic structural characteristics, they also adjust themselves continually to changes that affect them. After a long period of time, the arrangement we may observe is an adaptation based upon the previous one. Therefore, I believe that all research in this field of study, while attempting to frame the basic characteristics of the irrigation organizations, should also present them in dynamic terms.

b) Canal-Based Organization

The muang fai organization usually cuts across the boundaries of villages (muban) and sub-districts (tambon). In general, we see that each irrigation system delivers water to the fields of several villages, and this creates a grouping of farmers from several residential units (see Table 8.1). The organization of Muang Mai draws members from ten villages in two sub-districts, the organization of System Y recruits members from sixteen villages in three sub-districts, and Kosariam includes farmers from ten villages in two sub-districts. There is clearly a certain degree of diversity in members. The grouping of farmers from many villages illustrates a relatively complex pattern

within the muang fai organization. It is even more complex when the diversity appears both at the system level and in sub-units as in the case of the Muang Mai organization and the organization of Kosariam.

There also exists a type of muang fai organization which exhibits a relatively less complex arrangement and is composed of members from few villages; the organizations of Mae Sao, Muang Luang, Mae Na Guen, Nong Plaman, Na Huk, Huai Sai, and Mae Raem are good examples. The simplest arrangement of muang fai organization is illustrated by the organization of Na Pae, all the members of which come from the same village. These seven systems serve small areas in the narrow valleys where the fields are scattered and the residential units are relatively segregated; their organizations are rather small and illustrate a less complex structure.

Coward has provided a classification for the grouping of water users which he derives from several studies of irrigation organizations in many countries.¹ According to Coward, there are three different types of arrangement: non-village irrigation organizations, pan-village organizations, and the multi-village organizations. The first type refers to the organizations with members from many villages at both system and sub-unit levels. In the second type the water users of the sub-unit usually come from the same village; therefore, the representation of the village or residential unit is rather obvious within the organization. In the third arrangement a small portion of the members comes from outside the immediate area. These members are from far away

¹Coward, "Management Themes," p. 209.

villages and create an arrangement of differentiated membership: those who come from villages within the command area can be called residential members, and those from outside these boundaries can be identified as external members.

The arrangements found in the twelve muang fai organizations shows characteristics of both the non-village organization and of the pan-village organization. In addition, there is the Na Pae system in which the group of water users are all from the same village. This may be called a single-village organization.

c) Multi-level Organization

Generally, the farmers who share water from canals at each level cooperate in several groups to manage their work activities, and each group takes care of its own canal. Thus social units exist at all canal levels. The arrangement is in a hierarchical order: several small groups comprise a large group, several large groups comprise the muang fai organization of the entire system. Sometimes a number of small groups binds together into a large group under a recognized name and manages irrigation activities partly independently from the system-level organization; we may call this a "canal-level organization." The canal-level organization as a semi-independent body is usually developed at the level of the secondary canals (muang soi) to work on

irrigation activities, particularly canal cleaning.¹ It may not only have a distinctive name but may also have leadership at the secondary canal level, making some decisions and setting up plans and schedules separately from the system-level organization. In some areas, different rules on the allocation of work are applied (see section on Canal Cleaning or kan lok muang in Chapter V).

Here we see that the overall muang fai organization with a specific name may consist of a number of canal-level organizations, which

¹Many studies do not indicate explicitly the existence of the canal-level organization; however, they have described the activities of canal cleaning as divided into two levels: the activities at the main canal and the secondary canal. As Potter says: "I witnessed the size of the work groups in the canals increase as the men move upstream day by day to ever-higher levels of segmentation in the canal system. . . . Later, when Chiangmai village cleaned the six minor and the many minimal canals within the boundaries of the village, the process was reversed. The entire group of village men who used water from the system started out together. Then as they moved down, the canal, the groups became progressively smaller as men reached their branch canal and hived off at that point along with the men who shared that branch with them. Finally, each farmer was left with only a few neighboring farmers who shared the smallest canals in the irrigation system." Potter, Thai Peasant Social Structure, p. 96. Also, he indicates that the activity is divided into two levels which have separate schedules and are variable in the characteristic of work groups. He states: "In sum, they start at the boundary of the village and work up through larger and larger canals; then they go back to their starting place and move down through smaller and smaller canals until they reach their own fields." Ibid., p. 93.

Siriwong also indicates that there are two levels of canal cleaning activity, at the main canal and secondary canal. The allocation of tasks of the activities at each level are different. See Siriwong, A Comparative Study, pp. 68-69. Thus these canal-level organizations are not only coordinating bodies but also make some decisions independently from the system-level organization.

also have their distinctive names. Potter mentions that all seven major canals of System Y have names,¹ and at this level the activity of canal cleaning is carried out simultaneously but independently from the schedule and work at the system level. Siritwong also reports that the Kosariam organization consists of eleven canal-level organizations each with its own name.²

The Muang Mai organization is comprised of twenty-one sub-groups with distinctive names that are responsible for activities at the secondary canal level (see Table 4.1). But these canal-level irrigation groups are under the direction of the Muang Mai irrigation leaders and do not select their leaders.

d) Pattern of Canal Arrangement and Irrigation Group

All the muang fai organizations had patterns similar to the physical structure of their muang fai canal network. Generally the organizational arrangement follows the pattern of the canal arrangement and its segments of canals.

