This thesis is my own work and all the sources used in its composition have been acknowledged.

C. Vonk

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BUFFALO, BULLOCK OR HANDTRACTOR: A STUDY OF ALTERNATIVES OF AGRICULTURAL TECHNOLOGY IN RESPONSE TO SITUATIONAL CHANGE AMONG THE PEASANTS OF MUANG KAO, A VILLAGE IN UPPER CENTRAL THAILAND

by

Chamnan Vongvipak

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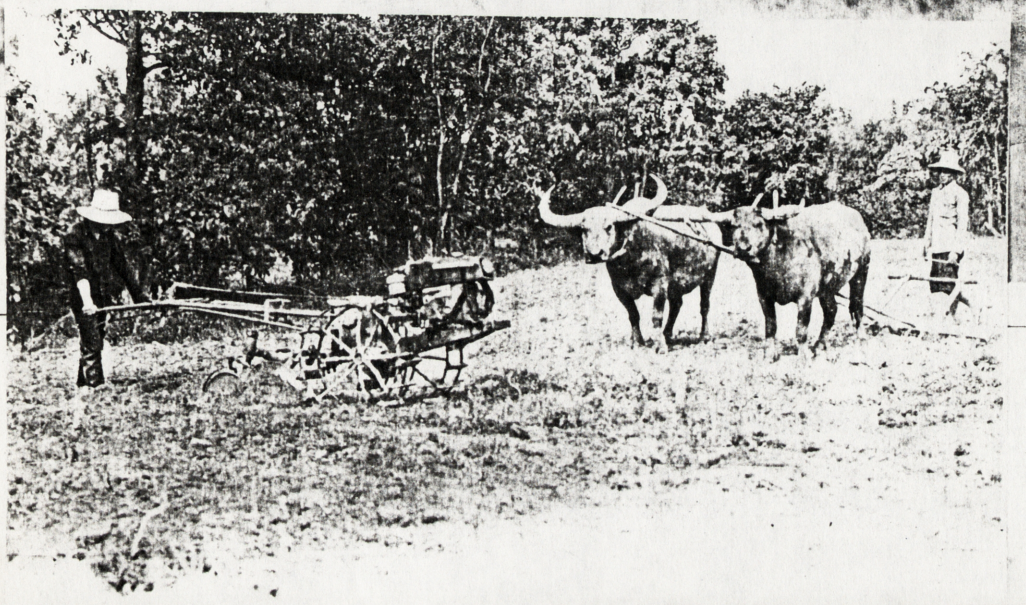

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INTRODUCTION

Problem and Purpose of the Thesis

Thailand is essentially an agricultural country where the large bulk of the population is engaged in farming. About 86 per cent of farmers grow rice, the mainstay of the economy. It is said that a desire for foreign commodities after the Bowring treaty (1855) and an increasing population resulted in an expansion of the area used for rice cultivation (Ingram 1971:43). The land use patterns of the country today show that, of the total area under cultivation, some fifty-five per cent is devoted to rice farming (Kamphol 1972: 123).

However, while the cultivated area has been increased, yields per hectare have declined since 1914 (Statistical Year Book of Thailand 1948-50, 1963). It is claimed that the extension of rice cultivation without improved seed quality,[1] without greater investment in modern irrigation (Wijeyewardene 1975:97, Feeny 1979:137) and without improved techniques (Ingram 1971:48) have led to a long term decline in yield per hectare.

Some maintain that for agriculture to develop, instead of becoming stagnant, technology must constantly be changing (Mosher 1966:75). Others emphasise bringing about technological innovation by farmers because "increased agricultural production comes from the introduction of improved techniques or methods into farming practice. Farmers will be unable to increase production if they continue to use the same varieties...in the same way in the past" (Shao-er Ong 1972:1). The traditional methods of increasing production by expanding the area under rice cultivation cannot go on forever, as arable land is limited. Thus it will become imperative to increase production per land unit by the use of modern inputs. But some have argued that modern technologies, such as tractors, are applicable only to large areas, and

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[1] Comments on the possible decline in seed quality can be found in Yai Suvabhan Sanitwongse (1924), Indra Montri (1930), and Phonrok (1941).

eighty per cent of the rice fields in Thailand are transplanted in small plots. This, it is said, makes the use of tractors impractical (Ministry of Agriculture (1949:13ff.).

In recent years many scholars have paid attention to the mechanization of rice farming in Thailand and some interesting views have emerged. For example, Inukai (1970), an economist, maintains that labour-saving devices, such as the tractor, have provided farmers with an opportunity to spread work over several seasons. Moerman (1968), an anthropologist, disentangles the rationality behind the economic decision of using or not using tractors among the peasants of Ban Ping, a village in Northern Thailand. Sithiporn (1969:14) argues that many of the results from the millions being spent on rice research cannot be applied because crucial factors related to the acceptance and rejection of mechanization have been overlooked. The handtractor, to cite one example, has been designed for use in small flooded fields. The dissemination of this modern technology has been successful only in Lower Central Thailand. In other rural areas of the country, such as the village I studied, Muang Kao, where the handtractor was introduced some sixteen years ago, new technologies have not been widely used. Almost all the farmers still cling to the methods and techniques handed down from generation to generation; a farmer uses the same tools of production as his father did. The following case study of Muang Kao rice farming will reveal why significant change in the technique of rice cultivation in rural Thailand has not taken place.

The purpose of this study is to answer the above question from the farmers' point of view. The question has, in fact, long been discussed by social scientists, e.g. reports prepared by the Royal Thai Government and others (1969), Inukai (1970:483ff.), Ingram (1971:48), Fuhs and Vingerhoets (1971:23), and Warranya (1974:245ff.), but what we really know about it is only sketchy. There are very few empirical studies. My thesis is an attempt to fill part of this void. As an ethnography, it describes the

social organization of a large rice growing village in Upper Central Thailand, a social organization that differs in several crucial aspects from other rice growing communities described in the literature on Thai peasants. As economic anthropology, it is a study of decisions made in rice farming under the constraints of economic limitation, local conditions, and socio-psychological preferences. More specifically, this research attempts to examine the peasants' choices of using water buffalo, bullocks (cattle) or handtractors in a condition of uncertainty in the physical environment and socio-economic spheres. My concern is initially to account for the empirical situation and later to use this as a basis for wider generalization, rather than to state and test hypotheses drawn from economic or anthropological theory.

Ammar (1974:39) says that draught animals, such as water buffalo, have played an important role in Thai rice farming from time immemorial, but that little is known about the efficient use of buffalo. According to him there has been no research done on the use of this animal in traditional agriculture. All that is known about the animal and Thai peasants is only the peaceful image of the rice plain with boats plying the canals and buffalo stamping along or wallowing lazily in the mud. This short monograph responds in part to Ammar's request. It is concerned mainly with the use of the draught animal in traditional agriculture. In addition, some effort is devoted to a socio-economic analysis of the relationship between animals and farmers, an area to which Inukai, in his work on mechanization (1970), paid no attention.

Frames of Reference

In dealing with the study of peasants' responses to economic development most economic anthropologists have taken changes in one set of factors as the independent variable and traced the consequences for other aspects of the society (cf. Alexander 1973:2). Pelto (1973), for example, begins with the

introduction of snowmobiles into the reindeer herding society of Skolt Lapps in northeastern Finland. Then he analyses the impact of the technology on the social, political and economic change which followed. The majority of such studies examine responses to innovations in technology, though Cancian (1972) and others have dealt with responses to new market opportunities and Geertz (1963) with the consequences of a rapidly increasing population.

The above approaches can be very instructive but they are not really applicable to the case of Muang Kao, since my studies do not deal with responses to a single innovation, or changes in one set of factors. In addition, changes that have taken place in the village cannot be classified as solely technological change, or population change. The present village of Muang Kao is the outcome of a large number of changes. Among the most important in the agricultural sphere are the lack of grazing areas, insecurity caused by buffalo thefts, and the introduction of upland crop cultivation for cash. These factors, some of which are neither technological nor demographic but which must be taken into account, will be referred to together as 'situational change'. My use of the term 'situational change' will become clear later in the study.

Since the analysis of the thesis is largely about the adaptive behaviour of human beings to new environment, the study will be incomplete if some aspects of cultural ecological perspective are not taken into account. Thus my frame of reference for this study is a general ecological orientation, within which I treat human cultural behaviour as a heterogenous and flexible system of adaptive responses (cf. Pelto 1973:11). Bennet (1969:11) has described this research orientation quite clearly "A second meaning of the term ecology emphasizes adaptation or adaptive behaviour. Here we refer to coping mechanisms or ways of dealing with people and resources in order to attain goals and solve problems. Our emphasis here is...on patterns of behaviour: problem-solving, decision-making...". So in this thesis I will

be concerned with examining the adaptive responses of different individuals to a new environment. Precisely, my research comes to focus on just one system: the adaptive strategies developed by the farmers of Muang Kao to cope with situational changes. The case study of Muang Kao contributes an understanding of the agricultural adaptation of rice cultivation in rural Thailand.

After a brief account at the beginning of chapter I of the geography of Thailand, the rest of the chapter is devoted to a description of Muang Kao village in terms of its people, location, and economy.

The social structure of Muang Kao considered in terms of the kinship system and its economic implications is presented in chapter II.

Chapter III is about the production process in traditional agriculture. 'Traditional agriculture' in this study designates the farming system in which cultivation is by means of animal-drawn wooden ploughs. The water buffalo is widely used in the village. Thus socio-economic aspects of the animal together with the costs involved in plough agriculture are dealt with in depth.

Landholding and tenancy is considered at the beginning of chapter IV. Then I concentrate on the recent expansion of cultivated land which has resulted in a particular pattern of rice farming in Muang Kao, and has brought about problems of shortage of grazing lands and transport to the rice fields.

It should be mentioned at the outset that although this study is concerned with technology in rice farming, it is focused only upon agricultural technology used in land preparation, i.e. ploughing, puddling, tilling and harrowing. It is not concerned with the technology of harvesting, threshing, milling, etc. In other words, it mainly deals with the production process in the planting season because the primary use of mechanization in this country is in the preparation of land for planting.

The expansion of cultivated land, the insecurity caused by buffalo theft, and the introduction of upland crops for cash are factors which have brought

about other alternatives in Muang Kao rice farming, namely the handtractor and bullocks (oxen). Thus chapter V opens with a description of handtractor agriculture. Reasons for the increasing use of the machine are discussed at length. While a handful of farmers have changed from buffalo to handtractors, a large number of peasants have solved the problems by using bullocks. Reasons for this are explained.

Though the majority of farmers have replaced buffalo with oxen, the technology of rice farming is still the same as plough agriculture done with the use of buffalo. The lack of significant changes in agricultural technology among the peasants of Muang Kao is the main subject of chapter VI. Reasons for clinging to traditional technology and not using the handtractor are presented.

The above description of Muang Kao's rice farming and its economy is empirical. To discover what principles lie behind the facts is perhaps the main difficulty that the anthropologist has to face (Leach 1954:227). Thus, the second half of the chapter attempts to analyse the reasons for the observed patterns. In so doing the concept of 'situational change' and some aspects of cultural ecology mentioned earlier are drawn upon for the analysis of the peasants' economic behaviour in allocating their scarce resources.

Research Methodology

The credibility of the information and argument that I have presented in this thesis rests principally on my personal observations of events and people in Muang Kao during two periods of field work.

Firstly, from April to June 1977 some of the staff from the Department of Anthropology, Silpakorn University, under the supervision of Srisakara Vallibhotama, went to Muang Kao to collect socio-economic data for the National Historical Park Project organized by the Fine Arts Department together with UNESCO. There I found draught animals working side by side with

handtractors. What was striking to me was that the former still outnumbered the handtractors, although the latter were introduced some sixteen years ago.

Secondly, I stayed in the village from July to November 1977. Most of my data collected during the second field trip resulted from the usual anthropological methods of participant observation, unstructured interviews, casual conversation, and attendance at activities. I also collected a considerable amount of more systematic data. Soon after arrival in the village I mapped the entire area and established the ownership of all land and house-sites. Then I visited each household and collected genealogies and basic census data. During that time I attended nearly all of the activities that took place in the village and others nearby.

When the planting season came I moved with my landlord from the house in the village to stay at his temporary farmhouse in the rice field. Most of the time I paid attention to land preparation done both by the use of traditional agriculture and mechanized farming which were observed from farm to farm.

I started doing structured interviews when farmers moved from the rice field to the ancient city of Sukhothai after they finished planting. It was during that time I carried out random sampling. Farmer households were divided into two groups in accordance with the use of plough agriculture and handtractor agriculture. Two hundred and forty one households who engage in traditional agriculture were interviewed in depth as representatives of Muang Kao population. Then I spent most of the time in September and October interviewing as well as collecting quantitative data about the use of handtractors from forty-seven households.

There are two major data bases used in this thesis. The first set of data comes from 638 households collected from eleven villages of the subdistrict (tambon) which includes the village of Muang Kao. This collection was made by the Department of Anthropology led by Srisakara. The second set is the data collected from 241 of 500 households who use

plough agriculture and 47 households who use mechanized farming will be called 'my survey' or 'the households surveyed'. It is worth noting that the account of Muang Kao in the past and its local tradition is derived from the verbal testimony of the old people because there is no written record about Muang Kao available.

Weights and Measures

Thai traditional weights and measures have been standardized in terms of the metric system:

1 pikul (or hap)	=	60 kilograms	(132.3 pounds)
1 kwian	=	2000 litres	(440 gallons)
1 thang	=	20 litres	(4.4 gallons)
1 rai	=	0.16 hectares	(0.4 acres)

The Unit of Currency

In October 1977: $A1 = 22.54 baht.

CHAPTER I

Muang Kao Village: People, Location and Economy

This thesis is mainly concerned with the economics of rice farming of a peasant village, Muang Kao, which one shall always bear in mind, that can never exists as an economically or politically independent and authonomous unit (cf. Pearson 1974:513). The village of Muang Kao is essentially a segment of a more complex society, Thailand. Thus after a brief account of the geography of Thailand at the beginning of the chapter, a description of the village is presented in terms of its people and location. The physical environment of Muang Kao is taken into account because it determines a pattern of rice farming which is different from rice growing villages cited in the related literature on Thailand. Much attention is paid to an examination of the interaction of the village economy within the wider society.

Geographically, Thailand lies approximately between 6^{o} to 21^{o} north of the equator and 97^{o} to 106^{o} east of Greenwich. The present area of the country is about 518,000 square kilometres. It is bounded on the west and northwest by Burma, on the east and northeast by Laos, on the southeast by Kampuchea and on the peninsular south by Malaysia (see Fig.1). Its population in 1976 was about 36 million.

In geographic as well as economic terms, Thailand can be divided into four regions: South, Northeast, North and Central. It is with the Central Region that we shall be mainly concerned because it is here that the village studied is located.

The Central Region (129,533 square kilometres) is the largest area of lowland. It is the heart of the Kingdom, the region that the Thai settled after leaving the mountains of Yunnan and northern Siam. Here they gradually penetrated the existing population and finally subdued it. They infiltrated

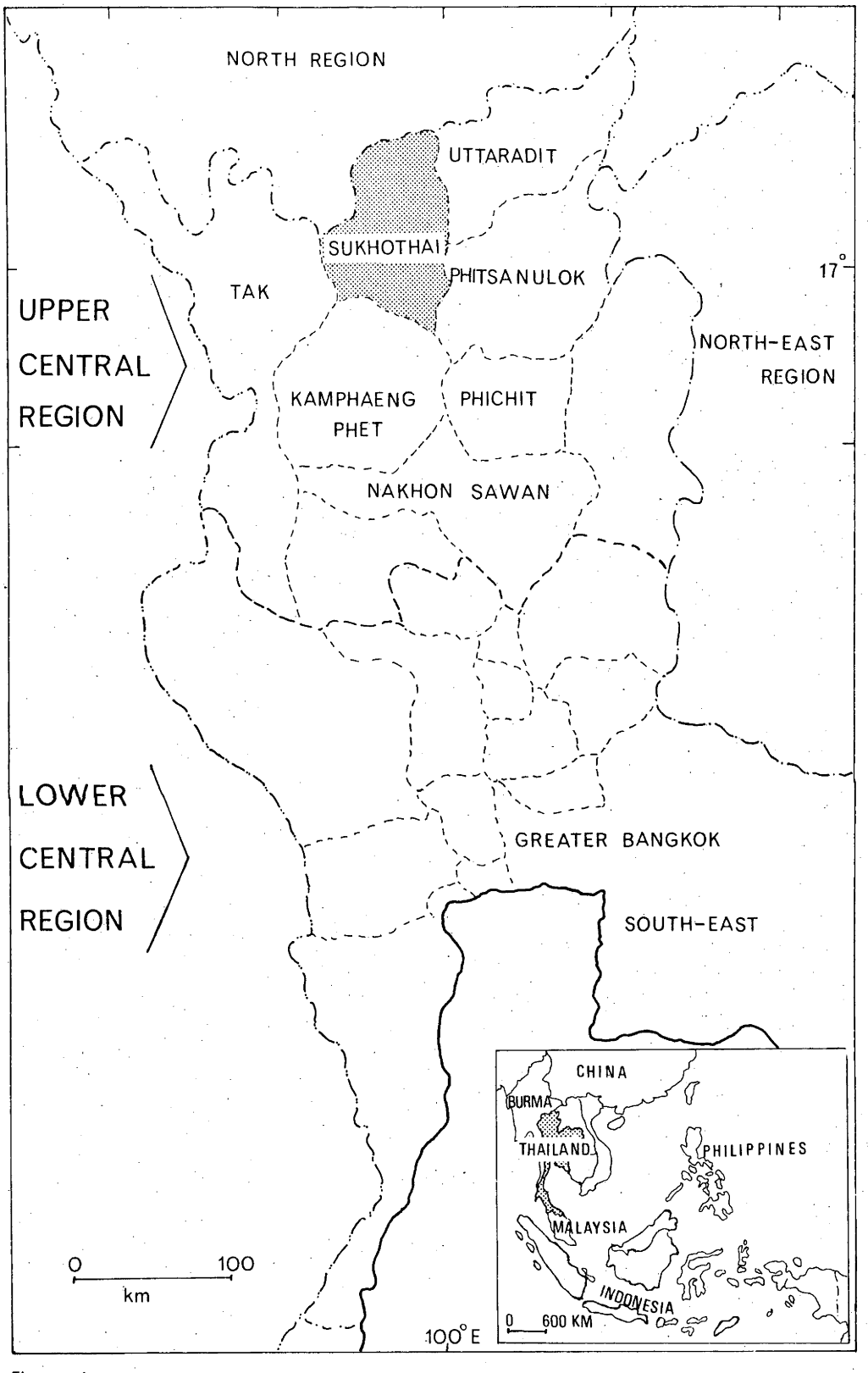

Figure 1

Administrative map of Central Thailand

and established the various Thai kingdoms, including the Sukhothai kingdom where the village of Muang Kao is situated.

