THE PROBLEMS OF AGRICULTURAL INTENSIFICATION IN A MARGINAL RAINFED ENVIRONMENT

A Study of Farmers' Practices and Government Policies in Two Villages in Northeastern Thailand

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ABSTRACT

In short, the study proposes that farming in a marginal rain-fed environment such as that of the Northeast Region of Thailand presents special problems for the intensification of production, and that government policies should take account of these problems.

The thesis is based on fieldwork conducted in two villages in the province of Mahasarakham, Northeastern Thailand, during the period September 1982 to June 1983. The villages were both farming communities in which households grew rain-fed wet-rice to meet their subsistence requirements, and upland cash crops (principally cassava) to supplement their income. A detailed questionnaire was conducted among approximately a fifth of the population.

The work involves an analysis of farmers' practices vis à vis rice and upland cropping and contrasts them with the government recommendations. There were significant disparities between the two and these have been explained from the perspective of the farmer, rather than that of the extension office. The outcome is that many government initiatives are shown to be less than relevant to the position in which the farmer finds himself.

This fact - that the government recommendations are often irrelevant to the inhabitants - is then expanded upon to reveal some of the problems of intensifying agricultural production in a marginal environment where the risks are great. The strategy that the farmers adopted appeared to consist of two contrasting, although not contradictory, elements: firstly, a great specificity of response to varying edaphic and topographic conditions; and secondly, an emphasis on flexibility of response to the variable climate. Both elements combine to stabilise production or minimise risk.

The resulting limited opportunities for investment in agriculture forced farmers to look for a large proportion of their cash income outside rice and upland crop cultivation. This was accentuated by the ever-increasing pressure on farmers to have a greater disposable income, and emphasises the importance of diversifying the farm economy and presenting farmers with opportunities outside agriculture.

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For my parents

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Glossary of Thai Terms

Amphoe	District
Baht	Unit of Thai Currency
Bhikkhus	Monks
Bor hok	Sixth year of education
Bor kaew	Kenaf
Bor krajaaw	Jute
Bor	Fibre crops
Bor sii	Fourth year of education
Chaaw naa	Farmers
Changwat	Province
Din juut	Exhausted soil
Farang	Foreigner
Kamnan	Village headman chosen to be head of the commune
Kanom	Sweets
Kaset Amphoe	District Agricultural Extension Office
Khaaw bao	'Light' rice
Khaaw jaaw	Non-Glutinous rice
Khaaw nak	'Heavy' rice
Khaaw niaw	Glutinous rice
Khaay suan	To sell a crop unharvested (green)
Khon Klaang	Middleman
Khwaay	Buffalo
Klum	Group
Klum kasetakorn	Farmers Association
Lam (Chi)	River (Chi)
Long Khaek	Reciprocal labour exchange
Mae Baan	The female head of a household
Man	Cassava
Man sampalang	Cassava
Muubaan/Baan	Village
Muu thii sii	Village number four (in a tambon)
Ngaan	Measurement of land (0.25 rai)
Phan phuan baan	Local or village variety of a crop
Phor Baan	Male head of a household
Phuan baan	Neighbour
Phuu yay baan	Village headman
Rai	Measurement of land (0.4 of an acre)
Sahakon	Cooperative
Sahakon muu	Pig Cooperative
Sangha	Buddhist monkhood
Sanuk	'Fun'
Satanii Phukh Rai	Upland Crop Station
Sataang	Unit of Thai Currency (100=1 Baht)
Tambon	Commune of villages
Tang	Measurement of paddy weighing about ten kilograms
Tham naa	Rice farming
Thii lum	Lower riceland
Thii naa	Riceland
Thii raap	Middle riceland
Thii dorn	Upper riceland
Thii prang	Irrigated riceland
Thii rai	Upland
Thua faak yaaw	Yard long beans
Wat	Temple
Wua	Cattle

Conversion Table

1 baht	=	US$ 0.045 (average banknote dollar exchange rate between Oct 1982 & March 1983)
100 sataang	=	1 baht
1 rai	=	1,600 square metres (0.4 acre)
1 ngaan	=	400 square metres (0.25 rai)
1 tang	=	20 litres (= 10 kilograms of paddy)