The Administration of Muang Fai Organizations

The last section discussed the basic characteristics of water users as well as some of the variation found among the twelve organizations. Here we will seek to understand how the organizations work to complete all the irrigation tasks. These groups of water users range in

¹Potter, Thai Peasant Social Structure, p. 84.

²For more details see Siritwong, A Comparative Study, pp. 22-24.

size from fewer than twenty persons to more than 1,500 persons, but they all require a certain degree of supervision, coordination, and direction to carry out all their work effectively. The muang fai organization prescribes clearly who has more and who has less authority, and to what extent each can exercise authority over others. It is the administration in the muang fai organization and the mechanism for coordinating irrigation tasks that is in the subject of this section.

From comparison of the twelve organizations, we have arrived at four conclusions which will be further explained in the latter part of the discussion. These conclusions are:

- 1) Generally, the muang fai organization arranges its administration in a hierachical order in which we can see several levels of coordination under the top authority.
- 2) At the lower levels of the organization, several lateral units function independently from each other. Each works in coordination with the others in system-wide activities under the direction of the top authority.
- 3) Usually the administrative structure reflects the pattern of the canal network itself. Sub-units, as cooperating work groups, are at the nodes, and the number of sub-units is equal to the number of nodes in the network.
- 4) There are differences between the patterns of administration in the upland and the lowland system.

Before proceeding to the analysis, three points in terminology and classification must be defined clearly.

First, we find that many researchers, as well as practitioners in development work, have a misconception about the groups of water users, believing village-based rather than canal-based.¹ These researchers fail to point out the basic principle of field location and canals used in common, and go further to refer to village units rather than canal units in the formal structure of the irrigation organization.² In fact, there are examples from some irrigation systems where the irrigation sub-units along a canal are organized along village lines, and here the village leader may be appointed head of the irrigation sub-group as well, which allows for greater effectiveness of coordination and communication.³

Second, although the central government has been actively involved in the management of local irrigation in recent years, in all these twelve systems it has not taken an active role in decision making in the routine activities of allocation, maintenance, ritual, and conflict resolution. Only emergency situations or special projects for

¹This has been pointed out by Coward and discussed earlier in this Chapter.

²Suraroek concludes that the irrigation leaders represent their villages, because this appeared to be true in the two systems she studied, but this was not true in principle. See Suraroek, Water Management Conflicts, pp. 117-120. Also Siri Wong concluded that the number of irrigation leaders varies with the number of villages, whereas the number actually varies with the number of secondary canals. See Siri Wong, A Comparative Study, p. 41.

³Coward, Management Themes, p. 209.

irrigation development have been managed jointly by both the local irrigation body and the government agencies. Therefore all twelve muang fai organizations may be considered as authentic local community organizations.

Third, as was mentioned in the last section, the sub-units or cooperative work groups are generally arranged at all canal levels, but in terms of administration and the distribution of power and decision-making there are no more than two levels in the organization. At the top level or the system level, there is an authoritative body responsible for system-wide or inter-canal activities. This will be termed the system-level organization. At the secondary canal or muang soi level each administrative unit is responsible for activities connected with that individual canal and for the internal activities of each group. For these units the term canal-level units will be used.

A muang fai system divided into several levels we will term a multi-level organization.¹ In contrast, the non-existence of a canal level organization means that the organization is responsible for the activities of the entire system, at all canal levels. Such a system can be classified as a single-level organization.

¹The term multi-level organization is used by Coward in explaining the irrigation organization found in the Philippines. See Coward, "Principles of Social Organization in an Indigenous Irrigation System," in Human Organization, 38: 1 (Spring 1979), pp. 28-36.

In the muang fai system in general, the organization is divided into two levels: the system-level organization is called locally mu muang lak, meaning the organization designed to carry out activities, while the canal-level organization is usually called in local terms mu muang soi, meaning the administration of individual canals (secondary canals, or muang soi).

At the system level, the top leader, called kae muang or huana muang, is the highest authority and makes final decisions in all affairs (see Table 8.2).¹ He usually works with a group of canal-level leaders to coordinate the work of the entire system, such as seasonal maintenance of the weirs and canal cleaning.

This is illustrated in five cases, in the organization of Muang Mai, of Mae Sao, of Kosariam, of System Y, and of Mae Chaem. However, they are slightly different. For example in the case of Mae Chaem and Mae Sao there is an overlap between the leaders at the system level and at the canal level. At Mae Sao, the top leader takes two positions, as top leader and as a leader of one secondary canal. This means that one of the canal-level leaders is selected to be the top leader (kae muang or huana). In the case of Mae Chaem, one canal-level leader is selected to be the assistant to the kae muang. System Y, a large system of 1,600 members and an extensive canal network, needs three leaders to work at the system level, one of which is the top leader.