Topographically this region is composed of flat, deltaic alluvial silt which the rivers brought down from the north and deposited throughout the delta area. According to Sternstein (1976) and Donner (1978) the Central Region may be divided into two sections, the Lower and the Upper Central.

Administratively, Thailand is divided into provinces (changwat), districts (amphur), subdistricts (tambon) and villages (muban).[1]

Sukhothai province, 480 kilometres north of Bangkok, at present contains eight districts (see Fig. 2). The village of Muang Kao[2] is one of eleven villages of a subdistrict, tambon Muang Kao, in Muang Sukhothai district. At the time of this study the population of Muang Kao was about 3,000, living in some 500 households. The population is homogenous both in language and way of life.

The village of Muang Kao is situated on the site of the ancient moated city of Sukhothai (Fig. 4). From the thirteenth to the fifteenth century this city flourished as one of the country's early political, religious and cultural centres (Charnvit 1976:13ff.). After the death of King Rama Khamhaeng, the greatest king of Sukhothai, the kingdom began to decline and was finally conquered by Ayutthaya kingdom. In the Bangkok era (1767-1932) King Rama I (1782-1809) of the Chakkri Dynasty found that the ancient city of Sukhothai was too big to offer protection from attacks by Burmese troops. So in 1786 he ordered the community to move from the ancient city and settle at the site of present Sukhothai town, 12 kilometres from the ancient city.

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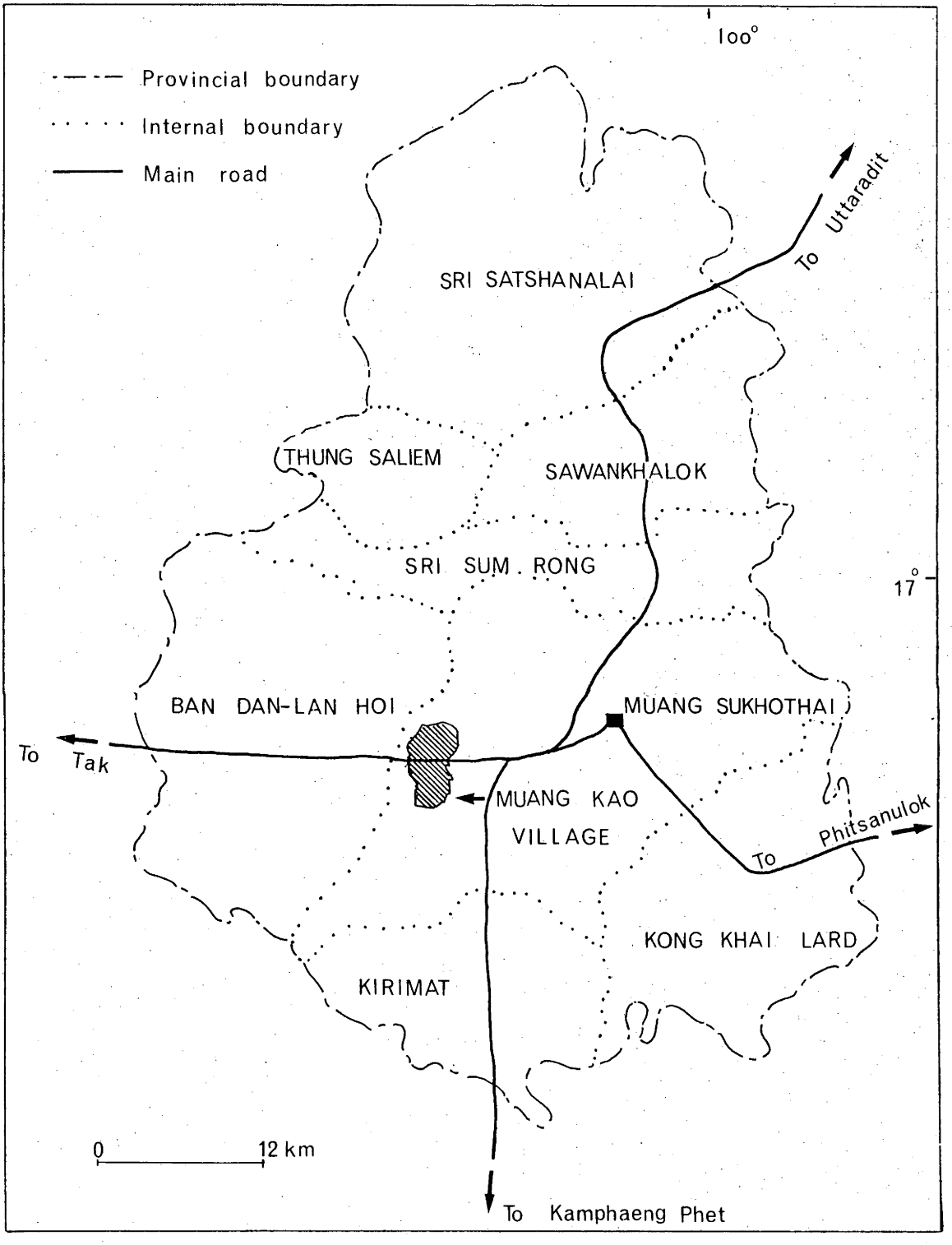
[1] For more detail about administrative divisions, administrative framework and territorial administration see Rubin (1974:2ff.) and Sternstein (1976: 3ff.). According to Rubin in the early 1970's the provinces contained between three and twenty-one districts. Each district contained an average of eight subdistricts that, in turn, had an average of nine villages.

[2] The village of Muang Kao, like other villages in this country, is under the control of a village headman elected by the adult residents.

Figure 2



Administrative map of Sukhothai

The new community has been called Muang Sukhothai up to the present. 'Muang' in Thai means town. In this thesis the terms 'Muang Sukhothai', 'Sukhothai town' and 'town' will all be used. All refer to the same place, the new site.

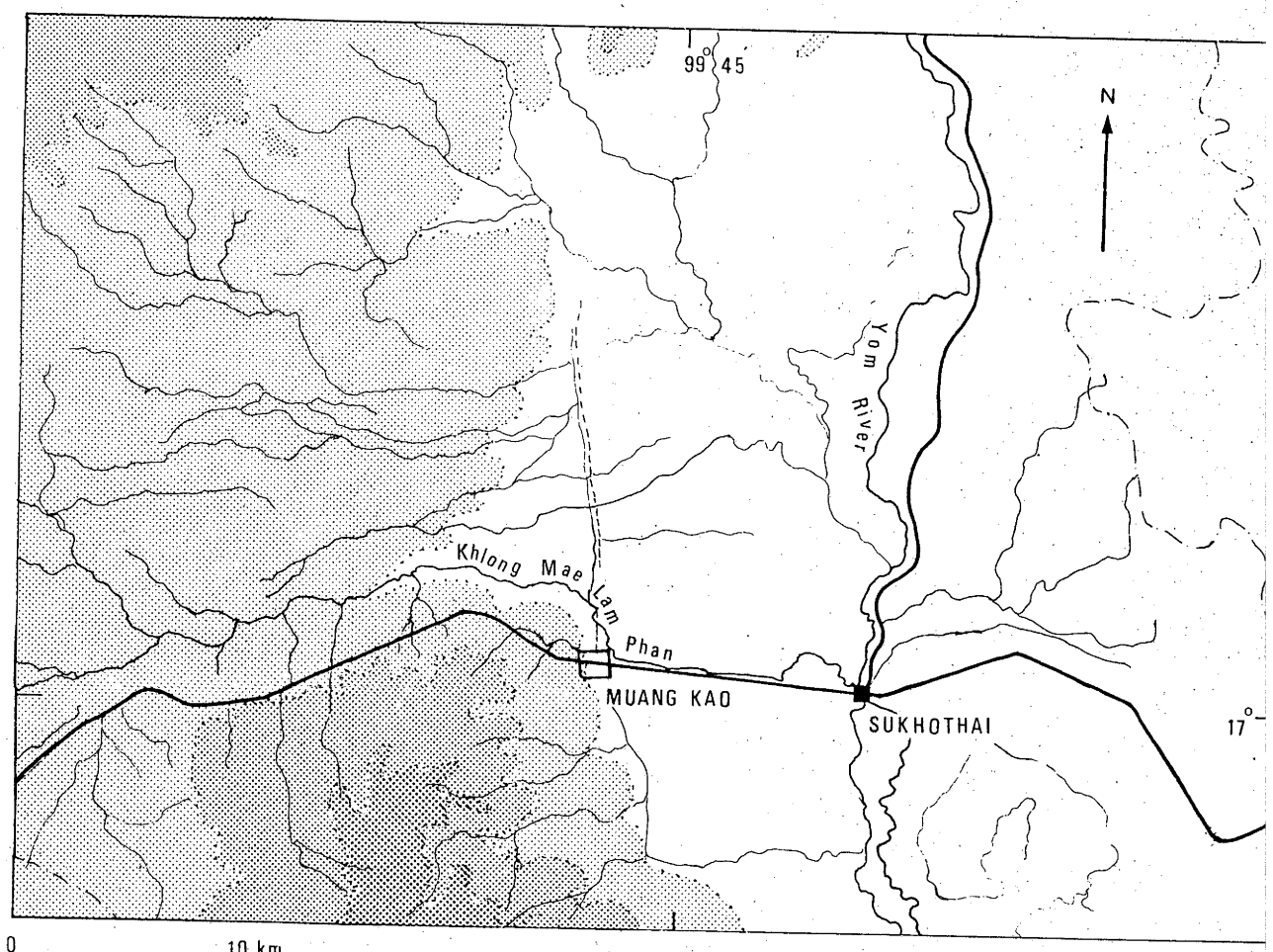
When the present inhabitants settled in the ancient city, they called it 'Muang Kao' which means old city. Though there are about 3,000 individuals living within the rectangular walls of the ancient city, administratively the community is only a village. So from now on the terms 'ancient city' 'Muang Kao village' and 'the village' will be used interchangeably to refer to the permanent living area within the earthern walls of the ancient city (see Fig. 4).

Physical Environment: Elevation and Drainage

Topographically, Muang Kao may be divided into two types of land: high lands and lower lands. The former range from 100 metres to 700 metres above sea level, while the latter are below 100 metres (see Fig. 3). In Figure 3 the high lands appear to the south and the southwest of the residential area. From the south, the high land elevation decreases gradually from 500 metres to 300 metres, and 100 metres towards the east of the village. From the west the high lands slope from 300 metres towards the northern part of Muang Kao. In this area, land forms are at different levels. The rice fields of the farmers are situated both on the high land and on the plain. I shall return to this point later on.

Khlong Mae Lam Phan, which starts in Tak Province, is the main stream in the region. Passing through cultivated land, the stream finally joins the Yom River at Sukhothai town. The stream has an average depth of 4 metres. It reaches flood stage from time to time in the rainy season when there is heavy rain. Running swift and full, the stream swells and overflows its banks flooding rice fields and the roads. It is upon this natural flooding and

Figure 3



Elevation and Drainage

rainfall that rice cultivation in this area depends. Though there are other small streams, all of them, including the main one, distribute water only in the rainy season.

Climate

The village of Muang Kao which lies in the Upper Central Region, shares with the northern and the northeast regions of Thailand three changes of season in the course of the year. They are the rainy season, the cooler season and the hot season. The rainy season lasts from May until October, with a monsoon coming from the southwest causing flooding all over this area of the country. Rainfall averages 40 inches (1,000 m.m) per annum (The Fine Arts Department 1978:34). Daily temperature varies little all year long ranging from 28°C to 30°C.

From November until January is a cooler season. The weather is rather dry. A cool wind from the northern part of the country passes through the area. It is called the harvest wind because at that time villagers begin reaping their crops.

The hot season lasts from February until April. There is a hot, humid westerly wind passing through the village. If the wind lasts long, until May or June, there will be widespread drought throughout Sukhothai and neighbouring provinces. In this case, rice cultivation in the area will begin later than usual.

Village Setting

The village of Muang Kao is 12 kilometres west of Sukhothai town. To get to the village from the town one takes a minibus from the terminal in the town. The bus runs along the Jarode Vititong Road which cuts through the ancient city (see Fig. 2).

On the way to the village, if a visitor comes in the rainy season, he will see green paddy fields on both sides of the road. The bus passes

various small villages: Ban Kloye, Ban Khwang and Ban Na respectively (as shown in Fig. 5). These villages are set along both sides of the road. From Ban Na onwards there are ancient Buddhist monuments lying in ruins here and there beside the road. Eventually one arrives at Muang Kao village.

Village Buildings

Most physical structures of the village are built within the ancient city (as shown in the table below).

Table 1: Village Physical Structure

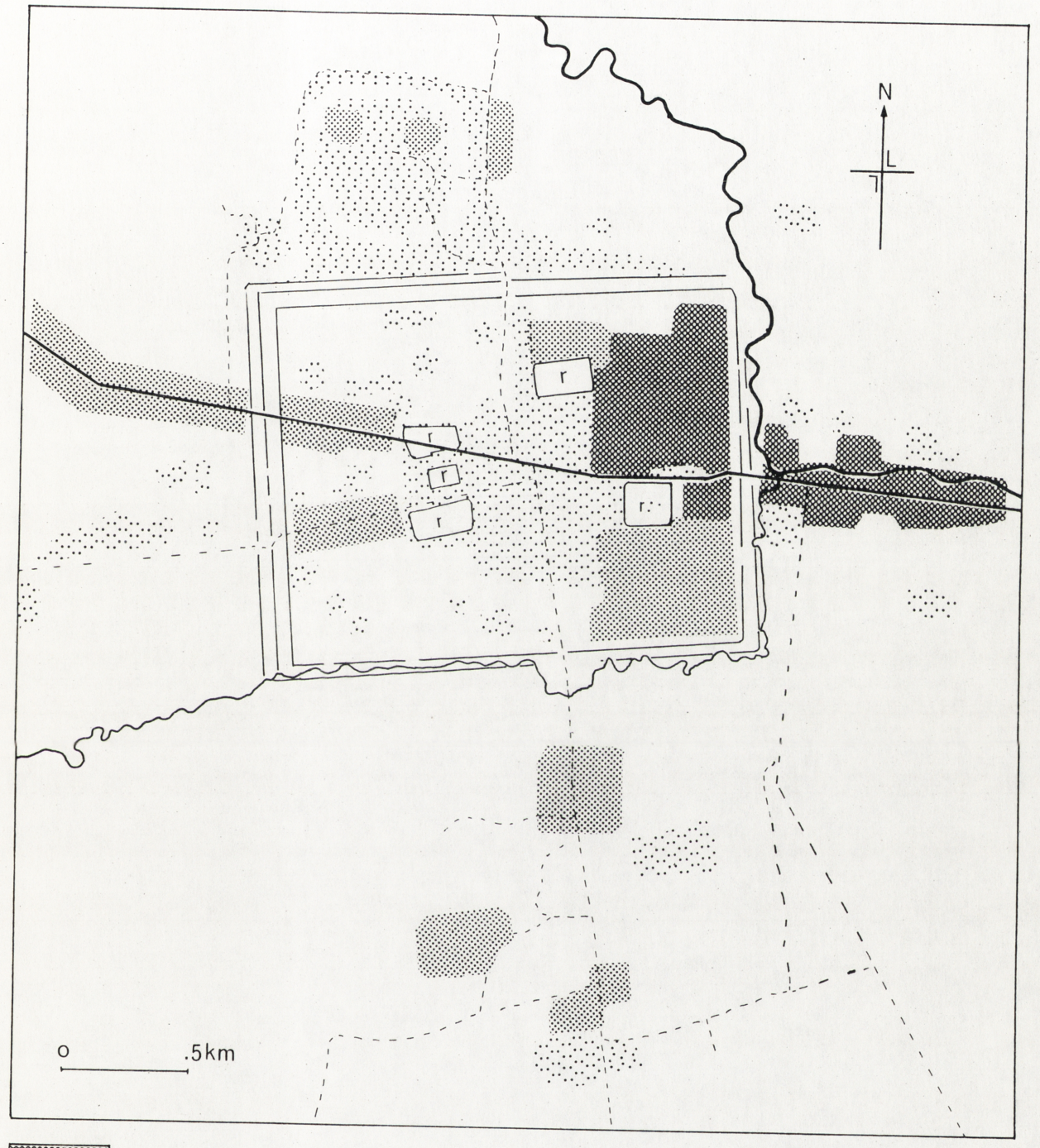
Type of building	No. of units
Houses	approx. 500
Shops and stores	52
Small rice mills	14
Temples	5
Schools	3
Others*	10

* Others are two local markets, a municipal slaughter house, a saw mill, a museum, a police station, a cock fighting arena, a gas station, a cinema and a garage.