Abbreviations

ALRO	Agricultural Land Reform Office
ARD	Accelerated Rural Development
BAAC	Bank for Agriculture and Agricultural Cooperatives
CBIRD	Community Based Integrated Rural Development Project
CDD	Community Development Department
ISO	International Sugar Organisation
MOPH	Ministry of Public Health
NESDB	National Economic and Social Development Board
PDA	Population and Community Development Association
TDP	Tambon Development Programme

"For nitrates are not the land , nor phosphates; and the length of fibre in the cotton is not the land. Carbon is not a man, nor salt nor water nor calcium. He is all of these, but he is much more, much more; and the land is so much more than its analysis. The man who is more than his chemistry, walking on the earth, turning his ploughpoint for a stone, dropping his handles to slide over an outcropping, kneeling in the earth to eat his lunch; that man who is more than his elements knows the land that is more than its analysis." [John Steinbeck, 'The Grapes of Wrath',1939,p 124]

Chapter One

Introduction, Theory and Aims

The Northeastern Region of Thailand: A Marginal Environment

The Northeastern Region of Thailand (Map 1.1) has, for many years, been characterised as a harsh land lying at the edge of the kingdom both in terms of communications and in terms of the Thai conciousness [1]. This is clear from early accounts:

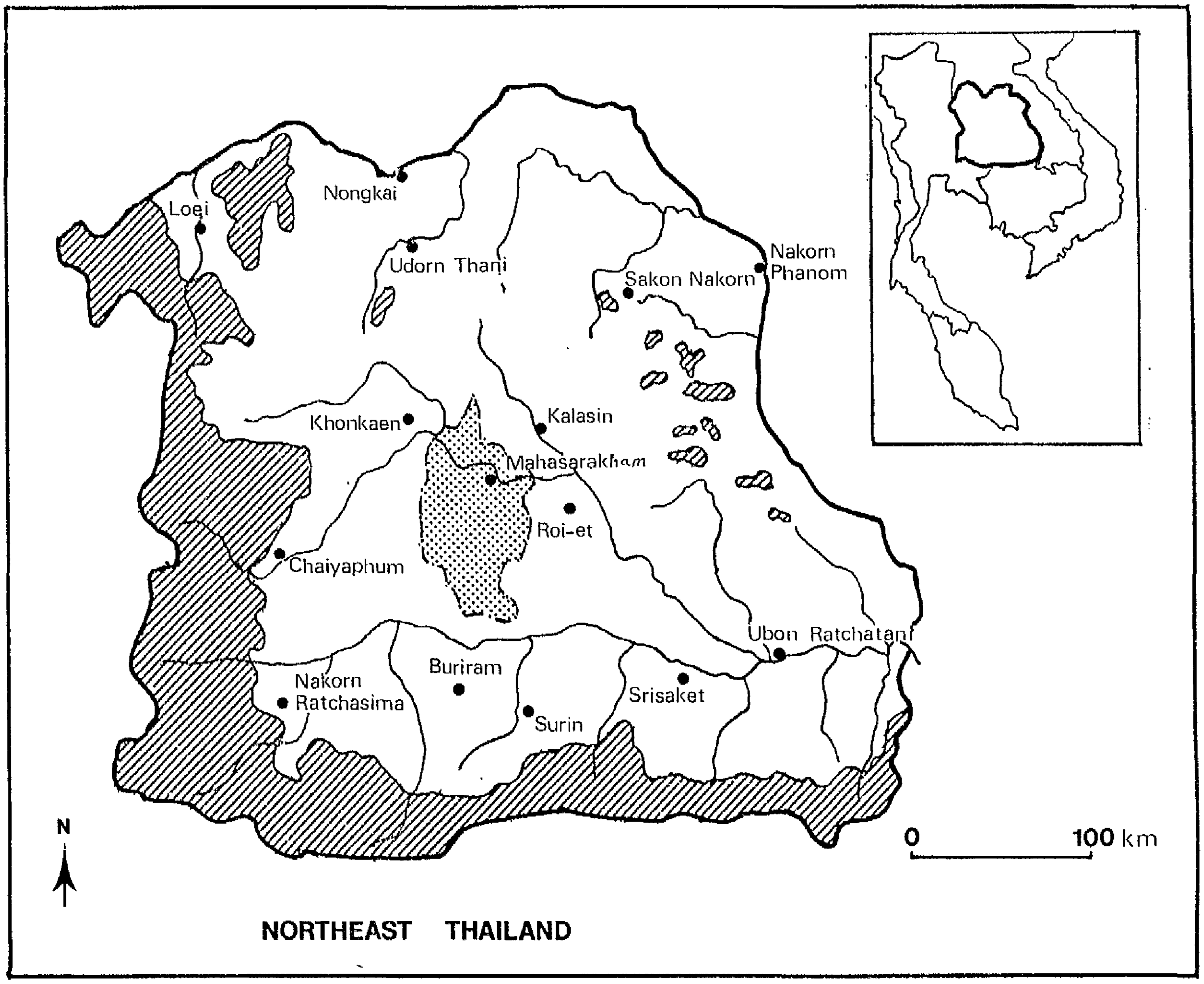
> "Communications [in the Northeast] are, on the whole, worse than in any other part of the country. Distances without water in the hot season almost impossible to man and beast, bogs and unbridged torrents in the rain, no salas, or rest houses, along the trails, dacoity not yet put down, and the least possible recognition of the importance of encouraging trade: such are some of the causes of the lethargy of the people - attributable, first of all, as I think, to the nature of the country, and secondly to the incompetence and lack of interest of the official class" (Warrington-smyth,1896; quoted in Donner,1979,p 631).