¹Generally, when the water users want to differentiate the top leader from the group of leaders, they call him kae muang or huana, while the other leaders (canal-level leaders) are known as puchuey. However, we find that very often the water users call them all by
Contd.

TABLE 8.2

SIZE OF ADMINISTRATIVE GROUP IN TWELVE MUANG FAI
ORGANIZATIONS

Irrigation organization	Number of system-level leaders	Number of canal-level leaders
System Y	3	7
Muang Luang	3	-
Mae Na Guen	1	-
Kosariam	1	4
Mae Sao	1	4
Mae Chaem	2	6
Nong Plaman	1	-
Huai Sai	1	-
Na Huk	1	-
Mae Raem	1	-
Muang Mai	5	-
Na Pae	2	-

At the canal-level there are a number of leaders, each responsible for an individual secondary canal (in the case of the System Y, Potter calls these major canals), who work independently from each other. This officer is known locally as puchuey kae muang (as the local people sometimes call all kinds of leaders kae muang, this leader is also called kae muang).¹ The number of puchuey depends on the number of secondary canals. In a small muang fai irrigation system where there are few secondary canals, the group of leader is small in size too, but a large system with several secondary canals creates a large administrative body. For example, the organization of System Y with seven major canals has seven water authorities at this level; the Kosariam system has eleven water authorities, each of them taking care of one canal.

Interestingly, the organization of Muang Mai, which has twenty-one secondary canals, has only four leaders (puchuey) who divide work at this level among themselves. The explanation is that the physical structure, with a main canal 22 kilometers long but with relatively short secondary canals about 500 to 1,500 meters long makes for small groups of water users at the secondary canals, 6 to 25 persons. In a system like the Kosariam one, on the other hand, the secondary canals are relatively long and therefore the groups at the canal level tend to be

the general term, kae muang. The word huana, in fact, is not a northern Thai word, but probably came from the official language of the central government.

¹Siriwong, A Comparative Study.

larger than at Muang Mai, about 20 to 90 water users. These larger groups need leaders to coordinate and supervise their internal activities but the small groups of the Muang Mai organization are not too complicated for the four sub-leaders to handle, and having the five leaders at the system level manage all irrigation activities reduces the cost of coordination.¹

Especially in the case of the Muang Mai organization, there is good reason to believe that the economic costs of coordination must be of great concern to both members and leaders. The reward system is based heavily on the ability of the leaders to manage the system, and the amount of reward depends directly on the amount of irrigated land for which the leaders are able to manage the water supply (the water users pay one taang of unmilled rice for every rai irrigated). The total amount of fee is equally divided among the five leaders (one top leader and four assistants). Instead of sharing this amount among a large group of administrators, or increasing the water fees in order to provide shares for a larger number of leaders, the organization has chosen to keep the water fee low and to select a small number of leaders; that is, they have chosen the least-cost alternative.

The Mae Sao organization has a very interesting arrangement of administrative groups. At the secondary-canal level, there are five

¹Thompson and Bates found that organizations attempt to organize tasks so as to minimize coordination costs. See James D. Thompson and Frederick L. Bates, "Technology, Organization, and Administration," Administrative Science Quarterly 2 (December 1957), pp. 325-343. Discussion related to other relevant literature can be found in Scott, Organizations, p. 214.

irrigation leaders who work on four canals. The first canal is reported to be administered by two leaders, who share the work, one leader supervising the northern Thai water users, while the other supervises the Thai Yai water users (an ethnic group that has migrated from Burma).¹ Thus the size of the leader group may also depend on the ethnic background of the water users; that is, sociocultural factors may effect the size of the leader group administration.

We shall now look at seven small irrigation organizations: the Muang Luang organization, with eighty-eight members; Mae Na Guen, with twenty-eight members; Nong Plaman, with sixty members; Huai Sai, with twenty-nine members; Na Huk, with eight members; Mae Raem, with sixteen members; and Na Pae, with eighty members. These organizations are simply single-level structures under the name of the main canal. There is no evidence to indicate the existence of any organization at the secondary canal level. The water users view themselves as a single group, and the administration is less complex. In the case of Muang Luang, there are three leaders - one top leader and two assistant leaders - to manage the entire system. The Mae Na Guen organization has only one leader to work with its twenty-eight crew members. The Na Pae organization has one top leader and one assistant to manage all its activities. Nong Plaman, Huai Sai, Na Huk and Mae Raem have only the position of kae muang.

¹Unfortunately, detailed data on the number in each ethnic group is not available. The proportion in each group could explain more about this representation.

We have seen the contrast between the small irrigation systems in the areas of narrow valleys in the upland area and the large organizations in the lowland plain areas. The organizations of the upland areas are relatively small in size, with single-level administration, and thus should be considered single-level organizations, while the organizations of the plain area are comprised of several levels of administration and so should be called multi-level organizations.