Villagers, by and large, have permanent houses in the ancient city, because most service facilities e.g. water resources (reservoirs and wells), electricity and a shopping area are available here. So inside the ancient city is mostly living area, while outside it is surrounded by cultivated lands (see Fig. 4 and 5).

At present the living area is limited, as legally the land inside the ancient city belongs to the Fine Arts Department. The Thai government has a project to reconstruct and develop the ancient city as a historical park and tourist centre. Villagers are allowed to live only in a certain part of the

Figure 4



> 1.8 Household per rai

1-1.8 Household per rai

r Reservoir

Ancient monument

Main road

Dirt road

Populated areas

Rectangular earthen walls of the ancient city

ancient city. In 1971 more than one hundred villagers were forced to move from the historical area to a new location at the southwestern corner of the ancient city. An increasing population, together with the Fine Arts Department's policy has resulted in densely settled living areas (see Fig. 4).

Local History and Village Life in the Past

According to local tradition there have been four periods of village growth. More than one hundred years ago people from Tak, Phichit and Phitsanulok Provinces migrated and settled around the biggest reservoir. Fresh water is available from the reservoir all year long. People named it 'Trapang Tong' (golden reservoir). The old temple near the reservoir had long been used as a monastery, and it was named after the reservoir 'Wat Trapang Tong'. The temple remains the political and socio-economic centre of the village even today.

In the second period, about a hundred years ago, there were some ninety households. The land outside the ancient city to the north was cleared and cultivated.

In the third period, starting around seventy years ago, rice was grown for cash. Khlong Mae Lam Phan served as a main means of communication from Tak Province and passing through the village towards Sukhothai town. Boats plying the waterway carried rice grain from the village to the town. Because of the growth in the national market for rice since the Bowring treaty (1855) and the other factors mentioned earlier there was an expansion of the rice growing area in this region, a topic that will be discussed in chapter IV.

In those days the village economy was more subsistence oriented than it is today. Farmers milled their own rice by hand. Cloth and clothes were woven and made within families. Hunting and food gathering were widely practised.

The last period began after the Second World War. Since the construction of the main road in 1953, communication with the outside world

became much easier than in the previous periods. The increased facility of travel brought about by the road has led to many kinds of changes, which will be now considered.

The Expansion of the Village

Expansion both in terms of the area covered by the village and in terms of population took place after 1953 when the road had been finished. Excavation and reconstruction started on the ancient city because over centuries the ancient city had become buried under earth, debris and forest. The reconstruction of the ancient city affected the expansion of the village in many ways.

Firstly, the village was developed physically. After the reconstruction Muang Kao became one of the tourist centres of Thailand. The Rama Khamhaeng museum, a primary and secondary school, and a police station were built. Thai and Chinese traders from other places migrated to the village and set up business there. The shopping area and market were expanded, and at the same time a dozen rice mills were opened.

Secondly, wage labour becomes available to villagers. A lot of the farmers become part time or full time labourers in the ancient city reconstruction. In the villagers' view, working for the government meant not only additional income but also increased social prestige and new experiences.

Thirdly, more and more people from nearby provinces and the surrounding areas migrated to Muang Kao. There was no population census of Muang Kao itself in the early fifties but according to The Registration Office, Department of Local Administration from 1957 to 1977 the population of the subdistrict[1] increased from 10,205 to 20,515. This is equivalent to an annual growth of 3.5 per cent, a large part of which is due to in-migration.

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[1] Containing Muang Kao, the biggest village, and ten other villages.

Village Economy and Productive Activities: Income

To an outsider, the economy of the village may appear to be essentially a household economy of small producers, peasants, artisans, and merchants whose primary motive for production is subsistence. But it is not a self-sufficient economy at all. In a peasant economy, like that of Muang Kao, most people have come to depend on production for sale as their source of livelihood. Market exchange is the dominant mode of transaction; commercial production tends to be more important than subsistence production (cf. Dalton 1967).

In the following pages, we shall be interested in the sources of income which the villagers use to obtain needed goods and services that are not produced by the farmers themselves. Though rice is the mainspring of the Muang Kao economy, there are several other means of obtaining income worth taking into account. In so doing I shall divide the sources of income into two main categories: income considered in terms of 'semi-subsistence' and that in terms of wages.

In the 'semi-subsistence' category, the sources of income are rice farming, fishing, poultry-keeping, charcoal-making, gardening, pig raising, hunting and wild vegetable gathering (as shown in table 2). 'Semi-subsistence' designates household production both for household consumption and for cash. We should always bear in mind that for ages peasant economies have had a double orientation towards both subsistence oriented activities and market oriented activities (cf. Thorner 1971:207).

Table 2: Sources of income (semi-subsistence): participation rates and average income

Economic activities	% of household	Income (average) baht
Rice	98	16,000
Fishing	90	-
Poultry	87	-
Charcoal making	80	-
Pig raising	50	-
Upland crop	20	3,000

(Fishing, Poultry, Charcoal making, Pig raising: information inadequate)

n = 241

The average annual income of a farm household in Muang Kao from rice growing in 1977 was about 16,000 baht [1] while the income of agricultural households for the whole Upper Central Region was 14,000 baht (Ho Kwang Ping 1978:42).

From the above table, next to rice cultivation, fishing seems to be the main occupation among the farmers. Sukhothai Province is well known as an important supplier of fresh-water fish for the region. Fish is the most essential supplement to the farmer's diet. Apart from rice, fish supplies the farmer with the great bulk of their protein and vitamin intake. There are fish in streams, rice fields and the Yom River. Every household has its own fishing equipment. In good years the farmer may have a large surplus of fish to sell, and in bad years little or none, but at least his family is fed.

Eighty-seven per cent of the households surveyed raised poultry; ducks and hens lay eggs for family consumption. Some villagers, particularly adult men, keep a cock for gambling. Poultry may sometimes damage other people's gardens and cause trouble between neighbours.

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[1] How the average annual income was calculated is shown in Index I.

Eighty per cent of the households make charcoal out of trees cut in the forest. Charcoal making generally takes place during the dry season when farmers are free from their work in the fields. The villagers make an arrangement with each other to collect wood. A visitor sometimes sees a caravan of more than twenty carts moving towards the mountainous forest area to collect wood. Charcoal is produced for fuel in each household and for sale.

Pig raising is another source of additional income. Fifty per cent of the households keep pigs. This is not for ancestor worship or slaughter for household consumption, but entirely for sale. It is worth noting that every rice mill owner keeps pigs simply because he has plenty of bran to feed them. The households that have pigs own six on average, which are cared for by women.

In addition to growing rice, the Muang Kao farmers cultivate upland crops in the fields called 'Chattupon' (see Fig. 5). Twenty per cent of the households undertake upland crop cultivation. The upland crops, e.g. corn, sugar-cane and different kinds of vegetables, are sold both at the local market and at the market in Sukhothai town.

Hunting and food gathering are still practised, although there is not as much game as in former days. A lot of farmers, especially the poor, collect wild vegetables, e.g. bamboo shoots which are plentiful in the forest during the wet season. Game is rarely sold for cash while the vegetables become one of the sources of income of poor, landless farmers.

Cutting down trees is illegal, but a large number of trees are nevertheless cut and sawn into planks. These are used for house-building, furniture making, granary construction etc. The planks are generally used by the households, but they are also quite often sold for cash when needed.

In terms of wages the sources of income are as shown in the following table.

Table 3: Sources of income (wages): participation rates

Economic Activities	No. of households	% of households
Store keeping	40	16
Thatch making	32	13
Basket making	21	8
Prepare food selling	20	8
School teaching	15	6
Musicians	15	6
Rice milling	14	5
Dress making	12	5
Carpentry	12	5
Souvenir selling	12	5
Museum officials	10	4
Money lending	10	4
Antique dealing	8	3
Hairdressing	7	3
Lottery ticket selling	7	3

n = 241

Note: Number of households stating various economic acitivites.

Sixteen per cent of the households permanently run stores. They sell dried and canned food, farm implements, clothes, hardware and other miscellaneous commodities. Farmers from other villages seldom buy goods sold in Muang Kao, though they drop in at the village on their way home from the town. The Muang Kao store business largely serves the farmers of the village.

There are thirty-two thatch makers in the village. Having finished rice farming, they harvest jâakhaá, a kind of weed that has long leaves. The leaves are left to dry in the sun and then are arranged in a row in the form

of thatch ready to be used to cover the roof of a house. Thatch makers are predominantly women who earn about 300-400 baht from thatch making during the dry season.

Twenty-one villagers are considered to be good at basket making. Baskets are made of bamboo, produced and sold at the local market. Basket makers are often asked by their neighbours to make baskets for them. The prices of baskets sold among villagers themselves are cheaper than the prices of those sent to sell at the market. The basket makers earn additional income of 200-300 baht per annum.

Market selling in stalls is the activity of another type of wage-earners that should be mentioned here. They buy vegetables, and dried food from Sukhothai market and sell them in the village market. Another group of stall traders that should be considered is prepared food sellers. The twenty prepared food sellers, like the market sellers in stalls, are women. They have no land for rice farming. Some of them sell cooked food at the market in the morning, while others peddle their goods around the village.

There are fifteen school teachers in the village. The average monthly income from school teaching was 1,700 baht. The school teachers also work part time in agriculture. Some of them having inherited their parents' rice fields, hire somebody to do rice farming for them. Others raise pigs or run a small store business for additional income.

Fifteen farmers gain additional income by being part-time musicians. Though pop music or Western songs is favoured among village teenagers, traditional music is still widely performed on many occasions, e.g. ordination and marriages. Muang Kao musicians are also hired to perform with Thai drama troupes in other villages from time to time.

Fourteen rice mill owners gain their major income by rice trading. They are, in fact, both local rice traders and middle men who trade with rice traders from other communities. The local rice traders try to get control of

rice trading in the village. They like farmers to sell their product directly to them rather than to outside rice traders.

Twelve villagers make their living as dress-makers, while another ten individuals earn their living as tailors. Both groups complained that their income had fallen after factory-made clothes were introduced to the village.

In present-day Muang Kao house building is done by professional carpenters. Labour exchanges for raising houses rarely occur. There are twelve part time carpenters in the village. They are hired at intervals to build neighbours' houses.

Souvenir selling was introduced in the village after it became one of the tourist centres of the country. Twelve villagers' income depends on selling things to tourists. A dozen boys and girls from poor families have become untrained tourist guides. They do this as a part time job after school or during the long vacation. In their view, being a guide is not only fun but also allow them to feed themselves from their wages and tips.

Ten of Muang Kao's inhabitants work as officials in the local museum. Some of them are clerks, while others are assistants to curators.

During the reconstruction of the ancient city, antiques were found. Villagers can find, even nowadays, ancient things buried in the ground. Porcelains, ceramics, celadons, pottery and other artefacts were discovered and sold to antique dealers. Eight villagers earn their living by dealing in antiques. They buy ancient things from villagers and sell them to antique dealers from Bangkok and other places.

Seven villagers earn their living by doing hairdressing while the income of another three village men entirely depends on their business as barbers. Hairdressers make more money during the dry season than during other seasons. Village women like to have their hair dressed and styled in the hot season because there are a lot of festivals and fairs during that time.

Seven landless villagers are lottery ticket sellers. Playing the lottery is very popular among the farmers, both rich and poor. The ticket sellers get a percentage from the tickets they sell.

Three per cent of the households surveyed have farm equipment for renting-out. Water-pumps are rented at the beginning of the agricultural season. The renter supplies petrol and pays the owner of the water-pump 60-70 baht a day for his services and equipment.

Although Muang Kao has two drug stores, one local doctor and two nurses and three midwives, folk medicine men curers (หมอ klang baan and หมอ nammon) still play an important role in curing sickness, particularly mental cases. By and large villagers consult the curers when they have already been treated at the hospital but have not recovered. The payment for folk medicine and magic cures is very reasonable, and to some extent flexible. For example some curers charge nothing for treatment if a cure is not effected.

Some villagers, especially old women, get additional income by making mats. Having harvested jâakog, a kind of grass, torn it into strips, and put it in the sun to soften it, the women weave the strips into mat form. Handmade mats are used in households as well as sold for cash if needed. Villagers prefer factory made mats to the ones produced in the village because they are cheaper and more colourful.

The village headman gets a small government salary. His major source of income is as a landlord for he has more than four hundred rai of land. He lends money at interest, especially to his tenants. He also runs a gas station, while his wife is a successful souvenir seller. The two of them, in fact, are the chief antique dealers in Muang Kao.

Massage is quite popular among the villagers. There are five masseuses and two masseurs in the village. It costs about five baht for each massage service. Both masseuses and masseurs more often than not get paid in kind: raw food, rice, or fish.

One per cent of the household surveyed earn their income from land rent. There are two types of landlords: firstly, those who are getting old and do not have enough labour in their family to run the farm, and secondly, those who have become rich and have given up rice farming for such business as rice milling, rice trading or store keeping. Payment of land rent can be in cash or in kind. The payment in cash is generally 100 baht per rai, while the equivalent amount in kind is 20 thang out of each 100 thang of rice grain. In other words, landlords get 20 per cent of the paddy harvested from their lands. Tenants generally prefer paying rents in kind to rents in cash. The latter is expected to be paid at the beginning of the planting season, but the former is paid after harvesting. Moreover, if it turns out to be a bad year the payment in kind is flexible, i.e. less than twenty per cent, while the payment in cash which has already been paid in full cannot be refunded. However, if it turns out to be a good year and the paddy price is high, payment in cash is cheaper than payment in kind.

Some farmers practise family sharecropping. In this case parents own the land and let their married son or daughter cultivate it. The distribution of rice yield in the family sharecropping system is more flexible than in the formal rental of land described above. The parents will take as their part of the crop only enough for subsistence. For example, Kap Janrieng, age 68, lets his youngest married daughter work his 30 rai of land. The harvest was about 900 thang of rice grain; Kap took only 80 thang of the 900.

Money lending is another source of income. There are about ten money lenders in the village. Money lenders, by and large, are store keepers, rice traders, and landlords. Money is lent at various times of the year, especially at the beginning of the planting season. Poor farmers need a large sum of money for rice cultivation.

Recently there has been one household earning its living by cattle trading. La Bunkhum is the head of the household. He buys oxen from the

cattle market at Ban Suan, a village 30 k.m. south of Sukhothai town. Some farmers buy bullocks from La if they do not go to the cattle market. La's business is improving as some farmers switch from the use of buffalo to bullocks - a topic which will be discussed in chapter V.

An increasingly common source of income in Muang Kao is to hire one's self out for wages. According to Srisakara's survey census seventeen per cent of the households surveyed depended entirely on earning wages. These wage-earners worked full time. Another forty per cent of the households gained additional income during the off-season by hiring themselves out. Wage payments are about 20 baht a day. Some of them are hired in agriculture, while the other work in non-agricultural activities, e.g., at the local gas station, the saw mill, rice mills, and in building construction in Sukhothai town or other towns nearby. Muang Kao farmers used to be hired to work in upland crop cultivation in Sawankhalok (see Fig. 2). Recently there have also been sugar cane plantations in the mountainous area adjoining Muang Kao. A large number of the villagers are hired as labourers in the plantations. The amount of wage labour increases in bad years when there is a drought or a destructive flood over the region. Farmers spend their time working on the plantations, while they are waiting for suitable water conditions for rice farming.

A large number of wage labourers are youths who earn cash for their personal use by doing odd jobs. They can spend it as they like. Some give their parents half of the additional income; the rest will be used for buying new clothes, or spending on movies etc. Even during periods of drought, elder people are hesitant about taking on casual jobs. They fear that when the rain do come and water is sufficient for cultivation they may lose precious time for the preparation of their fields because they are engaged working elsewhere.

Expenditures

In Muang Kao, as in other villages in Central Thailand, rice is the staple of the villagers' diet. Of the farmers' annual production generally five kwian of unmilled rice will be kept for household consumption and seed, while the rest is sold for cash because the village economy, as mentioned above, depends heavily on trade with nearby regions for needed goods and services which are not produced by the farmers themselves, but which are complementary to peasant production. Some goods and services which are required to meet the farmers' needs from the market economy are listed in the table below.

Table 4: Average household expenditures

	Yearly (baht)
Food stuffs and drinking	7,100
Miscellaneous, e.g., entertainment, batteries for transistor radio and electricity	3,260
Clothing	1,000
Children's schooling (for two children)	960
Religious merit making	900
Medical care	720
Total:	13,940

Source: my census, 1977.
Note : expenditures presented here do not include operating expenses, which are presented in chapter III and VI.

In the dry season expenditure for food is higher than in the rainy season because during the latter fish from streams or wild vegetables from rice fields are collected for everyday meals. Farmers eat meat once or twice a week. Meat or chicken are regarded as luxuries and too expensive for farmers to consume frequently.

At the beginning of the planting season, each household usually needs cash amounting to about 700 baht to spend on food for the family or farm implements. In some cases, some part of this cash will also be paid for other farmers who are hired to work. It is during this time that money is lent out to farmers of moderate income, as well as to poor farmers.