> "It is certainly no surprising fact that under such unfavourable circumstances the inhabitants [of the Northeast] are poor and backward compared with the Siamese of Lower Siam" (Carter,1904,p 54).

> "A population of some million and a quarter, Lao, Siamese and Kambodian, about 20 people to the square mile inhabit this inhospitable land, wresting from the reluctant soil crops barely sufficient to maintain an existence.....[this region] is one of the most miserable imaginable" (Graham,1924).

> "Communications except where the railroad is built and along the river leading through Roi Et to Ubol is [sic] almost totally lacking. (A part of the season this river is navigable almost to Khonkaen)." (Zimmerman,1931,p 294).

[1] In the thesis, the Northeastern region of Thailand will also be referred to as the 'Khorat plateau', the 'Isan region' or, simply, just the 'Northeast'.



Source; Ng. 1970 p.25

Land over 500 ft

Changwat Mahasarakham

Map 1.1 The Northeastern Region of Thailand

Until the post-war period the bulk of the inhabitants of the Isan plateau were subsistence glutinous wet-rice cultivators with little knowledge or contact with the world beyond their villages. This dramatically changed with the rapid development of communications in the 1950's and 60's and led directly to a spread in cash cropping. Farmers who previously had no means or desire to earn a cash income were presented with both and began to turn their uncultivated upland over to such crops as maize, kenaf and later cassava. However, this revolution in the cropping pattern did nothing to change people's assessment of the region as an area where physical factors impose severe constraints on farming; and to find more detailed references regarding the nature and influence of the environment one need look no further than the multitude of development reports. For example:

> "Most of the soils are strongly weathered and leached alluvial or sandy soils, low in fertility and moderately to poorly suitable for cropping. Many areas are suitable only for forest, others are better suited for pasture than for arable farming. The soils are generally poor in plant nutrients, particularly in nitrogen and phosphate...The rainfall varies from place to place and from year to year...in areas where no irrigation is possible the crop growing period is restricted to the wet season. Even in this period the irregularity of the rainfall constitutes a great risk to the farmer, resulting in little willingness on their part to spend money on agricultural inputs, particularly when profit margins are small" (IBRD,Nov 1974,pp 11-12).