The Muang Fai Leadership

The following points will be discussed:

- 1) The form of the muang fai leadership is parallel to the accountability model of irrigation leadership established by Coward.
- 2) The duties of the irrigation leaders cover all the four routine activities (water allocation, maintenance, conflict resolution, and ritual performance) as well as emergency work and special projects.
- 3) Their reward, in the form of benefits in kind, is proportionate to their ability to manage water allocation.
- 4) The distribution of rights and responsibilities among the leaders is on the basis of fair and appropriate exchange. The reward is directly tied to the degree of responsibility of the leaders. The higher the degree of responsibility, the higher the rights (e.g., the benefit in water exemption).
- 5) Leadership in the muang fai organization of the upland and narrow valleys is different from that of the lowland plain areas.

Coward has termed the form of leadership found in several traditional irrigation systems the "accountability model."¹ In his view, there are three elements here: small organizational scale, local selection, and direct compensation. The irrigation leaders serve relatively small groups of water users, they are selected by the members of the local group, and they receive their compensation directly from the members whom they serve. These are all characteristics of the muang fai organizations.

The term "small group" is rather indefinite, but Coward's small groups ranged in size from 30 to 60 persons.² The size of small groups in the present study ranges from fewer than twenty persons to ninety persons.

As for the element of local selection, all twelve organizations follow this practice, although they tend to re-elect their leaders again and again. There are slight differences in some of the groups in the case of the Muang Mai one, where the members vote only for the top leader, who usually selects his own staff of four deputy leaders to help in the system-level activities and to be responsible for the affairs at the canal level. The water users of System Y select the leaders at both system and canal levels. When the irrigation sub-unit communities are

¹See his "Management Themes," pp. 204-206, and "Local Organization and Bureaucracy in a Lao Irrigation Project," pp. 333-335, both in Coward, Irrigation and Agricultural Development in Asia.

²Coward, "Local Organization and Bureaucracy," p. 333.

the same as the village communities, the irrigation members in each village choose their representatives to work at the canal level. This practice is also found in the Kosariam, Mae Chaem, and Mae Sao organizations. The other seven organizations, Munag Luang, Mae Na Guen, Nong Plaman, Huai Sai, Na Huk, Mae Raem, and Na Pae, have only one level of leaders, and these are selected by the entire membership.

It is clear that the organization's members emphasize knowledge, experience, and skill in selecting their leaders, as has been noted for Muang Mai, Muang Luang, Mae Na Guen, and Kosariam. The organization tends to have a mechanism for giving the top position to one of the leaders who is reputed to be well trained in the irrigation work. In the case of Muang Mai, the man who has been the secretary assistant, or kae laeka, for several years usually moves into the top position when it is vacated.

In general, an organization classifies its leaders in hierarchical order, which can be seen clearly in any large government or business organization. The arrangement of leadership categories in a complex hierarchy is not so explicit in the observed irrigation organizations. But what we often find in organizations of traditional irrigation systems are several ways of defining leadership categories. For instance, the organization may emphasize the difference in functions or duties of the leaders: mu huana (irrigation heads), mu khon tao (the consultants), mu chaonati (government officials), and mu kammakarn (the ad hoc committee). The organization may emphasize conditions of leaderchoice, such as elected leaders vs. appointed leaders, or of time, such as permanent leader vs. temporary leader, or of reward, such as mu hub jang

TABLE 8.3

CLASSIFICATION OF LEADERSHIP

Classification of irrigation organization	Leadership category
Type 1	1. Irrigation leaders (<u>huana</u>, <u>puchuey</u>) 2. Consultants (<u>khon tao</u>) 3. Government representatives (<u>kamnan</u>, <u>puyaiban</u>) 4. <u>Ad hoc</u> committee (<u>kammakarn</u>)
Type 2	1. Leaders who earn a direct income (<u>kae hub jang</u>) 2. Leaders who earn an exemption (<u>kae nam yok</u>)
Type 3	1. Elected leaders (<u>huana</u>) 2. Appointed leaders (<u>puchuey</u>, <u>kamnan</u>, <u>puyaiban</u>, <u>kammakarn</u>)
Type 4	1. Permanent positions (<u>huana</u>, <u>puchuey</u>) 2. Temporary positions (<u>kammakarn</u>)

(the leaders who receive income directly from the members) vs. mu nam yok (the leader who receive an exemption from the water fee). The organization of Muang Mai manifests a complex arrangement of leadership categories in which the difference between the leaders in various aspects and conditions is clearly noted. The leaders have different rights and duties; although they are equally involved in decision making; and they do not receive the same rewards in the same degree.

Several organizations, including those of Muang Luang, Mae Na Guen, Nong Plaman, Huai Sai, Na Huk, Mae Raem, and Na Pae have a less complex arrangement. The role of each leader is inclusive, in the sense that the leader does all kinds of work. The huana and puchuey in the Na Pae organization undertake all the duties, from planning, supervising, and organizing to sending messages to all members. The roles of the two leaders are not clearly differentiated.