Expenditure on life crisis rituals should not be overlooked. Though rites of passage do not take place everyday, a large part of household income may be allocated for such occasions. For example in 1977, I attended four ordinations arranged by different households. The average expenditure for each ordination was about 4,500 baht. Some financial help may be received from relatives but the largest part of the expenditure is paid by the hosts' household.

This description of the economy of Muang Kao shows that there are many sources of additional income available to farmers. I am aware of the importance of the sources of income mentioned above, but it should be born in mind that the above productive activities tend to be supplementary, occasional and in some cases sporadic. It is therefore difficult to account for these in the average annual income.

Education

Villagers, by and large, have received only a primary education. They go to school in order to learn how to read and write, and because it is compulsory.

Table 5: Educational level of adults in 1977

	Uneducated	Primary	Junior High School	High School	College and University
Total	139	440	46	17	6
%	21.4	67.9	7.1	2.6	1

Source: Srisakara's survey census 1977

There are three schools in the community. Two of them are primary schools and the other one is a combination of primary and secondary school. There were about 1,000 students enrolled in the latter in 1977.

After having studied at school for a few years, children leave school and work in the rice fields with their parents. Those who want to further their studies have to attend high school in the town.

Many store keepers' and rice traders' sons and daughters go to high school. Some of them in past years earned diplomas by attending the teachers' college in Phitsanulok Province. Recently a teachers' college and a professional college have been established in Sukhothai town. The Muang Kao students prefer to go to the town colleges rather than to the college in Phitsanulok Province. Some well-off families send their sons and daughters to universities in Bangkok. A lot of the poor attend adult education evening classes in the town after work hours in the fields. Many young farmers received training as apprentices in garages, barber shops, and dress making shops in the town and other places outside the village.

However, what is striking from the above table is that the percentage of illiterate people is very high. It is doubtful whether those who have received an elementary education are able to read and write, because after leaving school there are few chances for them to use their literary skills. Their lives are tied to rice fields and buffalo day after day. Education must influence acceptance or rejection of agricultural innovation. Unfortunately my data on this is limited and the topic cannot be discussed here.

Muang Kao and the World outside

As mentioned earlier many kinds of changes have taken place in the village since the main road was completed. The present Muang Kao is on the main road between Sukhothai town and Tak Province. The village is linked to the outside world by the visits of outsiders to the village as well as by the

relationships and communication of Muang Kao villagers with the town and its people or the members of other communities. I conclude this chapter by looking at these relationships, first looking at those outsiders who have relations with Muang Kao.

Rice traders and middlemen seem to be the first outsiders to have come to trade with the farmers and the local rice traders. The outside rice traders mostly come from Kamphaeng Phet and Nakhorn Sawan Provinces.

Businessmen and peddlers are another group of outsiders who come to trade in Muang Kao. Many of them selling such things as pots and pans, clothes and medicine after putting on an open movie show in the temple courtyard in order to attract customers.

Singers, musicians, actors and actresses from town and city come to entertain the farmers from time to time on festive occasions.

Tourists and villagers from other places are also among the outsiders to the village. The former come to visit Muang Kao and go sight-seeing at the local museum and around the ancient city. The latter may stop at the village on their way home just to have a drink and a chat or some other more specific reason.

These outsiders, especially rice traders and middlemen, are not just strangers who enter the village once, do their business and leave. They become friends and are welcomed into the houses. They always come with news, gossip and amusing stories from other villages.

As said previously the economy of Muang Kao depends largely upon trade with nearby regions. A lot of villagers, especially those who grow upland crops, often go to town in order to sell their crop and vegetables. Then they buy food and household necessities to take back home.

Some of the villagers go to communicate with government officials in the town, while others attend schools and colleges or are apprenticed in some trade. A certain number of them hire themselves out for wages outside the village. Like other Thai men, at the age of 21 villagers become liable to

conscription by ballot. Those chosen spend two years in the armed forces. Another means by which relations are established with the outside is through pilgrimage and attendance at festivals in other provinces. Villagers often jointly hire vehicles for this purpose.

It appears from my data that there is a correlation between the use of handtractors and frequency of contact with the town. In chapter V I discuss how urban contact influences the use of mechanization.

The village of Muang Kao is also linked to the world outside by mass media: radio, newspaper, and television. Almost all of the households I surveyed had transistor radios. Villagers know what happens outside the community by listening to news on the radio. Many are always accompanied by their transistor radios - even at work. They prefer to listen to music or drama than to programs about agriculture or politics. Some read newspapers which are available free at the coffee shops. Housewives have a chance to read or look at women's magazines when they go to the hairdresser.

In 1977 there were twenty television sets in the village. All of them belonged to storekeepers or to local rice traders. The television sets are usually surrounded by children from many households. In the past, during the evening the young sat around the old who told stories, making baskets, weaving, netting etc. One hardly finds this picture in present day Muang Kao. Parents complain that since television was introduced their children have become too lazy to run errands or look after the buffalo.

CHAPTER II

Muang Kao Social Organization

This chapter is divided into two sections: the first part deals with social structure, while the second section is devoted to the organization of labour in the planting season.

Social Structure: Kinship System and Family

Rice farming in Muang Kao, like other economic activities in rural Thailand, is predominantly the business of domestic units. In terms of factors of production, the peasant controls his own labour which is drawn from his household. This does not mean that the single household provides all the labour necessary for cultivation. It does mean that to understand the organization of Muang Kao agriculture, factors determining the composition of the household must be given attention first of all. In the pages to follow the social structure of Muang Kao is presented in terms of kinship, marriage, residence, inheritance, and household, each considered in relation to its economic implications.

Social scientists have found it difficult to generalize about the social structure of the whole of rural Thailand from the few villages studies that are available. This is not only because there is a lack of information, but also because the various communities studies were written at different times by anthropologists and rural sociologists with different theoretical framework, interests, and emphases (see Potter 1976:148). However, the social structure described in the literature on rural communities in Thailand is taken into account in this thesis for two reasons. On the one hand, Muang Kao is a peasant village that is essentially a part of a far more complex society, Thailand. The village has many cultural traits in common with other parts of the country. On the other hand, Muang Kao has some particular aspects of social structure that are different from those mentioned in the literature.

Thus it may be useful to compare what I have found concerning Muang Kao's social structure with what has been discovered by other anthropologists and rural sociologists. What I am doing here will give readers a clearer picture of Muang Kao's social structure.

In common with that of most other communities of South-east Asia, the Muang Kao kinship system is undifferentiated. Descent is reckoned both in the male and female lines. The system emphasizes lateral rather than lineal ties and lumps together siblings with cousins and their spouses (cf. Amyot 1965:169). In a situation such as I have found in Muang Kao where there is an absence of clear-cut rules defining kinship ties, a farmer will say that nearly everyone in the village is related to him. This is probably not an exaggeration because the village is more than one hundred years old, and most villagers are related to each other either through affinal or consanguinal ties.

Marriage does not take place between kins closer than second cousin. Uxorilocal residence is the norm among the peasants of Muang Kao. After marriage the young couple goes to live with the bride's people. This agrees with what Tambiah (1970) found among the farmers of Northeast Thailand, and with Wijeyewardene's generalization, supported by statistical data, that "...for most of Thailand...marital residence is bilateral with a tendency towards uxorilocality" (1967:69). According to Rajadon (1954) and Kemp (1970), ideally and almost universally in rural Thailand a young couple are expected to reside initially in the bride's parents' household. After a period of time, usually several years, they move to a new house constructed near the bride's family house.

In Muang Kao, if the bride is the youngest daughter the couple will reside in the bride's parents' house permanently, but the young couple is economically and financially independent of the bride's parents. If the bride is not the youngest daughter, the couple usually lives in the bride's

parents' house for at least a year. Then they erect their own house in the same compound with the bride's parents. Parents in Muang Kao generally want their married daughter and son-in-law to stand on their own feet as soon as possible. A son-in-law who depends financially on his parents-in-law for more than a year without trying to become independent will be looked upon with disfavour.

In accordance with the above idea of parents-in-law, the young couples desire to achieve independence from the parental household so that they can have the chance to build up their own resources. If possible, they try to work in a separate rice field. If this is not possible, they work on the farm of the bride's parents and give the parents rice grain or payment for allowing them to use the land. Generally the young couples eat from their own granary. One quite often encounters an aging couple living in the same house with the youngest married daughter, but economically separated. It is not unusual to find two or three cooking places in one house or in many cases, even in the same kitchen. Each cooking place belongs to a separate nuclear family. One will find that in some cases the old, especially widows, cook their own food. The elderly give as a reason for this that they want to be free and do things on their own. If an elderly parent is too sick or too old to help him/herself, he (she) is looked after by a youngest daughter or the daughter who is going to inherit the house. In some households, grandchildren run errands for the old. It is understood that the grandchildren's mother will inherit the land and the house when the elders pass away.

However, like all other people of rural Thailand, the farmers of Muang Kao have some choices and flexibility in their social patterns which they can exercise to maximize their personal interests. This is why some villagers prefer virilocal residence to the ideal of uxorilocal domicile. In this case the man's family is usually much richer or of much higher status than the woman's family. The couple decide that it would be greatly to their

advantage to cast their lot with his family. In some cases, if the groom's parents have no daughters to perform the woman's work of the household, to care for the groom's parents in their old age and to inherit the house, the young couple may decide to reside with the man's family.

According to Amyot (1965:169) both the nuclear and extended family are found in Thai villages. Potter (1976:152) has argued that the extended-stem family, not the nuclear family, is the dominant form in rural Thai society. This seems to be inconsistent with what I have found in the Muang Kao case. Identically in accordance with the results reported by Kamol (1955) and Smith (1973) in Muang Kao nuclear families outnumber extended ones. Of 241 households surveyed, 70 per cent were nuclear families which reside in the compound matri-uxorilocally (cf. Fox 1967:84). As mentioned earlier, there is a scarcity of available living area in the ancient city, and thus new nuclear families usually raise their houses physically joined to those of the original nuclear family. Thus, it is not unusual to find two, three, four or even five houses joined together in the same line like Iban longhouses. Other houses are linked together in a round shape, i.e., the parents' house is surrounded by the married daughters' houses. Whether the house is long or round depends on the space available in the parental compound. Though it is a matri-uxorilocal compound which includes several nuclear families living together, from a productive point of view it is not cooperative. The residents of the compounds do not operate as a labour team in rice cultivation. They help each other only in non-productive activities, e.g., in time of rites of passage. This is probably because in Muang Kao, as in other rural areas of Thailand, there is an absence of clear-cut rules defining obligations both among kin and non-kin (cf. Wijeyewardene 1967:65). What I have found in the case of Muang Kao is identical to the findings of Piker, who says that "...the absence of corporate extended kin groups is a well-established feature of Thai society...", and again "...Economic cooperation, other than occuring within the kindred, normally rests upon ad hoc dyadic ties and implies no

lasting relationship between individuals and families. Enduring cooperative work groups, as such, are all but nonexistent" (Piker 1966:62ff.).

Inheritance, another element of Muang Kao social organization, must be taken into account for an understanding of how village economic activity actually works. Because the most valuable capital inherited among the farmers is land, it is regarded as the most important of economic interests upon which individual decisions about residence depend. Ideally and generally, inheritance comes through the father who is the head of the family. Both sons and daughters inherit rice land equally. When all sons and daughters have married, parents like to keep some part of their rice fields in order to have a source of income in their old age. The land, which is kept by the original nuclear family, is usually used for family sharecropping.

Household Production

The 'household' as used in this study, consists of all persons living together in the same house and working as a unit in cultivating their plots of land and/or other agricultural activities. The household is producer and consumer. Some economists, Cairncross (1958-59:15ff.), for example, say that in terms of administrative units, the household works the same way as a firm. If Cairncross is right, it is not an exaggeration to compare everybody in a household to shareholders in a firm. Everyone in the household has a right to share in the household property, e.g., land, house, rice field, draught animal and farm tools. I shall, therefore, describe the Muang Kao household as 'a firm system'.

In the village the socio-economic unit is the household which averages six individuals. As an economic unit the household is corporate. Parents and children work in the same fields and share the same house. A child becomes a productive member of the household after he or she leaves school, and works full-time with and for his/her parents. Many sons and daughters bring money home to their parents if they work outside the household farm.

They know that they will get a share of the profit at the end of the agricultural year. After harvesting, more than half of the household rice yield will be sold for cash. The cash may be divided for household expenditure, repairing the house, buying buffalo etc. and for personal expenditure. Parents generally buy new clothes both for themselves and their children. In a well-off household, a gold belt may be bought for the daughter and a wrist watch for the son.

Because household production is 'a firm system' a large part of the family income will be also spent on some social expenditures e.g., a son's ordination or a daughter's marriage. On the occasion of marriage, the household family provides a departing member with working capital, e.g., land. By moving into a separate home a new conjugal pair reproduces the conditions of production, domesticity and the family. The 'firm system' of the household comes to an end at the time when the youngest son or daughter marries.

Division of Labour in Planting Season in Relation to Natural Environment

The division of labour in a culture is based upon the allocation of tasks. In Muang Kao, as in Gopalpur, a south Indian village, different tasks are allocated to different individuals on the basis of age and sex (cf. Beals 1977:346). The very young and very old are not expected to work. The village children (above five years old), especially the boys, look after the water buffalo when the grown-up people have a break from work in the rice fields. When the animal is in use, the children generally run errands between the farmhouse and the paddy fields.

Otterbein (1972:22) has pointed out that the division of labour by sex is universal. The greater strength of men makes them more suitable than women for carrying out heavy work. Thus a Muang Kao man principally takes responsibility for land preparation, which is regarded as arduous work because it is mainly done with water buffalo. The use of and management of

buffalo has been traditionally and entirely in the hands of men. A young man receives this training from his father, who plays the important role of socializing his sons to rice farming. While the men are occupied with land preparation, the women are engaged in transplanting. However, the normal division of labour as outlined above cannot be strictly followed because of some particular aspects of the natural environment in this region. To have a clear picture of the problem, a very brief summary of methods of rice growing is included.

Before moving from the ancient city to stay in the farm house, a household elder comes to the rice field, and selects a suitable site near a source of water for nursing seedlings. Water is let in, by pumping, and the soil ploughed and cross-ploughed. Sowing the nursery is done by either men or women about 20-25 days before the time when it is expected that the field can be made ready for transplanting. Before sowing, the seed is induced to sprout by soaking overnight in water and is then covered with straw or cloth to hasten germination. It is left covered for one day and one night. Seed preparation is carried out by women, normally the mother of each household. The sprouted seed is sown in the nursery, which is already inundated, and the water is drained off by the men. After sowing, the nursery is left to dry for a week. When the seedling is well established water is let in, a little at a time.

In Muang Kao, in preparing for nursing seedlings, light rice will be sown nearly two weeks before the heavy variety. If both of them were to be sown on the same day, there wouldn't be enough household labour to transplant them. Some of the seedlings would be too old to be transplanted. The grown seedlings are uprooted and cleaned of mud by women and young girls. To facilitate transplanting, the seedlings are separated from each other by shaking. Then they are tied into bundles and carried to the prepared terrace. In transplanting, the space between clumps and the number of seedlings per

clump is determined entirely by experience, to suit each particular field. Transplanting in na khūm [1] the space between hills is greater than in na tūrn. Since na khūm gets more water than na tūrn, its rice plants grow bigger than those in na tūrn. A young girl will learn these things from her mother.

Because of the natural environment, all the processes of land preparation and transplanting have to be carried out very quickly and continuously. In this country, after harrowing, the mud is not left to settle for a day or two before planting as is practised among the farmers of central Thailand. In Muang Kao the soil is quite sandy. If the land has already been prepared and it is left for just an hour, the soil will re-form itself, joining together as if it had never been ploughed before. Thus it is quite difficult to plunge the plants into the sandy mud, with the thumb leading the way. Transplanting is time consuming, and a back-breaking task.

Water supply is another reason to explain why transplanting has to be done immediately after harrowing and puddling. The weather during the rainy season is still as hot as in the dry season. One condition of transplanting is that at the time of transplanting the water level in the terrace should be about 1.5 inches above the ground level. During such hot weather the water evaporates very fast. If one leaves the prepared terrace for a short while, there is no water left to transplant. Though there is plenty of water around, it is not worthwhile or practical for farmers to let water into the terrace again rather than finishing transplanting immediately after the preparation of the land. Thus men will help women transplant as soon as the land preparation in a terrace is finished. Although the task of land preparation is traditionally assigned to men, this rule also does not always apply; when men are sick or engaged in other activities, women can carry out this task without bringing any disgrace upon the men.

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[1] Na khūm is low land rice field, na tūrn is high land rice field.

In summary, in non-industrialized cultures, as that of Muang Kao, the tasks that are to be performed are simple and can be performed by almost anyone. Among these farmers, there is an ideologically elaborated sexual division of labour but in the exigencies of the farming process, this is often forgotten. Men and women have to get on with the tasks at hand. There is no regulation to prevent men doing women's work and vice versa. Women, for example, can use buffalo, ploughs, or ox-cart, which are regarded as being in the men's sphere. Though women control and manage household finances, men share in decision-making on all kinds of household expenditures. To my knowledge, parents normally discuss with each other what to buy, how much money they can afford to spend on a new bicycle, or a radio set. To an outsider the division of labour in Muang Kao rice farming may appear flexible or loosely arranged, but the assigning of different tasks to old and young, to male and female, at least creates an economic interdependence that serves to strengthen family organization.

CHAPTER III

Traditional Agriculture: Water Buffalo

In Muang Kao, as in other rice growing villages, in Thailand, the water buffalo is as important to farmers as the cow is to East African pastoral societies. In the first part of this chapter an account of the buffalo is presented in terms of husbandry and health, and of its socio-economic aspects. The cost involved in plough agriculture is discussed in the second part of the chapter.

Husbandry and Health

According to the F.A.O., the buffalo of Thailand are of the Swamp breed. It is estimated that in 1974 there were 570,000 buffalo (F.A.O. 1977:177). Half of the country's buffalo are kept in the northeastern region where there is plenty of pasture land, especially on the Khorat plateau. From there they are sold as draught animals for the central plains or for export. The number in the region may be declining, and approximately 3,000 buffalo are exported to Hong Kong and Malaysia every month.

A large number of buffalo in Muang Kao are dark coloured animals, a few are albino. A buffalo's body is short and its belly large. It has a flat forehead, prominent eyes, short face, wide muzzle and a comparatively long neck. The withers and croup are prominent. Its horns grow outward and curve in a semi-circle, but always remain more or less on the plane of the forehead.

The behaviour of the Muang Kao buffalo is the same as that of the swamp variety in the other parts of the country. They really love to wallow. If permitted, they will spend the hottest hour of the day almost completely submerged. They prefer to wallow in mud holes that they make with their horns. Their purpose is to acquire a thick coating of mud which protects them from being annoyed by insects or heat from the sun. They do this everywhere they graze, in rice fields or in the public grazing area.

At the age of about 3-4 years a buffalo will be broken in to work. After the cartilage of its nose is pierced with a bamboo spike, a rope-thong is inserted passing through the perforation, the free end being on the animal's left. Then a single rein is attached to the nose thong which is worn permanently. This operation is usually done by the head of the household. The buffalo is now said to be ready for further training in the rice fields. It is generally yoked with another one that is well trained or with its mother.

Domestic buffalo are not only trainable but also docile and easily controlled by their attendants. In Muang Kao the animals are commonly tended by men and boys who are often seen leading or riding their buffalo to wallowing places. The children go into the water to douse the animals and clean their nostrils, eyes and ears.

Some farmers have their male buffalo castrated when the animal is 5-6 years old. In the villagers' view the desexed buffalo is stronger and easier to look after than the ordinary one, which is likely to wander around looking for female buffalo and fighting with others. Around this age a buffalo will be registered. In 1977 a buffalo certificate cost five baht.

Socio-Economic Aspects of Keeping Buffalo

As in many other parts of the country, the buffalo in Muang Kao plays an important part in the lives of its owners. It is invariably treated with gentleness and consideration. The typical pattern in the past was for the animal to have been raised by a child, to have been received recognition as a pet, and to have stayed all its life on the same farm. It would have been given a name in accordance with its character and colour. With an average life expectancy of some fifteen to twenty years for a buffalo the owner and his animal often toil together for very many years. The feeling of being grateful to the animal is expressed by the ritual of 'Asking Pardon' of the buffalo

after finishing land preparation. This ritual is widely practised among peasants of Northern Thailand.

Among the peasants of North eastern Thailand a ritual for ancestor worship is arranged in May before rice farming is begun. As one part of the ritual, coconut leaves are collected and simply woven in the form of buffalo and bullocks. Each household brings woven coconut leaves equal to the number of buffalo or bullocks they own to the ancestors' shrine. The ancestors are asked not only to protect their descendants, and the rice crop but also the draught animals (Suthep 1968:139ff.).

Traditionally the animal will be kept until it dies of old age. The horns of the dead buffalo will be used to decorate its owner's house, as objects of rememberance. Some horns are used as candle sticks in front of Buddha images in the village temples. The old people reasoned that this was to make merit for the poor animal, which is believed to be in a state of sin. For once upon a time, according to a Muang Kao folktale about the buffalo, it was one of those who had an appointment with the Lord Buddha to go to heaven. Unfortunately the buffalo came late and thus could not go. The animal was very upset and angry with the Lord Buddha. This is said to explain why the buffalo usually tends to attack Buddhist monks anytime it sees the yellow robe. Moreover some villagers told me that the buffalo dislikes and deliberately attacks white men simply because the white men's scent is different from that of the Thai.

The buffalo is interwoven in the history and mythology of ancient Thailand, and in the literary classic, Ramakian, features importantly as the character called Torapee. In a former existence Torapee was a gatekeeper of Siva's celestial palace on Krailart mountain. Reborn as a buffalo, Torapee challenged and killed his buffalo sire, Torapa. Thinking himself invincible, Torapee challenged Siva. Siva ordered Pali, the monkey king, to battle with Torapee who was beaten and killed in the ensuing encounter. Torapee's

intransigent character is contrary to the teachings of Buddhism, and troublesome children in the village will be called Torapee by their parents.

To the best of my knowledge there is no evidence of buffalo sacrificing ceremonies among the peasants of Muang Kao. The farmers are Buddhists whose ideal basic prohibition against the taking of any form of life remains as strong as ever. However, the villagers eat buffalo meat from the local abattoir which is run by villagers. Moreover the slaughter of the animal is done by both non-Buddhists and Buddhists villagers. Sometimes when a buffalo dies of old age, or of other reasons the dead animal will be butchered by its owners.

In the old days, the farmers of Muang Kao tended to have a lot of buffalo. A pair of buffalo was paid as the bride price, as well as a wooden cart and the betrothal house. Some households owned 30 to 40 buffalo, because the number of such beasts indicated one's prestige. The buffalo is so important that every man is expected to know how to choose a good working buffalo.

The buffalo's love of water, its ponderous and deliberate movements, its large hooves and flexible foot joints make it the ideal animal for working in the deep mud of paddy fields. It has been referred to, with justification, as 'the living tractor' of the East (F.A.O. 1977:115). It is said that in the East for centuries the system of paddy cultivation carried out by the application of animal power, especially water buffalo, has remained almost unchanged (Cockrill 1974:317). For example, a primitive farm of rice cultivation known as jijak in Borneo and known as perudiga, feva or amate in Indonesia is still practised among the farmers of those countries. There groups of half-wild buffalo are rounded up and driven round and round the flooded paddy fields. The size of the group depends on the area to be cultivated. The feet of the animals break up and churn the soil and press down the weeds. No implements or trained animals are needed for this method (F.A.O. 1977:115).

However, as working animals, the buffalo of Muang Kao are used differently from those of Borneo and Indonesia. In land preparation the animals are used for ploughing, tilling and harrowing. After ploughing, the field is flooded and the buffalo are brought in again to harrow the grass from the field, and at the same time to stir up the soil until it is of the proper soupy consistency to receive the rice shoots. The buffalo work belly-deep, churning the soil and breaking up the lumps.

In Muang Kao as in many rice producing areas, the buffalo are also used for threshing. When harvesting comes, farmers prepare the threshing floor by clearing, and levelling the ground. The threshing floor is then moistened and plastered with buffalo dung mixed with water, and allowed to dry. The plastering is done in order to separate rice grains from the earthern floor. After bamboo mats are laid at the centre of the threshing ground, sheaves are arranged on the mats in a layer that is kept at a depth of about 60 cm. Then two or more buffalo are led round and round in a tight circle on the sheaves. The grain and chaff are collected while the straw which is removed at intervals is kept elsewhere in the household courtyard to feed the buffalo in the dry season.

In the village, the buffalo are also used for transport. During the rice harvest the buffalo are employed to transport the sheaves from the rice field to the courtyard in the ancient city. In addition, the animals are yoked with ox-carts to collect wood from the forest during the off-season. Some households get additional income by hiring themselves out together with their animals and wooden carts to transport someone's goods from place to place.

In terms of working life, the farm buffalo of Muang Kao work on an average of 130 days a year and five hours per working day. It is said that the animal's normal working life is to 10-11 years of age. I was told that a buffalo works efficiently between the ages of 5 to 12. It will normally

be retired from working in the fields at the age of 14-15 years. It is then too old to do such hard work in the rice fields.

In Muang Kao the buffalo not only provide labour power for working as cultivating machines, transport, and meat for food, but also some other useful products and by-products. According to the F.A.O. (1977:111), the swamp buffalo excretes about 38 litres (10 gal.) of dung everyday. A lot of farmers whose rice fields are near the ancient city collect buffalo faeces to be used as fertilizer. Some peasants make harnesses out of buffalo hide. They cut the hide into strips and plait them into a form of rope. The farmers prefer a harness made of buffalo hide to a factory-made one because the former lasts longer than the latter, aside from the fact that it costs nothing. Moreover buffalo hide is used for drum making. The drum body is made of wood whose cylindrical ends are covered with tightly stretched buffalo hide.

Costs Involved in Plough Agriculture

As we have already seen in the introduction, traditional or plough agriculture is the common mode of production among the peasants of Muang Kao. All the arduous work in the paddy fields is carried out by household labour and water buffalo. The principal implements used are a wooden plough (with a metal share), an ox-cart, a wooden harrow and a set of harnesses. Let us see what the cost of plough agricultural technology, including working buffalo, really is.

Table 6: Average Costs Involved in Plough Agriculture (1977)

Farm Implements	Price (in baht)	Working Life (year)	Operating Expense (per year)
A pair of buffalo	4500	10.5	428.57
An ox-cart	4400	17.5	251.42
Two hoes	130	6.5	37.14
A metal share	30	1	30.00
A set of manufactured harnesses (if one has not got any buffalo hide harnesses)	30	1	30.00
INITIAL COST	9190	Running cost (per year)	777.13

Source: my census survey 1977

The farmers of Muang Kao normally buy buffalo from the buffalo and cattle market in Ban Suan, a village 30 km south of Sukhothai town. Because at present the farmers tend to raise male buffalo instead of female ones. Many farmers consider it inconvenient to use a female buffalo with calf in the rice field. Each household owns at least a pair of male buffalo. Buffalo dealers from Ban Suan sometimes bring draught animals to sell in Muang Kao. The price of buffalo is variable depending on supply, demand and quality. A pair of mature buffalo in 1977 ranged from 4,000-5,000 baht. A young animal not ready for farm operations cost as much as 1,500 baht.

In plough agriculture, it is necessary for each household to own a wooden cart because it is the most important means of land transportation (before the introduction of the truck or lorry). In the village here and there a visitor will see ox-carts moving side by side with modern forms of transportation. In Muang Kao there is a carpenter who produces carts for

sale. A lot of the carts used in the village are produced by cart traders, many of them from Tak Province.

To deal with his environment, the farmer of Muang Kao has available to him a stock of techniques and ways of acting handed down to him from his forefathers. Apart from the buffalo, cart, sickle and metal share, other farm implements and tools are made in the village by the farmer himself. He makes a wooden plough, and a yoke which is placed on top of the neck of the buffalo and held there by ropes and bars of wood tied beneath the buffalo's neck. Attached to the rear of the plough share is a wooden handle, which the farmer grasps with one hand and tilts to the left or right in order to steer the plough. In addition to the plough, the farmer makes a harrow, a horizontal wooden pointed stick which is drawn through the soil, as well as an assortment of rakes. The harrow's major function is as a weed cleaner to clear the field, as well as to smooth the soil.

In conclusion, one more important point should be made concerning the economics of plough agriculture. Many of the implements required for plough agriculture could, traditionally, be acquired within the village, or made by the farmer himself. For example, farmers used to keep many buffalo, both male and female and the village would breed the animals it required for farming. Farmers now prefer to keep only males which are mostly bought from outside the village. Again,the village has carpenters and blacksmiths who produce carts for sale. Yet, for a long time farmers have had carts delivered from other provinces of Northern Thailand. These two examples indicate how farmers deliberately choose to participate in and rely upon the wider economy.

CHAPTER IV

Land Use

Rice Fields and Water Management

In the village, rice fields are divided into two categories: na khūm, low land rice fields and na tūrn, high land rice fields. The former flood easily, while the latter rarely flood. Rice fields are normally divided into rectangular terraces which are separated by bunds (dikes), a low earthern embankment enclosing a field. Because rice has to be partially submerged while growing the terraces have to be diked on all sides to maintain a certain minimum level of water. Each terrace is less than 0.5 rai (about 30 metres square).

Farmers whose lands are close to the streams may begin farming before those whose fields are remote from the waterways. Having finished transplanting in his field the former will let water pass from his field to others further away. Then the latter can begin planting. In a good year when there is plenty of water for rice farming, this process can take place without any problems. But if water is scarce, the former will try to keep enough water for his fields, which may mean the latter goes short. In very bad years even the fields next to the streams may be short of water. There are sometimes conflicts between the owners of the rice fields close to the waterways and those of the rice fields far away from the water resources. The latter may be accused, charged and sometimes fined for stealing water from the former's fields.

In such a landscape, flooding upto a certain point is useful for rice farming, but on the other hand if the flood lasts too long it will cause damage to the young seedlings. In this type of country where there is little drainage, all cultivated land is sure to be under water. The young plants rot because they do not grow fast enough to survive the sudden flood.

Moreover, if work has not yet begun in the fields, farmers have to wait until the flood water subsides, and then rice farming can be started.

On the other hand in a very bad year when there is no flooding and not enough rain for planting, nothing can be done even in the rice fields near the streams. If there is a drought for a long period, as happened in Muang Kao in 1974, there is not even enough rice to feed the families. It is said that in Thailand in the five-year period 1954-1958 almost 1,000,000 acres of crops each year were presumed lost because of flood, drought or other causes (Pendleton 1962:149).

To conclude, as a result of the elevation and drainage situation together with the complete dependence upon rainfall and natural flooding, uncertainty is rather high in Muang Kao rice farming. How this affects the use of mechanized farming can be seen in further detail in chapter VI.

Landholding Size and Tenancy

In regard to factors of production, the peasants of Muang Kao, by and large, own both labour and land which are the most important assets for them. Land in the village is individual owned, the average amount of land per family being 33.26 rai (the national average of 21.68 rai, Donner 1978:258). This landholding average is derived from my own survey census of 241 households who use draught animals for rice cultivation.

In Muang Kao, as in the whole area of Sukhothai Province, the percentage of tenancy is as low as 2.4%. This is a very low percentage in comparison with some other parts of Thailand, e.g., Pratum Thanee Province where the percentage of tenancy is as high as 57% (Ammar 1979:19). This is probably because the land which is close to the capital city of Bangkok (as in the case of Pratum Thanee Province) has long been used for cultivation since 19th century. Moreover, the land which is near Bangkok has been mostly owned by royalty, eminent noble officials and the rich who do not cultivate

the land themselves, but rent it to landless farmers or small landholders (Tanabe 1977:23ff.). In contrast, the land upcountry such as that in Muang Kao which is several hundred kilometres away from the capital, has only been regularly cultivated in the last two decades. This land is largely in the hands of small farmers, hence the rate of tenancy is quite low.

Some farmers take turns in rice farming on lands which belong jointly to the household. An example is the case of Somsri, who has one elder sister and one younger brother. They inherited some 35 rai of land from their parents, which has not been divided between them. The three of them hold the right to cultivate the same land. In 1976 Somsri's sister did rice farming on the land. Somsri's turn to use the land was in 1977, while her brother would cultivate the land the following year. In the years when they wait for their turn on the parents' land, they rent somebody else's land.

The Expansion of Cultivated Lands

Rice fields in this region are contiguous. There are no fences or enclosing barriers even between the rice fields of different owners. In previous days when land was plentiful and the population was low, one could get from one rice field to an other by paths or cart-tracks between the fields. The paths were big enough for the farmer to drive his cart back and forth from his field to the roads. There was no problem about getting in and out to the rice fields until the expansion of cultivated land.

As I said earlier, when the present inhabitants first settled in Muang Kao they cultivated the land nearby the ancient city. After rice began to be grown for cash some seventy years ago, new land outside the ancient city to the north was cleared and got the name 'Tung Pak Khlong'. Farmers went to work in the fields in the morning and came back home at dusk because rice fields were close to the ancient city.