With regard to the compensation received by the leaders, we find an elaborate system for determining rewards in the muang fai organizations. There are two types of rewards: the first one is locally known as nam yok, and the second one is called nam loh.¹ the leaders are basically water users who temporarily take responsibilities as leaders when elected; they have the right to get a share of water. While they are in service, they earn an additional share of water as a compensation, which is called nam yok. This amount is fixed and expressed in terms of land size, such as 10 rai or 20 rai. The top leader usually gets more

¹The water fee is locally called as nam loh. Sometimes people call the leader who receives nam loh the kae hub jang (the employed leader). For more details, see Chapters IV and VI.

than the assistant leaders, because he assume relatively greater responsibilities. The second type is similar to a seasonal allowance. The leaders earn an amount proportional to the size of the irrigated land. This may vary from one place to another. Usually, the water users pay in rice when they grow rice, and pay a fixed amount of cash per rai when they grow cash crops like garlic, onions, soybeans, tobacco, and peanuts. The reward depends on the ability of the leader, because the organizations set up the condition that only the members who cultivate productive land pay the water fee.

The organizations of Muang Luang, Mae Na Guen, Kosaraim and Na Pae use the nam yok system, while the organizations at Muang Mai, System Y, Mae Chaem, Nong Plaman, Huai Sai, Na Huk and Mae Raem use both nam yok and nam loh. There is an interesting point to be discussed on this variation between small and large irrigation organizations. In a small muang fai system, in general, we find that the leaders have a relatively small range of duties which emphasize only the mobilization of laborers to work on maintenance tasks. The work of the leaders in large organizations includes water allocation, maintenance, conflict management, ritual performance, and coordination with the government agencies during times of emergency and special projects. The very basis of the remuneration in the muang fai system is simply that when the leaders work more, they get more. The Muang Mai organization pays the leaders both the nam yok and nam loh schemes.

The Muang Fai Membership

In the previous discussion I have pointed out that membership in a muang fai organization is defined on the basis of field location and use of canals in common. Moreover, the members are generally from several villages. This section will explain how the organizations classify their membership. There are several points in the analysis of this topic:

- 1) The membership of muang fai organizations may be classified into several categories according to differences in access to land, type of cultivation, location of the fields, and season of cultivation. These membership categories acquire different rights and responsibilities.

- 2) Water allocation is based on the principle of proportional rights and responsibilities. Every member gets irrigation water and contributes resources proportionate to his water share.

- 3) The allocation of rights and duties is based on the principle of appropriate exchange. Members have to contribute in proportion to the benefits they receive.

- 4) The allocation of rights and duties practiced by organizations in the upland and narrow valley areas differs from that of the large organizations of the plain areas.

In the Muang Mai organization, the membership is highly diversified. The organization divides its members, or luk muang, into categories with different responsibilities and rights. Based on the type of cultivation, the members are classified in two categories: rice farmers and fruit growers. And with regard to access to land the members are divided into landowner members and tenant members. The landowners

have the right to vote and contribute cash. In contrast, tenant farmers do not have the right to vote. They contribute labor and materials. The arrangement of membership categories in the organization of Muang Mai includes all four types (see Table 8.4). Although Potter's study does not describe membership categories, there are some evidences to indicate that the membership arrangement of System Y is probably similar to that of the Muang Mai organization.¹

Siriwong and Suraroek, have indicated that the muang fai organization emphasizes the difference between landowners and tenant farmers.² Landowner farmers have the right to vote, but tenant farmers do not have. In the case of the Na Pae organization, members are homogeneous: all farmers own land they cultivate, and the same farmers work in both wet and dry seasons.

¹The recent report of the Multiple Cropping Program of Chiang Mai University (1980) indicates that Muang Mai in Chomthong District and System Y in Sarapi District have similar cropping intensity and diversification and similar sized traditional irrigation systems. Moreover, based on the author's observation, fruit orchards have been developed extensively in Sarapi District. There is a similarity in year-round cultivation and extensive use of traditional irrigation. We may find that the members' characteristics of System Y are differentiated. The organization of System Y, therefore, adapts a complex form of membership.

²Siriwong and Suraroek term luk rua the people who work on irrigation maintenance. Actually, this includes all types of cultivators, who may be either landowners or tenants. A specific local term for landowners is hua-na, that is, one who has the right to vote in the election of the irrigation leader.

TABLE 8.4

CLASSIFICATION OF MEMBERSHIP

Classification of irrigation organization	Membership category
Type 1	1. Rice farmers (<u>mu ya na</u>) 2. Fruit growers (<u>mu ya suan</u>)
Type 2	1. Land owners (<u>mu jao ti</u>) 2. Tenants (<u>mu na chao</u>)
Type 3	1. Wet-season cultivators (<u>mu na fon</u>) 2. Dry-season cultivators (<u>mu na laeng</u>)
Type 4	1. Head-section cultivators (<u>mu tang kao</u>) 2. Tail-section cultivators (<u>mu tang pai</u>)

Now we will consider the allocation of rights and duties of twelve irrigation organizations. Actually, there are two types of allocation practice in the muang fai irrigation system. The first one is known locally as baeng ta-ang (baeng is to allocate, and ta-ang means a fixed share of water). The second type is known as baeng tae (tae means flexible share of water). The allocation and adjustment of tae nam have to be made every season. The allocation of tae is more elaborate.