After the Second World War, the growing demand for rice necessitated by an increasing population and the desire for manufactured goods brought about

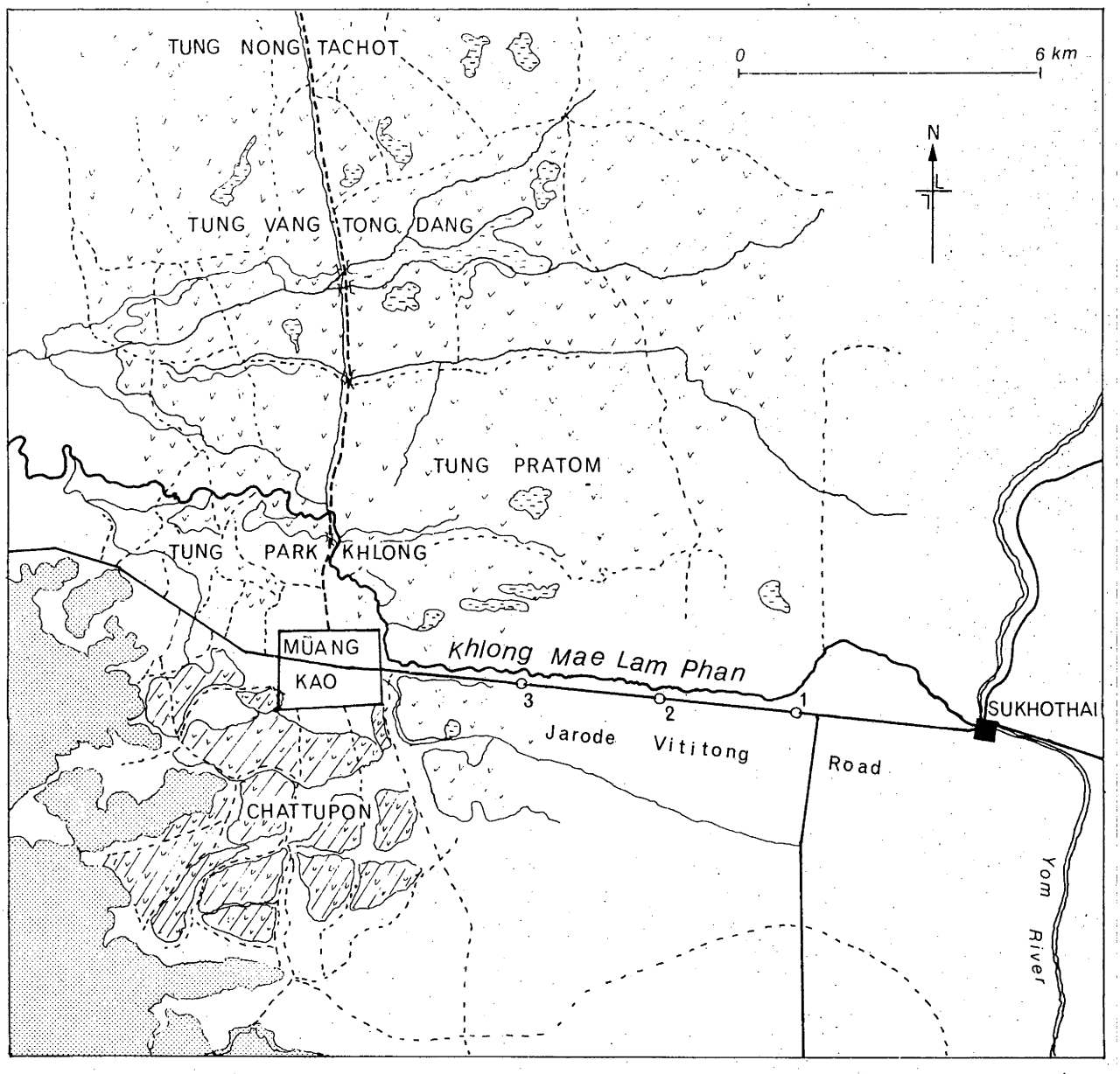
an expansion of rice growing areas. The land further north and northeast of the ancient city was opened up for cultivation. Villagers named the new cultivated land 'Tung Pratom, Tung Vang Tong Dang and Tung Nong Tachot' as shown in figure 5. Distances from the ancient city to each cultivated area vary considerably, as illustrated in the table below. The expansion of cultivated land has resulted in a particular pattern of rice farming in Muang Kao, and has brought about problems of grazing area and transport to and from the rice fields.

Table 7: Distances from the Ancient City to Rice Fields

From	To	Distance (km.)
The ancient city	Tung Pak Klong	2
	Tung Pratom	4.5
	Tung Vang Tong Dang	10
	Tung Nong Tachot	16

A new pattern of rice farming has developed among the farmers of Muang Kao since the expansion of cultivated land. The new cultivated lands are far from the permanent living place in the ancient city. It is not convenient for farmers to go to work in the rice fields in the morning and come back home in the evening. So when the rainy season comes, the farmers move from the ancient city to stay in temporary farm houses in the field. Farmers whose rice fields are close together make an arrangement to move to the fields at the same time. Going alone one may be robbed on the way to the farm houses. These are also likely to be built near each other because the owners are afraid of theft, burglary and robbery. At the beginning of the cultivating season, a visitor will see caravans of hundreds of animal-drawn wooden carts moving in a long line on the roads to the rice fields.

Figure 5


TUNG NONG TACHOT
0
6 km
N
TUNG VANG TONG DANG
TUNG PRATOM
TUNG PARK KHLONG
MÜANG KAO
Khlong Mae Lam Phan
3
2
1
SUKHOTHAI
Jarode Vititong Road
CHATTUPON
Yom River
Paddy field
Mixed cultivation
Mountainous area
Swamp
Main stream
Small stream
Main road
Dirt road
1. Ban Kloaye 2. Ban Khwang 3. Ban Na
Cultivated areas

Moving to the farm houses is considered particularly auspicious and promising on a Friday, but any other day will also do - except a Wednesday or holy day. Farmers believe that if one commences rice farming on a Wednesday the crop will fail. One may have an accident moving on holy days because devils, ghosts, and demons are allowed to be free on those days.

A lot of houses in the ancient city are left vacant when the owners have moved to the farms. In some households grandparents will look after grandchildren, who still go to school. In many households the children will take care of themselves. Farmers who are economically independent of their parents tend to hire somebody, usually the elderly who have not got any land, to look after their children, the house and rice granaries. It was said that the paddy had sometimes been stolen from granaries when the owners stayed at the farm houses. Thus it is worth hiring someone to keep an eye on property when the owners are away from home.

The farmers will return to the ancient city from time to time. Some come to visit their children or take them up to the farms when the school term has ended. Many of them come back because they run out of commodities, while others come to see a doctor, to make merit on a special holy day, to report their lost buffalo to the police etc.

The ancient city at that time becomes as quiet as if it were deserted. There are only shopkeepers, traders, government officials, school children, the elderly and monks left in the ancient city. Some aspects of village income are affected during the time when working farmers, the majority of Muang Kao's population, have moved to the rice fields. Traders of course get less income than usual. Some hairdressers report that they have only a few customers a week and sometimes none at all. The village cinema shows films only once a week instead of nightly as during the off-season. Many pedlars stop peddling, while some barbers work only certain days.

Staying in the rice fields during the rainy season is economical because there are fish and wild vegetables available. Fermented and salted fish are preserved to be consumed during the lean dry season. Bamboo shoots and some edible weeds are collected from bushes and cooked for everyday meals. A lot of farmers say they would like to stay at the farms all year long but it is nearly impossible to do so. In the hot season there is no water for them and their animals. There are neither fish nor wild vegetables. Thus the farmers have to move from the farms back to their houses in the ancient city.

The above pattern of rice farming is now changing somewhat due to the increasing desire for wages together with the great danger of buffalo theft and robbery. We have already mentioned that a lot of farmers hire themselves out for wages when they are free from working on their own lands (see chapter I; Village Economy). Furthermore buffalo theft and robbery, which rarely happened in previous days, have increased more and more, especially during the drought years of 1974-1975. At the present time it seems that the longer one stays at the farm, the greater the danger of buffalo theft. Thus farmers try to finish their rice planting as quickly as possible, then move back to the ancient city although there is, quite often, no additional job available for them during the long idle period. When the harvesting season comes, the farmers move out of the ancient city to stay at the farms again. Then they will move back to the ancient city as soon as they have finished reaping their rice crops. Hence the farmers will move back and forth between the ancient city and the rice fields twice a year. In one year they spend seven months in the rice fields and the other five months in the ancient city.

It is worth noting that during the time of moving back to the ancient city after transplanting has finished, there will be at least one person, usually the father or eldest son, left to look after the transplanted young

seedlings. In this case food will be delivered from the ancient city from time to time. In some households father and son take turns to be at the farm. Many households go to take care of the rice fields, stay overnight there and then come back home. They do this twice a week if everything is going well, that is if the weather is good and there is enough water in the rice fields. However, nothing is left at the farm after the rice crop has been harvested. The farm house will be torn down. Its components - poles, wooden floor, wall and roof - are collected and loaded on an ox-cart to be kept under the house in the ancient city. It is not at all safe to leave farm houses in the fields during the time that the owners are in the ancient city. Parts of the structure, for example the floor, might be stolen if they are of good quality. On the other hand, if they are not made of valuable material they may be intentionally burned by some persons.

Previously there was a public grazing area at the west end of Muang Kao outside the ancient city. It was quite large, about 7,000 rai of land. During the cultivating season, when seedlings are transplanted, there is no grass left in the rice fields to feed the buffalo. The animals were allowed to graze on the public grazing field. Though there was grass and rice straw in the paddy fields during the dry season, farmers preferred to let their buffalo graze on the public grazing area simply because it was close to the village. Moreover there were swamps and water holes here where buffalo could wallow freely. The grazing area, however, was gradually cleared and cultivated for rice and upland crops around eight years ago, rai by rai. Eventually, the grazing land disappeared completely.

Since there is no longer any grazing land, farmers usually graze the animals in the ancient city. There is grass on the courtyard around ancient monuments, along the main road and on school courtyards. The grass is not rich but it is plentiful enough to feed the animals all year. Moreover it is convenient in many ways to graze buffalo there. On the one hand it is

near the farmers' houses. It is safer, from the point of view of buffalo theft, to graze them there than outside the ancient city as in the past. On the other hand, there are reservoirs in the ancient city where the animals are rounded up and allowed to wallow.

The Fine Arts Department, which has a long-term project to reconstruct and develop the ancient city as a National Historical Park, recently announced that grazing draught animals in the ancient city and rounding up the animals to wallow in the reservoirs is illegal. The animals damage ancient monuments. Furthermore they make the surroundings of the ancient city dirty, i.e., leave their dung around the monuments. Some farmers quite often have arguments with government officials who look after the ancient city, while other peasants are fined because their animals grazed in restricted areas.

The expansion of cultivated land has also caused a problem regarding access to rice fields. There are no longer paths or cart-tracts between the rice fields as in previous days. Every square metre of land is ploughed and cultivated. Farmers whose fields are close to the main road or dirt roads do not face this problem, but those whose rice fields are far away from the roads find it very difficult to get in and out to their farms.

The lack of grazing land and the problem of access to rice fields are major factors that have encouraged a lot of farmers to replace water buffalo with handtractors and bullocks. The details of these will be related in the chapter to follow.

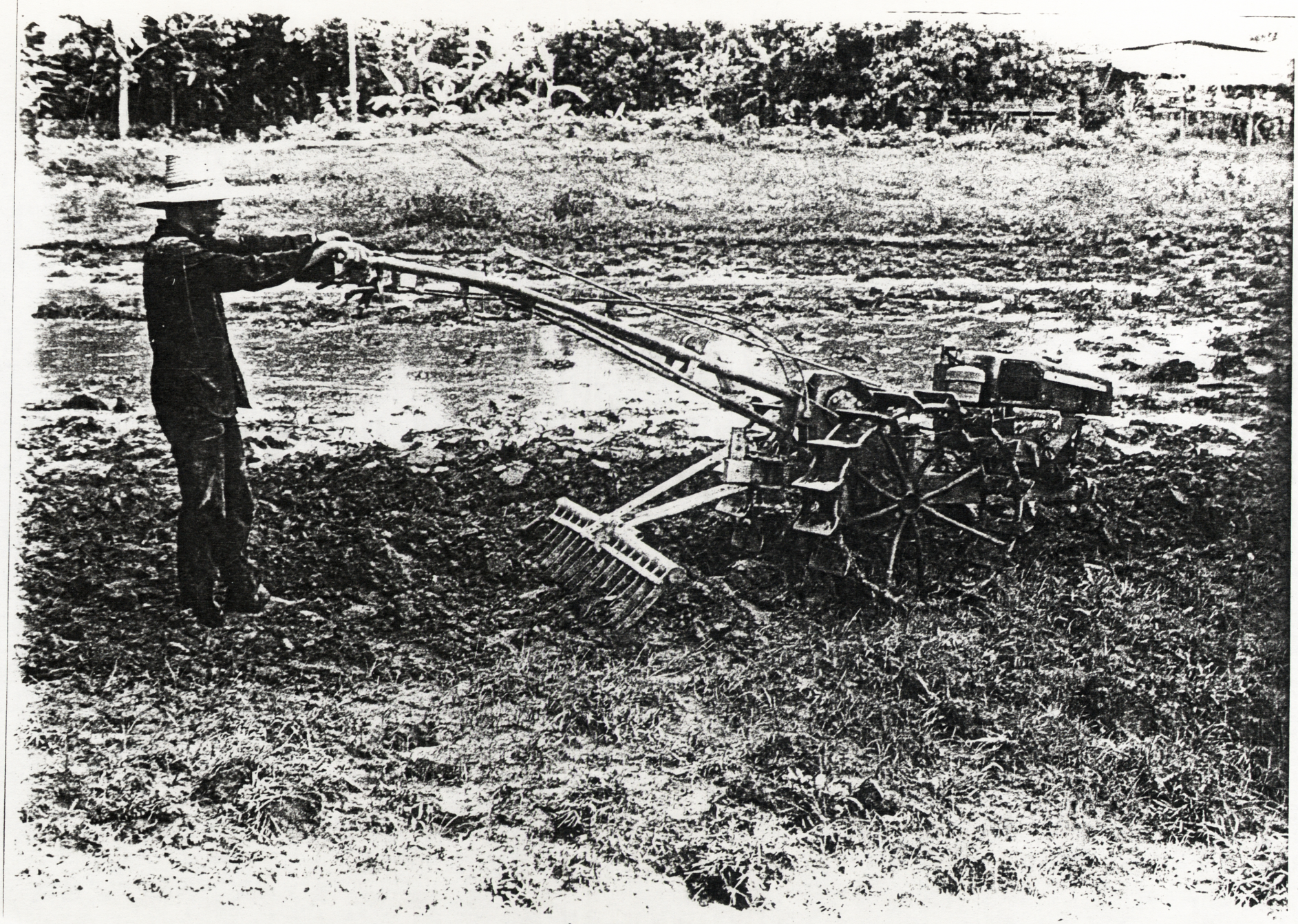
CHAPTER V

Alternatives in Muang Kao Rice Farming

In the preceding chapter we saw that the shortage of grazing land is one of the pressures forcing farmers to change from buffalo to handtractors. In this chapter we shall discuss the use of handtractors in more detail. I shall reveal yet other situations that stimulate the use of mechanization. In doing so, reasons for the use of mechanized farming will be presented. Moreover, the division of labour in handtractor agriculture and diffusion of handtractors will be taken into account. While a small number of farmers used handtractors, the great bulk of Muang Kao farmers have solved the problems by using bullocks. So the last part of this chapter is devoted to an account of a traditional alternative agriculture, the use of bullocks.

The term 'handtractor' is used throughout this thesis to designate small engine-powered, tillage machines which the operator walks behind and controls by hand (as shown in the figure below). The term 'handtractor agriculture' and 'mechanized farming' are used interchangeably.

In Muang Kao in 1977, there were 47 handtractors owned and used by the farmers. In nearly all cases the money for buying handtractors was raised by the sale of buffalo and rice grain. All the 47 handtractors were paid for in cash. The cost of buying and of maintenance in handtractor agriculture is shown in table 8.



A Handtractor

Table 8: Cost of buying and of maintenance of handtractor

Implements	Price (in baht)	Working life (year)	Operating expense per annum (baht)
A handtractor	17,000	15	1,133
A two-wheel trailer	5,000	15	333
A set of furrow disc plough	1,900	8	237
A pair of rubber wheels	900	5	180
A pair of belts used when the machine is in the rice field	250	1	250
A pair of belts used when the machine runs on roads	180	1	180
Petrol (use for 70 rai of land)	195	1	195
		Annual running cost:	2,508

Source: my own survey census from 47 households.
Note : it takes one litre of diesel to prepare one rai of land; in October 1977 the local diesel price was 2.79 baht per litre.

The Introduction of Handtractors

In 1962 a Muang Kao farmer named Pichit Srichalk bought a handtractor from Phitsanulok Province. There was no handtractor agent in Sukhothai town at that time. Pichit had been recruited as a soldier serving in Phitsanulok Province in 1960. There he had seen the widespread use of handtractors and tractors for upland crop cultivation. This is because Phitsanulok Province has large alluvial terraces, land suited for paddy and upland crop cultivation. There are irrigation projects in that area as well.

At the harvest of 1961, Pichit inherited some 60 rai of land from his parents. The land is in the mountainous area of the village (see Fig. 5),

an area suitable for upland crop cultivation. Pichit had just married when he inherited the land. Because of the difficulty in finding labour to work the upland field Pichit purchased a handtractor. Pichit is one of a few Muang Kao farmers who grow upland crops for cash and cultivate rice at the same time.

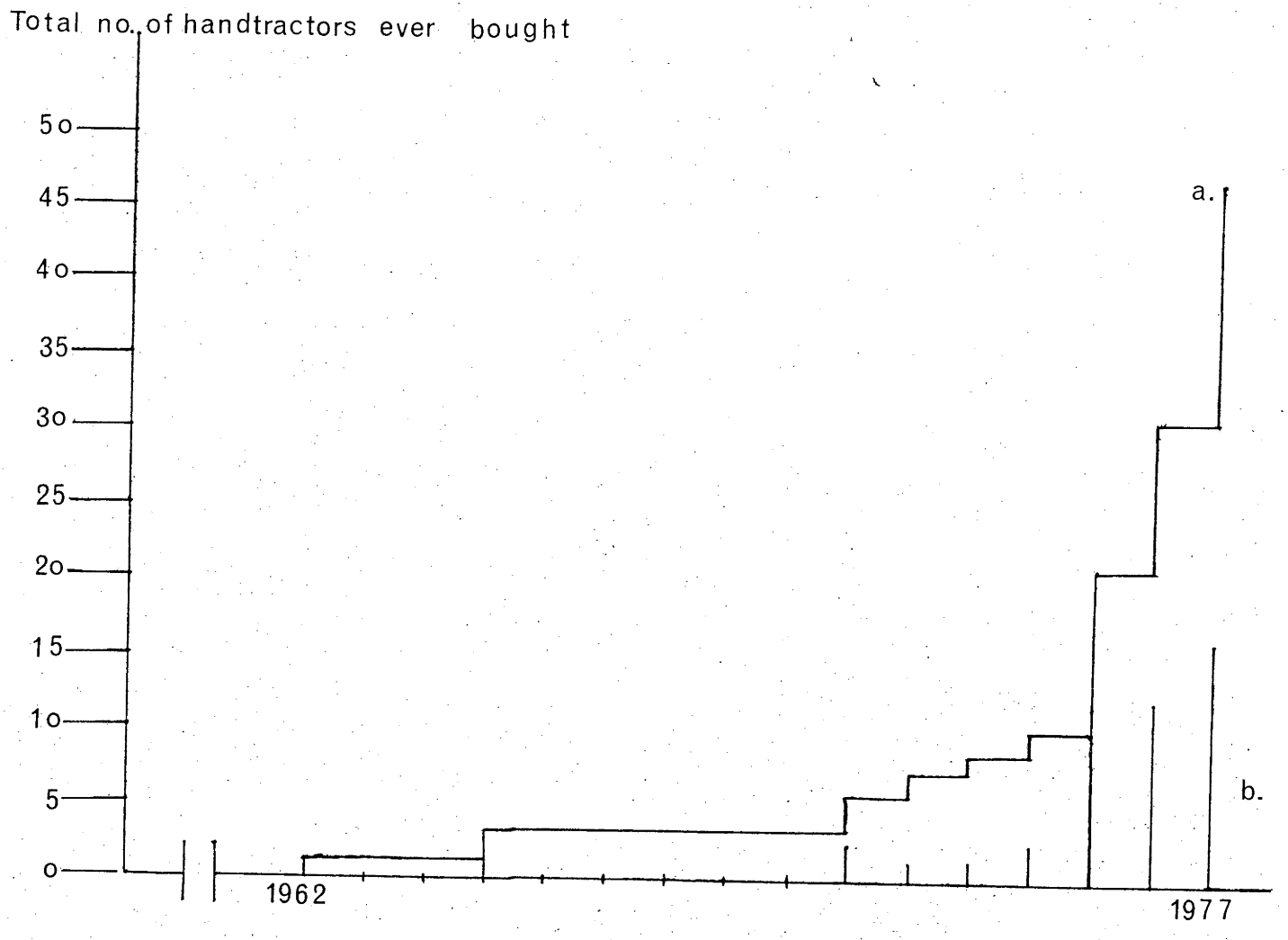
In the dry season of 1962 when the first handtractor was introduced to the village, there were about ten villagers who came to see the handtractor. Some of them tried to operate it, while others were reluctant to do so because they were frightened when the machine was in motion. No one bought any handtractors during 1963-1964.

By 1965 an agent selling handtractors had established himself in Sukhothai town. Another three handtractors were bought for use in the village. One of the new owners, Somboon Muanuum, was a very active member of the District Agricultural Association. In his earlier years, he used to be a truck driver, and had some knowledge of how motors work. He could do minor repairs, but could not handle anything difficult. Being a truck driver, Somboon had travelled from town to town. He said that his inspiration for using handtractors was because he had seen that they were used in the central plain of the country.

Handtractors, however, did not attract much interest among the farmers of Muang Kao until 1971, when another two handtractors were purchased. Heng Khomburi and Pang Yaisala were the new owners; both of them have nearly 300 rai of land. Before buying the machines they did only rice farming. Heng cultivated rice on about 100 rai of land, while Pang did so on about 80 rai of land. The expansion of land for upland crop cultivation is a major stimulus for them to use handtractors, a point to which I shall return later.

Both Heng and Pang came to see and tried to use Somboon's handtractor for a week before they decided to buy their own handtractors. Pang reasoned that he did so because he wanted to make sure that he could operate the

Fig.6 No. of handtractors in Muang Kao from 1962 to 1977



(a.) cumulative (b.) new handtractors purchased each year

machine, although he had some experience of machines from the time when he was a bus conductor.

After 1971, handtractors were bought each year. The number of handtractors increased rapidly during 1974-1977 (as shown in Fig. 6). Reasons for the increasing use of mechanized farming are discussed in the following pages.

Table 9: Reasons giving for using handtractors from 47 households

Reasons	No. of times mentioned	% of respondents
Problem of grazing land	42	89
Buffalo thefts	37	78
Time saving	33	70
Use for mixed cultivation	31	66
Practical and convenient	21	45

Source: my survey census 1977

Apart from the shortage of grazing land, widespread buffalo thefts are another reason accounting for the rapid increase in the use of handtractors. The following detail of buffalo thefts will explain how much the thefts influence the decision-making of the farmers in using mechanized farming.

As mentioned earlier, in the decades prior to the 1970's grazing buffalo was very convenient and rather safe. The animals were allowed to graze on the public grazing land or at the edge of rice fields under the supervision of young boys. In the morning the buffalo were rounded up and taken to the fields to graze. Quite often, they came back home by themselves without control or guidance from their owners. Some of them enjoyed grazing, and

stayed overnight in the fields without being stolen. The only thefts that occurred were motivated by conflict between the thief and the owners of buffalo.

There were a few buffalo thefts in 1970, because the owners left their animals without surveillance. Buffalo thefts also took place once in a while between 1971 and 1973. The owners of the stolen animals could usually manage to get the buffalo back from the thieves. The former paid a ransom to the latter who later returned the buffalo to their owners.

The animals are usually stolen while they are grazing or while they are stabled in farmsteads. A lot of buffalo were stolen from stables while the owners slept. Thieves, quite often, poisoned watch-dogs before they stole buffalo. The owners of buffalo sometimes knew that the animals were being stolen. Thus there was fighting between the thieves and the owners of buffalo. The former usually could escape or manage to take the animals with them. Farmers said that thieves are generally well armed with guns that are more efficient than those of police or farmers.

Both buffalo thefts and robbery of buffalo usually take place during the hot season or at the beginning of the planting season. During that time the country is dry. It is therefore simple for thieves to herd the animals and escape with them. It is difficult for the owner of animals to follow them because on hard, dry land the animals' tracks or foot prints are not as clear as during wet season. Furthermore it was reported that some groups of robbers parked a truck near the main road. Robbing farmers, rounding up the animals into the truck, the robbers then left the village without leaving any track for police or farmers to follow.

Danger from thieves and robbers is also high when farmers stay in temporary farm houses during the planting season. At that time farmers are very busy preparing land and transplanting seedlings. Some farmers were robbed while they were ploughing. In very isolated rice fields, farmers

were forced to have an armed companion stand guard to meet any danger that might arise.

Some households were robbed when everybody was at dinner. Thieves tied the farmers to the house poles, then escape with buffalo. Some farmers were taken by the robbers as hostages. Owing to this kind of robbery, members of a family have to take turns having dinner. A father may go for dinner, while his son stays close or watches their animals.

The greatest robbery of buffalo and cattle took place on the 12th of May, 1974. Crops had failed because of widespread drought. Muang Kao farmers went to the forest somewhere in Tak Province in order to collect wood. A long caravan of 40 carts drawn by buffalo and bullocks moved towards the forest area. The farmers had stopped overnight on the way to their destination. There were fifteen robbers armed with M.16.s and carbines who attacked the caravan. There was fighting between the farmers and the robbers, but finally the latter took seventeen animals and escaped. Police followed the robbers with the help of a helicopter but in vain.

In the year that this research was conducted there was no robbery as sensational as that of the year 1974. Nevertheless, in October 1977, there were eight buffalo thefts and robberies in the village.

Now let us turn to consider the third and fourth reason for using handtractors, i.e., time saving because of use in rice and upland crop cultivation. To understand this, it is necessary to take into account the matter of introduction of upland crops. We should bear in mind that handtractors were initially used for the cultivation of upland crops.

In 1965 there was double cropping in Sawankhalok (see fig. 2). ~~Biennial~~ The Second crops, e.g., corn, monkey nut, and tobacco, were grown in rice fields after the harvesting of rice. As mentioned earlier, a lot of Muang Kao farmers hired themselves out as labourers for off-season work on the upland field in

Sawankhalok. The idea of growing upland crops in Muang Kao seemed to come from the pattern widely practised in Sawankhalok.

In 1971 the Muang Kao farmers seriously started upland crop cultivation for cash on the field called 'Chattupon' (see fig. 5). I shall call this region 'the mixed cultivation area', for both rice and upland crops are grown there. In other words, there are rice fields and gardens in that area. All gardens are mixed; they are used for planting sweet potato, sugar cane, corn, and different kinds of vegetables, i.e., cucumbers, pumpkins, hot chilis, peanuts and snake beans.

Mixed cultivation requires more time to complete than growing only rice. The average landholding of handtractor users is as large as 70 rai. To facilitate and carry out the mixed cultivation in time the use of handtractors is an alternative way chosen by the farmers of Muang Kao. Apparently an economic benefit derived from handtractor use is the considerable reduction in the amount of time required for land preparation. It takes a farmer two hours to plough and harrow ¼ rai of land with the use of buffalo. But it requires half an hour for the same work to be done with the handtractor.

Practicality and convenience is another reason to be taken into account for the increasing use of handtractors. As was mentioned previously, buffalo love to wallow, especially in mud holes. Before work can begin, the animals must be cleaned. Working with dirty buffalo is inconvenient and annoying. Buffalo are liable to be bitten and irritated by insects. To minimize their discomfort they usually swish their tails most of the time. When they move their tails, mud around their bodies is splashed into ploughmen who walk behind. Also the harness around the animals' necks will get dirty and worn-out very soon.

In preparing land with the use of animal labour, one has to wait until the land is wet and soft enough for ploughing. Furthermore, the animal can work well only about seven hours a day. The farmer usually begins working

at 7 a.m. and has lunch at 11 a.m. At lunch time, the animals are allowed to graze, while their owners eat, smoke, or take a rest. They start ploughing again at 2 p.m. and stop working at 5 p.m.

In contrast to traditional agriculture, mechanized farming is practical and convenient. One just starts the engine and goes to work directly. He has no need to wait until the land is softened. A handtractor can be used in any season if it is needed. Moreover, one can work any time of the day and for as long as he wants. Using a handtractor one has no need to be worried about grass to feed the animals or be afraid of buffalo thefts. After being used a handtractor is cleaned and kept in the locked garage under the house, in a farmstead, or in a room next to its owner's bed room. Moreover, the use of mechanized farming makes mixed cultivation on such a large 70 rai of land possible in time (within the rainy season).

There are two other crucial points worth considering for the understanding of handtractor agriculture: the division of labour and diffusion of handtractors.

Though farmers change from buffalo to handtractors, the division of labour in mechanized farming is not different from that in traditional agriculture. Men still take responsibility for land preparation and the other heavy work expected to be done by male members of a household. The father and sons manage the use of and take care of the handtractor, and help female members of the family who are as busy preparing seedlings and transplanting as they used to be in plough agriculture. Handtractors have just replaced the animals. The machine is not a labour replacement.

A handtractor, together with the knowledge of mechanized farming is perceived as an innovation by the farmers. According to Rogers (1962:19ff.) the diffusion process is the spread of a new idea from its source of innovation or creation to its users or adopters. In the pages to follow I shall investigate by what means the use of handtractors has diffused in Muang Kao.

Forty-two per cent of handtractor users had some previous mechanical experience before they bought their machines. They had at least once in their lives, usually in their teens working outside the village as truck drivers, bus conductors, apprentices in garages or service boys at gas stations. I shall call these farmers 'innovators' because they were the first to use handtractors.

Another fifty-five per cent of handtractor users got the information about the use of mechanized farming from their neighbours or relatives who used the machine before them. The farmer goes to have a look at the use of a handtractor by his friends. He not only tries to use the machine again and again, but also asks the owners about the cost of buying, the cost of maintenance, how to repair the machine etc. Therefore, in Muang Kao the use of mechanized farming has been introduced and mostly diffused earlier to villagers by the farmers themselves. Only five handtractors users got the idea of using a handtractor from dealers and agricultural extension officials.

Alternatives in Traditional Agriculture

Bullocks or oxen were introduced to the village some 30 years ago by traders from Thung Laung, a district 40 k.m. south of Muang Kao. In the village bullocks traditionally acted only as transport animals, i.e., drawing the native ox-cart, the kwian. Thus there was a small number of oxen in former days. According to a local survey census done by a village headman, in 1964 there were about 800 bullocks, while the number of buffalo was about 7,000. However, another survey census conducted in the village in 1972 indicates that there were then about 1,500 bullocks, while the number of buffalo was around 2,000[1]. At the present time farmers find it

[1] This large apparent decrease in the number of buffalo, and also in the total number of draught animals, may be in part the result of inaccuracy or incompleteness of the census data.

more convenient to use bullocks rather than buffalo in rice farming. The behaviour and management of the buffalo have proved impractical in the changed circumstances.

Buffalo like humid places. At night the animals are kept in stables on the ground next to their owners' houses. Moreover, the stable ground should be muddy for the animal to wallow. The mud covering the buffalo's skin protects them from being annoyed by mosquitoes. In the hot season, when the stable ground is dry, a fire has to be lit near the stable to help keeping the animals from being bitten by insects. The above requirements for keeping buffalo, together with the animals' characteristics mentioned earlier, are inconveniences that force a large number of farmers to use bullocks instead of buffalo.

The advantages of using bullocks are as follow. One can keep them at home all the time if one wants. There is no need to graze them in the fields like buffalo. An ox does not like to wallow in any sort of water, let alone a mudhole. It gets along well in a dry place. It can stay in enclosures, which are built on stilts like farmers' houses. They are 3-4 metres above the ground, and raised physically close to the farmers' places. There are ramps for the animals to walk into the enclosures. In addition, mosquito nets may be put up to protect the animals from insects.

At night the enclosures are locked. Keeping bullocks in such places cannot guarantee that the animals will not be stolen, but it is safer than keeping them at ground level like the buffalo. It is easy for the owner of bullocks to get up and inspect the animals if he suspects that there is something wrong in the enclosures. I remember well that my landlord, the farmer with whom I stayed during the time of this research, woke up two or three times a night. He turned on a flashlight and shone the light around his animals' enclosure when he heard dogs barking.

It is nearly impossible to keep buffalo in bullocks' enclosures. Some farmers tried to keep buffalo in enclosures but in vain. The animals were too frightened to walk or move on a wooden floor. In one case the buffalo jumped out of the enclosures.

Let us consider food for the animals. If buffalo are stabled in the compounds of the owner's house, the farmer must provide food for them. The owner has to go out nearly everyday, cut and collect grass from the edges of rice fields, or in other places where grass is available. Moreover water must be brought from wells or reservoirs to give to the animals. A buffalo eats and drinks two or three times more than a bullock. Two bundles of grass and twenty litres of water are said to be enough for a bullock to eat and drink each day, but that is not enough for a buffalo.

The difficulty of access between rice fields and the roads mentioned in chapter IV is another reason why a lot of farmers replaced buffalo with bullocks. There is no longer access as wide and convenient as in the past decades because the expansion of cultivated land included the paths and tracks. The farmers whose rice fields are near the roads - usually they are those who use buffalo or handtractors - find little problem about getting in and out to the rice fields. But this has become a burdensome problem for farmers whose cultivated lands are far away from the roads. These farmers generally are those who at present use bullocks.

As was mentioned previously rice fields in this region are contiguous. At the present time, there are only bunds between rice fields. The bunds are no wider than 25 inches. A buffalo is too big and clumsy to walk on such bunds. If it does so, it usually slips off the bunds and damages rice plants. This causes conflict between farmers and sometimes results in the buffalo owner being fined.

When a farmer uses bullocks, he can lead or guide the animals to walk along the bunds without any problem. A bullock is generally smaller in size

and lighter in weight than a buffalo. Hence, bullocks are preferred by farmers whose rice fields are far from the roads.

Of the 241 households in my sample 130 (54%) keep bullocks. Of the 130 households which kept bullocks, 34 (26%) bought the animals just before the planting season. Farmers use bullocks in the planting and harvesting season. The animals are sold during the off-season. Farmers can usually buy bullocks at a reasonable price simply because the animals are skinny and not really healthy. The prices for a working bullock in 1977 ranged from 2,000 to 3,000 baht. The animal grows a lot during the eight months when it is used in the rice fields and kept at farmsteads. The owners of the oxen can gain about 400 to 600 baht as profit from selling a pair of bullocks.

Of the 130 households, 21 (16%) kept bullocks for a couple of years before selling. Farmers reasoned that if they fed the animals for a few years until the animals are full-grown, they could be sold at a higher price. Seventy-five households of 130 reported that they did not know when they were going to sell the animals. If the bullocks work well, they may not be sold. It is noticeable that farmers who keep bullocks during the off-season are the ones who use the animals to draw carts carrying wood from the forest. They got additional income from charcoal making and wood cutting.

However, a large number of farmers still use buffalo for rice cultivation. Of 241 households, 102 (42%) keep buffalo. Thirty (29%) households of these 102 are not owners but rent buffalo from other villages in the flood plain area around Sukhothai town. Because of the topography, farmers in the flood plain area finish rice farming before Muang Kao farmers. It is worth noting that the farmers who rent buffalo are poor farmers. They cannot afford to buy them. They rent the animals and use them for labour in land preparation, then the animals are returned to their owners. The buffalo rent is usually paid in kind, and is about 100 thang of rice grain per pair of buffalo. If

the buffalo are stolen while they are being rented, the farmers pay half the price of the stolen animals. If they die, no compensation is paid, but the carcasses must be returned to the owner.

In summary, the pressures of grazing land and the great danger caused by buffalo thefts etc. obliged farmers to find alternative ways to cope with the problems, but only a handful of peasants changed from water buffalo to handtractors. The majority of Muang Kao farmers still cling to traditional agriculture. Though a large number of them replaced buffalo with bullocks, the technology of rice farming is still the same as plough agriculture handed down from generation to generation. The reasons why mechanized farming has not been widely used, although the handtractor was introduced since 1962, will be set out in the following chapter.