As Hunt and Hunt point out:

A major feature of water control systems is the possibility of a shortage or excess of water. Water scarcity is not a fixed condition of any place, but rather a particular relationship between supply and demand for water at a given point in time. If demand is greater than supply, then there is scarcity.¹

From observations made in several studies, Hunt and Hunt have described several strategies that irrigation organizations use to attempt to meet increased demand; these include utilizing present technology to expand supply, searching for new technology, and locating a new source. The Hunts explain that responses to the difficulties of balancing supply and demand include tightening up the rules on exploitation of resources and placing limits on demand. The irrigation groups may then undertake new construction, try out new technology, in search for a new source of water.

The allocation practice of each irrigation organization is an adaptation, a response to the supply and demand situation with regard

¹Hunt and Hunt, "Canal Irrigation," p. 392.

to water in its particular area. The practice in an area with an ample water supply, such as a main river from which water is available throughout the year, is different from the practice of an area with a small water source, a tributary river or a small stream. With the problem of recurrent flooding and destruction, large irrigation systems in the plains areas require a high investment that is beyond the capacity of a small group. To expand such an irrigation system it may be necessary to recruit more water users so as to have more and more resources. For these system of baeng tae nam, in which the water shares are flexible, is adaptive. For small irrigation systems which demand only a small investment, the allocation practice baeng ta-ang nam, with fixed shares, is appropriate.

In areas with an ample water source, at the initial period of establishment people tend to allow extensions of fields and canals quite readily and without strict control. The process of land development and extension of the irrigation system is gradually extended to the full capacity of both land and water. Therefore scarcity of water is a common situation in the large lowland valleys. Because of this expansion of fields, the irrigation organizations have had to adjust their system of allocation and the rules enforcing irrigation behavior to ensure the capacity of the system. The leaders and water users have had more tasks added to their duties and the arrangement has become more elaborate, as in the organizations of Muang Mai, System Y, and Mae Chaem.

This type of allocation is known locally as baeng tae nam. This means that the allocation has to be made and adjusted every season in order

to best balance claims on the water supply. The procedure is carefully carried out, and the leaders are assigned various types of routine and emergency tasks. The organization manifests a system of complex rules, roles and relationships among water users, as we learn from the data in these cases.

In contrast, small water sources, like tributary rivers and stream in the hill areas make people very conscious of the limited water supply. They tend to act to protect the supply of scarce water. Shares have been allotted among the members who first built the irrigation system, and allocation to newcomers is restricted. Thus demand is fixed in order to secure a balance between supply and demand. This allocation practice is called baeng ta-ang nam, as each member is assigned one share of water, or one ta-ang. Although this share is considered relatively fixed, it may be adjusted when the members request water for their new fields. Thus the share of water (ta-ang) among the members may differ; some members get more than one ta-ang, as in the Na Pae system. To secure a permit for newcomers who have never participated in the establishment is not impossible but is difficult. One alternative was used by an irrigation group in San Kam Phaeng area; the association sold water rights to the farmers who had requested an extension of the canal. This contract required a cash payment proportionate to the total labor invested by the irrigation group.¹

When the shares of water or ta-ang nam are relatively fixed, the allocation practice can assist the organization to balance supply

¹Siriwong, A Comparative Study, pp. 49 and 63.

and demand so that the water in these areas is sufficient. The organization may therefore not require elaborate rules. The leaders take major roles in maintenance tasks and the mobilization of labor and resources. This baeng ta-ang nam type of allocation is found in the cases of Muang Luang, Mae Na Guen, Mae Sao, and Na Pae. The organization of these systems is relatively simple.

All the muang fai organizations also have to be concerned with assigning duties among members. We have observed from these organizations that they attempt to assign work fairly to every water user. This means that the organizations emphasize two principles: each gets a proportionate share of the total benefits and of the total amount of work, and, in fair exchange, each has to share work according to the benefit he or she receives. We find that the muang fai organizations usually have a method of record-keeping to confirm the water shares and to ensure fair exchange.

The Na Pae, Muang Luang, Mae Na Guen, Kosariam and Mae Sao organizations use the ta-ang nam method to allocate the maintenance tasks according to the size of water shares. In large organizations, such as Muang Mai or System Y, there is a complex system for determining water shares as well as maintenance duties. Efficient record keeping helps to accomplish fair exchange.

The last point of this section has to do with overlapping membership. In small organizations, most of the irrigation members have the same ethnic background, reside near each other, grow the same crops, and own their land. The irrigation membership is not differentiated,

and there is an almost complete overlap between the residential and irrigation groups, between wet-season and dry-season growers, and between rice growers and cash-crop growers.

In the large organizations we see a complex arrangement of membership categories differentiated according to several factors. The example of the Muang Mai organization indicates that there are also some overlaps in the membership: some who grow rice also grow fruit, many who cultivate in the wet-season also work in the dry-season, and those who own land at the head section may also have land at the tail section. It is this overlapping membership in the muang fai system that partly enables the association to become an established social organization.

Organization of Work

This section will discuss how the muang fai organization arranges work groups for various types of work.