CHAPTER VI

Conclusion

The account of Muang Kao, its peasant economy, social structure, traditonal agriculture, land use, and alternatives in rice farming considered in the previous chapters - all give us a general background for an understanding of agricultural technology used in the village. In this chapter I turn to a close examination of the crucial question of why there has been no significant change in agricultural technology among the peasants of Muang Kao. Then I shall come to a generalization about the peasants' economic behaviour derived from answering the above question. To achieve that end an exhaustive comparison between plough agriculture and mechanized farming is needed. My intention here is not to prove that either the former or the latter is superior, but to understand more clearly the factors associated with the use of each.

Reasons for not Using Handtractors

Reasons that farmers, by and large, do not and cannot use handtractors may be classified under the following main headings: economic limitations, topographical conditions, problems of transport, situational uncertainty, and socio-psychological preferences. Though economic limitations statistically appear to be most significant, it is important to recognize that socio-cultural and psychological factors are also very significant and may, in fact, be disguised by the economic limitations. I shall discuss these factors in turn.

Economic Limitations

The economic limitations will be dealt with in terms of operating expenses, size of landholding and income of farmers.

The high cost of purchase and maintenance is the first reason for not using handtractors. Sixty-five per cent of the households surveyed indicated that a handtractor was too expensive for them. The initial cost in plough agriculture is only 9,000 baht, while that of handtractor agriculture is approximately 25,000 baht. In operating expenses per annum, it costs a farmer less than 800 baht to farm with the use of traditional methods but it will cost the farmer more than 2,500 baht if he uses mechanized farming.

The size of landholding is the second reason for not accepting mechanized farming among the small farmers. The average landholding of cultivators who use handtractors is 70 rai (both rice land and land for upland crop cultivation), while farmers who grow rice with the use of draught animals own only rice land on average less than half the amount of those who use handtractors. From the small landholders' point of view it is not worthwhile using handtractors with a small amount of land. After planting has been done the small farmers can make little use of the handtractors because these farmers are mostly engaged in rice cultivation. It might be suggested that if farmers used handtractors they could finish planting sooner than usual, and spend the time they saved doing odd jobs around the farms or seeking wage labour elsewhere. But it should be borne in mind that the productive activities described in chapter I, excluding rice cultivation, tend to be supplementary, occasional and sporadic.

Income of a farm household is another factor determining the use of mechanized farming in the village. The average annual income of a farm household growing rice in the traditional way is about 16,000 baht. Household living costs on the average are 14,000 baht per annum. This would imply that the surplus income per household averages about 2,000 baht per annum. With this amount of surplus income, it is almost impossible for the small landholders to save enough to meet the establishment cost of using handtractors.

Some farmers bought handtractors by instalment. They borrowed money from the local Agricultural Credit Union, and paid the handtractor dealers as deposit half the price of the handtractors. So they are in debt to the dealers. The debts must be paid at the coming harvesting. In bad years, when crops failed, there have been cases of farmers who were unable to keep up payments on their handtractors and have had them repossessed. This is one of the reasons why farmers are afraid of buying the machines.

However, even in a good year with satisfactory harvest yields the rice prices at harvest may be less than had been expected and on which decisions about types of seed had been made at the time of planting. Rice prices fluctuate according to demand on the national market and its supply from the peasant market. For example the local paddy rice price in September 1976[1] was 2,200 baht per kwian, but it was as low as 1,700 baht per kwian in April of 1977.

Topographical Conditions

Natural environmental uncertainty is also a determinant of handtractor use. Using handtractors in rice fields that are flooded above a certain level is impossible, as the engine of a handtractor will stall if water gets into it. There is no problem of this sort with the use of buffalo, which love to work in any kind of flooded field. A lot of farmers who own na khūm cannot use handtractors for this reason (see p.47).

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[1] Rice supply to the national market is fairly low at this time of the year, as farmers have not got much of the rice crop left. April is in an off-season period when cash is most needed for household expenditure and the expenditure for the coming planting. Rice supply to the national market is high because every household sells rice.

As mentioned earlier the major part of the peasants' income is derived from rice cultivation. Unfortunately rice farming in such topographical conditions as those of Muang Kao, where there is little drainage and the cultivation depends completely on rainfall and natural flooding, there is considerable uncertainty. It is not possible for farmers to calculate at the beginning of the planting season how much rice yield they can expect at the end of the year. Their rice crop may fail for a wide variety of reasons beyond the farmers' control, e.g., drought, flooding above the needed level, or pests such as birds, rats, and grubs.

The inaccessibility of the agricultural areas is one of the major factors delaying significant change in agricultural technology among the peasants of Muang Kao. As has been said previously (in chapter IV), since the expansion of cultivated land farmers have had to farm far away from the residential area. Distances from the ancient city to different cultivated lands vary from 2 km. to 16 km. There are few roads between rice fields. Moreover, the interior rice fields are completely inaccessible if one wants to reach them by driving a handtractor because it can move and work well only on flat land. In addition, it may be recalled, the handtractors used in the village are generally machines which the operators walk behind and control by hand. When the land is to be prepared, the handtractor has to be transported to the field by ox-cart along dirt roads. How does a farmer who uses a handtractor manage to reach an interior field? Some farmers dismantle their handtractors at dirt roads, then carry each part of the machine along the dikes to their rice fields, and reassemble them on the field. When the handtractors are out of order, they must be dismantled again, and the defective parts brought out of the rice fields to be fixed in town. Carrying handtractors in and out of the rice fields, especially during the flood period is burdensome. A handtractor is three times heavier than a wooden plough. From the farmers' point of view, it is not practical for them, especially for those whose land

is far away from the ancient city and the dirt roads, to do so. Thirty-nine per cent of the households surveyed indicated that the difficulty of transport to the rice fields is one reason for not using handtractors. Fifteen respondents who own more than 60 rai of land would like to use handtractors but cannot do so because of the problem of accessibility to their lands. Some of them have to wade through streams in order to get to their rice fields. In this case it is not possible for the farmers even to think about the use of mechanized farming.

To conclude, for small landholders whose income is low, rice farming is subject to natural environmental uncertainty and the fluctuation of rice prices - conditions under which it is pointless to consider the use of more expensive technology. There are few chances and choices available for them to otherwise profit from their scarce resources.

Situational Uncertainty

Some situational uncertainty, the petrol crisis for example, hinder the acceptance of mechanized farming. Handtractors, together with the knowledge of mechanized farming, are imported innovations which farmers cannot produce in the village for themselves as they can do with the means of plough agriculture. Without petrol mechanized farming is completely impossible. During the planting season of 1977 there was a national petrol cricis whose repercussions, of course, affected the use of handtractors in Muang Kao. When there was no petrol available in Sukhothai Province for nearly a month, of the 47 households that use handtractors, 20 bought bullocks to work in place of handtractors. Another eight households used buffalo during the period of petrol shortage. The situational uncertainty caused by the petrol crisis has brought about a special farming alternative in the village. It is a combination use of animal ploughing and handtractor agriculture. Bullocks or buffalo might be seen working side by side with handtractors

in the same field. In some well-to-do families, the animals are kept in case there is a shortage of petrol.

Anusorn (1971:116) expects that handtractors will gradually replace the draught animals in the rice producing areas within this decade. Furthermore Ammar (1974:40) assumes that the increasing demand for beef consumption in Thailand at present has resulted in higher beef prices than in the past. It has been argued that the opportunity cost[1] of selling buffalo for beef is higher than of keeping the animals for use in cultivation. According to Ammar, this is why farmers, especially those in Central Thailand, tend to use tractors instead of buffalo. However, Anusorn's pre-fuel crisis expectation and Ammar's argument mentioned above are unlikely to be fulfilled and are probably wrong because the petrol crisis has induced the government to exhort farmers to switch back to the buffalo in order to save fuel. In Thailand at present scientists are trying to breed a new type of buffalo stronger and more suitable for agricultural use in order to replace "oil-guzzling tractors and other machines" (Kelly 1979).

Socio-psychological Preferences

The persistence of traditional opinions is another explanation why mechanization has not gained as much popularity with the peasant of Muang Kao as might be expected. Some economists, Inukai for example, assert that traditional ideas usually hinder the dissemination of technological change. Inukai (1970:461) has held that buffalo should be replaced by tractors because mechanized farming is more efficient and economical than traditional technology. Traditional agriculture is subject to diminishing efficiency,

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[1] Opportunity cost: in economics, it is considered appropriate to define cost in terms of the value of the alternatives or other opportunity which have to be foregone in order to achieve a particular thing.

but tractor agriculture is not. Songsak went further by saying that the initial cost of production in traditional agriculture using buffalo is, in fact, higher than that of tractor agriculture. By including cost of risk in the case of buffalo dying or being stolen (without including the cost of labour used in land preparation by the use of buffalo and tractor), Songsak found that land preparation by the use of tractor costs only 2,123 baht while that of buffalo costs as much as 3,055 baht (Songsak 1975:104).

However, twenty-eight per cent of my survey census reasoned that, in such topographical and socio-economic conditions as those facing the farmers of Muang Kao, the use of traditional agriculture is in many aspects more economical, practical and sensible than the use of handtractors. First of all draught animals can be sold easily. If the animals do not work well, they will be replaced by new working animals. Furthermore, as discussed in chapter V, in selling the animals the farmers usually make some profit. This cannot be done with the used handtractors. The farmers will not be able to sell their old handtractors. No one wants to purchase secondhand machines because the cost of maintaining a used handtractor is higher than buying a new one.

Draught animals not only provide labour power for cultivation but are also used for transport (see p.43) and provide some useful products and by-products which handtractors certainly cannot give the farmer. Some of them said that handtractors cannot carry as many sheaves or as much rice grain as a cart pulled by draught animals.

Dry dung of the animals is used for fertilizer, while wet dung mixed with water is used for plaster on the threshing floors. Some farmers asked me how they could prepare the threshing floors without plastering them with the animals' dung. Rice sheaves cannot be threshed well on a threshing floor that is made of cement or concrete. Threshing on such a hard surface, the rice grains are normally broken when the animals or handtractors are driven

round and round on the sheaves. I was told that when the threshing time comes the owners of handtractors usually face the problem of finding wet animal dung to use in the preparation of threshing floors. The handtractor owners have to ask for wet dung from their friends who use draught animals, especially buffalo. Buffalo dung is preferable for plastering the threshing floor than ox dung. As we know, in the village at present the number of buffalo is less than that of the previous days. It is not unusual to find that during threshing time handtractor owners and farmers who have not got any draught animals come to buffalo owners in order to book wet buffalo dung. The booking is sometimes made a week or two in advance.

Seeing no immediate productive relation between the use of mechanized farming and an increase of rice yield some farmers have rejected the use of handtractors. As far as the farmers have observed it has seemed to them that the new technology has not given promise of substantial increase in yield. Moreover, other farmers reason that using handtractors for a certain period of time will cause soil to become harder to plough.

Some farmers thought simply that as a handtractor is made of iron which is heavier than a wooden plough, whenever the handtractor got stuck in the mud it could not be gotten out as easily as the plough. Others said that they could not use handtractors because of the tree stumps still in their fields. A working handtractor usually moves faster than walking draught animals, and thus the handtractor might be more likely to hit the stumps in the fields. This might cause damage to accessory parts of the handtractor, e.g., furrow disc ploughs may be broken.

When people are confronted with new opportunities, acceptance or rejection also depends upon psychological factors (cf. Foster 1973:130). How does the novelty appear to the individual? That is, how does he perceive it? Twenty-six per cent of the households surveyed did not want to use handtractors because the farmers feared the machines. Some farmers told me

that they had tried to use their friends' handtractors but they did not feel comfortable with them. The farmers were frightened and nervous when the machine was in motion. They believed that the shaking of the handtractor would cause them to lose weight and become ill if they used the machines for a long period.

Having no previous experience with mechanization some farmers, especially older people, hesitate to use handtractors. For instance, a man had already agreed to sell his family's buffalo to a buffalo dealer, but when the dealer went to collect the animals, the man's father told the dealer that he did not want to sell the buffalo. There was another case of a farmer who bought a handtractor but did not know how to manipulate it. He thought he had understood when a mechanic explained to him how to use the machine. A couple of days later, the farmer wanted to plough his fields. He started the engine in low gear, and the machine moved forward. Then he put the engine into higher gear, and the machine moved faster than when first started, making a loud noice. He thought the machine was going to explode. He wanted to stop it but he was so nervous and panic-stricken that he forgot how to stop the engine. He shouted for his wife to hand him a rope. He tied the handtractor to his house pole, and then ran to fetch a neighbour to stop the engine for him.

A lot of farmers fear that if the machine is out of order it will cost a lot of money to repair as in the following case. Reign left his farm house with the new handtractor which he had just bought. There is no path leading to his rice field, so he tried to drive the handtractor across a dike. Unfortunately the handtractor fell from the dike and turned over. The handtractor engine was damaged and it cost Reign 500 baht to fix the broken machine.

Some farmers told me that they were afraid of being deceived by handtractor dealers. The latter might sell the former a low quality machine, or

a used handtractor that has been newly repainted in its orginal colour. This is one of the reasons why farmers who have decided to use handtractors generally ask those who have used the machine before to accompany them when they go to buy the machine. The farmers have good reason to feel such fear and anxiety because past experience teaches them that since the beginning of time the farmer has been victimized by persons more knowledgeable than him. The farmer has learned that the outside world is fraught with dangers, that it is unpredictable and cannot be understood (cf. Foster 1973:32ff.).

Response to Situational Change

The above discussion of the agricultural technology used in the village is factual. In the last part of the thesis I shall conclude my study by paying attention to the concept of 'situational change'.

Everyone is familiar with the idea of situation, location or position with reference to environment, so the concept of 'situational change' can be easily understood by an analogy. In Muang Kao rice cultivation, we have learned that the main factors inducing the farmers to take alternative ways of rice farming are the pressure of grazing land, the great insecurity caused by buffalo theft, the problem of access to the rice fields, and the introduction of upland crop cultivation for cash. In terms of situation, these factors are altered conditions. There was plentiful grazing area in Muang Kao in the past. After the expansion of cultivated land this situation changed to the condition of a lack of grazing land. I shall call this 'a gradual situational change' because it started to happen last decade, but it has only recently had a serious effect.

Farmers used to lead their lives with some degree of security. However, this peaceful situation has changed into a stressful one, marked by increasing of thefts and robbery. I shall call the danger from buffalo thefts

'an immediate situational change' simply because it affects directly the social security of farmers.

The problem of access to rice fields is another altered condition that has changed from accessible to inaccessible into the rice fields. I shall call it 'a consequential situational change' as it was brought about by the expansion of cultivated land.

The farmers used to grow upland crops and vegetables for household consumption. This subsistence cropping no longer exists as upland crop and vegetables are now grown mainly for cash. I shall call this 'stimulant situational change' because it is the most important factor that stimulates and accelerates the use of handtractors in this region.

I shall approach peasants' economic behaviour with the four models of situational change mentioned above.

The economic behaviour of Muang Kao farmers, like most of the human behaviour studied by social scientists, involves different types of decisions (cf. Roger 1962:78). In making decision a farmer examines and evaluates a situation prior to deciding what kind of agricultural-technology is appropriate. So each farmer reacts differently to situational changes. Apparently faced with a gradual situational change, an immediate situational change and a consequential situational change, small landholders who grow only rice find it suitable and economical to keep draught animals. Farmers whose rice fields are interior and far away from the roads see the use of bullocks as more practical than that of buffalo. The farmers who undertake both rice farming and upland crop cultivation find that in coping with the above situational changes, particularly the stimulant situational change, the use of handtractors will facilitate mixed cultivation. The use of bullocks at the present, together with the acceptance of handtractors - all reveal how the farmers adjust their economic way of life to fit new surroundings.

There is an essence of adaptive behaviour lying beyond the range of what the farmers of Muang Kao have done. In response to situational changes an individual farmer defines situations and acts in a way he perceives as being reasonable and efficient for him in order to fulfill his psycho-biological needs. Moreover, considering reasons for the use of each type of agricultural technology for rice farming in the village, one can make the generalization that in response to situational changes farmers will allocate their scarce resources to alternative ends not only according to their economic limitations but also according to topographical conditions and socio-psychological preferences.

Suggestion for Further Study

In Thailand there has been a great deal of research conducted on rice farming using a macro-economic approach. This thesis, like other anthropological studies of rice growing villages in rural Thailand, is a small scale study. It focuses mainly on a small scale society, i.e., a peasant economy. Further study should bridge the gap between the macro-view point and the small scale study; Muang Kao's economy could be seen as linked to the national one. It may turn out that significant changes in agricultural technology in rural Thailand do not take place, not only because of local problems such as those facing the farmers of Muang Kao, but also because of government policy regarding the rice 'premium' (the tax on rice exports) and domestic rice price fluctuations.

APPENDIX I

The average annual income of a farm household in Muang Kao in 1977

Average Land holding	Average yield per rai	Gross yield thang	kwian	Net yield (kwian)	Local rice price per kwian (baht)	Net income (baht)
of 33 rai[1]	20 thang	660	13.2	8.2	2,000	16,400
of 70 rai[2]	20 thang	1,400	28	23	2,000	46,000

Note: of the farmers' annual production generally five kwian of unmilled rice will be kept for household consumption and seed for the next cultivation; the rest is sold for cash.
Yield and prices given here are for average conditions, but large annual fluctuations may occur. Changes in yield being inversely related to changes in prices.

1: An average landholding of farmers who grow rice with the use of draught animals is 33 rai.

2: The average landholding of cultivators who use handtractors is 70 rai.

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