1) Basically, the muang fai organization organizes work groups to deal with the four main activities, and these work organizations vary in size and composition.

2) In response to different situations (routine work, emergencies or undertaking of special projects), different seasons (wet or dry seasons), and different levels of activities (systemwide and sub-unit levels), The muang fai organization arranges different forms of work groups to suit the conditions.

3) There are differences in the arrangement of work groups between the organizations in the hills and on the plains.

We should begin with a full picture of the irrigation tasks carried out by the muang fai irrigation system. One cycle of normal routine involves the completion of all the four major activities of allocation, maintenance, conflict management, and ritual. The muang fai organizations carry out either one or two work cycles a year.

The nature of work in wet-season and dry-season is different; the work is heavier in the wet-season. The organization must arrange work groups according to these seasonal situations. Again, we have to be aware that there are three different types of work, the routine, emergency work, and special projects. In these categories of work the muang fai organizations are different; some have more complex situations than others.

The larger organizations divide tasks into system-level and canal-level activities according to corresponding levels of administration. The small organizations usually arrange their work groups in less complex way, because the tasks are not complicated, with little work to be done. The work of the large irrigation systems of the plain areas, on the other hand, is more complex and diverse, and the arrangement of work groups is highly complex. The most complex system of work group arrangement has been observed in the Muang Mai organization.

There are three types of arrangements. In the first, all members are organized into four work groups to work in the four major activities. In the second type, the organization arranges irrigation labor in response to the requirements of different situations, as stated earlier. This is an elaborate arrangement, which we find the

TABLE 8.5

CLASSIFICATION OF IRRIGATION WORK GROUPS

Classification of irrigation organization	Irrigation work Group
Type 1	1. Allocation work groups 2. Maintenance work groups 3. Ritual work groups 4. Work groups for the resolution of conflict
Type 2	1. Wet-season work groups 2. Dry-season work groups
Type 3	1. Routine work groups 2. Work groups for emergencies 3. Special project work groups
Type 4	1. System-level work groups 2. Canal-level work groups

Muang Mai organization has been doing until today. Third, according to seasonal cycles, the organization arranges work groups to be responsible for all activities in each season. The work groups of the wet season are different in their size and composition from those of the dry season.

Most muang fai organizations employ one of these arrangements to carry out their four main functions. Some of them have to carry out two cycles of activities, but they do not arrange work groups as elaborately as does the Muang Mai organization. The same work groups may work year round. In other cases, the arrangement is simple because the irrigation system requires only wet-season activities, as with the work groups of the Na Pae system. The Muang Mai, Mae Chaem and System Y organizations have developed complex arrangements for their work groups.

Relationship Between Leaders and Water Users

As Southall has stated, "Persons are linked by the roles they share. Groups are linked by persons who play roles in each of them."¹ The irrigation leaders act as the authorities who direct, organize, and supervise water users in all activities. Clearly, they are in a close relationship with water users. The water users must be responsible for the tasks assigned by the leaders. This leader-water user relationship is culturally defined and normatively prescribed. The

¹Aidan Southall, "An Operational Theory of Role," in Human Relations 12, 1 (1959): 22.

rules of the muang fai organization define clearly all the rights and duties of both the leader and the water users.

In actual practice, it is obvious that the leaders tend to emphasize intimate, face-to-face relationships with the water users, who respond in a similar way. This has been witnessed by many researchers and can be found in the studies of Moerman,¹ Potter, Siriwong and the author. There are some interesting points in this relationship that we should discuss here. It has been observed that the muang fai organizations tend to arrange small groups in order to create an intimate relationship between the leaders and water users. The aim is not only to obtain good work performance in small work groups in which each group member cooperates and informally controls the others, but also to have a close relationships among the members and between the members and leaders. This practice can be seen from the example of the Muang Mai case during the maintenance activities of canal cleaning and weir repair, when the organizations arrange small work groups called taa, which are generally composed of ten people. As the activity proceeds, the leaders and water users are always in direct communication and tend to maintain a pleasant atmosphere. So the leaders and water users express their relationship through direct communication. Besides maintenance activities, other types of work such as allocation or conflict resolution are carried out in a similar way. The large organizations need to confirm and maintain the contact

¹Moerman, Agricultural Change and Peasant Choice, pp. 33-63.

between the members and leaders, and we see that they arrange several routine meeting during each season. However, with two cycles of activities a year for the large organizations, the leader-water user relationship is regularized.

In an earlier chapter I have pointed out that the ritual of the muang fai, or piti phi fai, plays an important role in symbolizing and reinforcing the unity of the irrigation groups, as well as the authority of the irrigation leaders. The irrigation leaders, who are also water users, may find it difficult to maintain their relationships with fields neighbors, village neighbors, and kinsmen who violate the rules. Clearly, the irrigation leaders need to build up their authority in order to direct and supervise the water users and enforce the rules. The rituals partly assist them to do this by emphasizing the importance and power of the irrigation leaders. Since mutual acquaintance may create difficulties in the relationship between the leaders and water users, there are also mechanisms to maintain the relationship between them, so as to accomplish all irrigation tasks facing the organization.

The intimate, face-to-face relationship is the main theme of all twelve muang fai organizations. However, there exist some variations between the small and large organizations. As compared to the large organizations, in the small organization of Na Pae the leaders' role is not so differentiated from that of the other members. The main duty of the leaders is to mobilize the work group. The organization seems to emphasize the significance of the spirit of the water source more than the role and power of the leaders. This is in contrast to what we find in the large organizations of Muang Mai and System Y,

where the relationship between leaders and water users is relatively more complex.

Linkage to the Central Government

The central government has been involved in local irrigation activities since before the present century. The central government has played an active role in the central areas of the valley in the proximity of the city and in other accessible areas, but its involvement in the remote areas has been considerably less active.¹ Although the government's activities in local irrigation have increased rapidly during the last three decades and the relationship with some remote areas (the politically sensitive zone) has been tightened, we still see a difference in the treatment of the two regions.

From previous research it seems that the areas of massive construction and conflict resolution are closely linked with extra-local organization, while maintenance and daily allocation matters are often in local hands.² The government's involvement is usually in one

¹Turton points out the difference between the Chiang Mai Kingdom's relationship with peasants around the city and that with the peasants in the marginal territories. One exception has been the Chiang Dao District, a remote area in the north, because of its teak industry. Today the Communist threat also encourages the central government to be more active in the peripheral districts.

²Hunt and Hunt, "Canal Irrigation," p. 396.

of three ways. Direct involvement is carried out when new dams are constructed that serve several traditional irrigation systems; after the work is completed the government takes over all duties of allocation, dispute settlement, and sometimes maintenance as well. On the other hand, the government may work closely with the local organization in construction or repair and may after the completion continue to work jointly with the local group. Or a third practice encountered is for the government to provide materials and other resources needed for construction or repair while leaving all other duties to the local organization. It has been observed from the twelve organizations that:

1) There are differences between the government's involvement in the mountain areas and its activities in the plains areas.

2) The organizations in close and frequent contact with government agencies for various form of assistance tend to manifest a relatively more complex arrangement than do organizations that have less frequent contact and are only loosely related to the government agencies.

3) This complex arrangement results from the fact that in establishing contact with government agencies, the local organization needs assistance from consultants and specialists.

The Muang Mai organization, though far from the central area and long neglected, has become closely related to the central administration. In obtaining government assistance for special irrigation projects, the local organization has had to deal with all bureaucratic regulations and work in coordination with amphoe officials and RID agents. New tasks have been added, and the leaders have assumed new

roles as mediators between the government agencies and the local irrigation groups; this has included frequent trips by irrigation leaders to the city center to get in direct contact with appropriate agencies. The organization sets up ad hoc committees to assist the leaders to deal with new situations. The organization has submitted large construction proposals (in the amount of 10 million baht, or US \$500,000) to the central government and has received funding for them. The case of Muang Mai is a good example indicating the complex arrangement of an organization in response to its links with the government.

System Y has a complex organization that probably adjusted itself in a similar way. Its close proximity to the city and intensive market-oriented agriculture would tend to encourage a close relationship with the government.

We see a contrasting picture in the organization at Na Pae where the marginal location of the community explains its loose relationship with the central administration. Very little assistance has been allocated to the local irrigation group as a part of the government's village development budget, and the local organization has never gotten in direct contact with the government agencies in the city. The local irrigation group works through the office of the village headman. Thus its connection with the central government has been minimal.

Conclusions from Comparative Analysis

This observation of the twelve muang fai irrigation organizations indicates that there is significant variation in the complexity of their arrangements. The organizations are on very different points of a continuum representing the range of complexity. A number of the organizations exhibit much more complex arrangement than do others.

Some organizations, such as the Muang Mai organization and the organization of System Y, manifest complex roles for leaders and water users and an elaborated relationship between them. These organizations are formed of differentiated groups of water users: rice farmers and fruit growers, land owners and tenants, wet-season growers and dry-season growers. The organizations have created elaborate rules to govern their various irrigation groups and to guide their different activities.

In the other muang fai organizations studied the roles of leaders and water users are not so complicated. The leaders of these organizations are involved regularly only in maintenance and routine work and rarely allocate water or settle conflict, nor are they often called to face emergency situations or do main weir repair. Also, in this form of organization the water users have few tasks; they are mainly responsible for the routine maintenance once a year. Some of them mentioned some emergency with considerable destruction as the one big event during their membership in the organization. Usually the organization has a simple set of rules that describe the rights and duties of all members. The rules are so simple that they may not even

need to be recorded in written form: the members simply memorize all of them.

It can be said by way of summary that:

1) There are two forms of the traditional muang fai organizations in Chiang Mai Valley, the small and relatively less complex local organizations of the upland or tributary valley areas, and the large and more complex local organizations of the plains areas.

2) All muang fai organizations are basically formed with the same set of principles, but they vary in several organizational features due to the difference in the ecological conditions and historical background.

3) There are various ecological factors that influence the organization and encourage different forms of arrangement. Some of these are complex, and others are less so.