Until the last decade or so increases in population in Northeast Thailand have been accommodated through an expansion of the area under cultivation. This means that although paddy production has increased, there has been no necessity to increase production per unit area and indeed, yields have decreased as more marginal land has been brought into use. Today however, the limits of farmland expansion have been reached and the only means by which a greater agricultural population can be supported is through the intensification of land use [1]. This hiatus is in some respects a conceptual one as different changwats, and different areas of changwats have obviously reached the point of saturation at varying times, and there are certainly some areas where a modicum of expansion is still occurring. Even so, this idea of a move from an expansionist strategy to one of intensification is broadly accurate and is crucial, as farmers have to change from an approach to cultivation in which the production methods are kept within the boundaries of the environment to one where the limits of the environment are being pressed upon or even exceeded [2]. The consequence of this, ecologically, is that the system moves from inherent stability where negative feedback flows tend to maintain an equilibrium, to instability.

The "limits of the environment" though need not be static and modern farming methods are founded on the basis of pushing the margins further and further outwards. For example; irrigation can negate the effects of a variable

[1] An alternative strategy would, of course, be to diversify the economic base of the region and to stimulate industrial growth.

[2] An example of the limits being exceeded is over-cropping where the soil nutrient content is gradually depleted until, eventually, it becomes sterile.

or insufficient rainfall; fertilisers can improve the limits set on yields by the fertility of the soil; and green houses or under-soil heating can eliminate the problem of dangerously low temperatures. But, it is important to realise two points connected with the manipulation of the limits set by the environment: firstly; not all locations are equally suited to such inputs and secondly, Liebig's 'Law of the Minimum' always applies [1]. In addition, as a result of the efforts made to overcome the influence of the environment (which tend to involve an investment) the economic and the physical risks increase. The economic risks increase because investment increases. The physical risks are amplified because, for example, high yielding varieties of rice are often more suceptible to pest attack and climatic variations,and yields tend to show greater instability. Invariably, this change in the level of risk is due to a move from a subsistence farming strategy where farmers "risk minimise" to a commercial one where the objective is the maximisation of profit (though, in fact there is a spectrum of points between the two extremes). How does all this apply to the Northeastern region?

The inability of farmers in the Northeast to control water supply is usually identified as the principal constraint restricting the intensification of wet rice production (Ng,1970,p 39). Unfortunately, irrigation which would solve this problem has not, and cannot be,

[1] This states that the constraining factor is the resource in shortest supply.

developed to any degree because the nature of the topography of the plateau (undulating and fragmented) prevents the construction, in most areas, of any large-scale schemes. At the present time only 6% of the cultivated land is irrigated (MOAC,1981,tables 84 & 90,pp 153 & 168) while the maximum irrigable area is estimated to be only 11.5% (Sanan Chantkam,Oct 1981,table 1,p 4) leaving the great majority of farmers still operating in rain-fed conditions. The use of high yielding varieties of rice, chemical fertilisers and pesticides is similarly low: it was estimated in 1973 that HYV's were planted over less than 1% of the paddy area of the region (Framingham,1982,p 32) - and the figure certainly remains considerably below 10% (12% of nation's riceland is currently planted to 'official release varieties' and the figure for the Northeast would be far less - US Presidential Mission,April 1982,p 7); while the rate of application of chemical fertilisers recorded in the 1978 agricultural census averaged a mere 4.7 kg per rai (NSO[1],n.d.,pp 24 & 86) - one of the lowest rates in all of Southeast Asia (see: Table 2.11).

The dilemma facing the farmers of the Isan region is therefore clear: they are now presented with the need, which is becoming increasingly severe, to intensify their production and hence to intensify their production techniques. But, the two main avenues by which this is traditionally done - irrigation and the use of modern farm inputs - are unavailable to them in the first case, or remain underutilised by them in the second. It is this second question; why are farmers loath to use new farm inputs to increase their yields, which is one that will be investigated in this thesis.

But rice cultivation, although still the mainstay of farming in the region, is not the whole story, for many farmers have turned to growing upland crops in order to provide themselves with a cash income. Here the level of investment, in terms of inputs, is considerably lower even than that on rice and as a consequence of overcropping many areas are experiencing severe problems of erosion which have, in some cases, led to land being abandoned. It could be that the reasons for the low level of investment mirror those for rice - although it should be remembered that from the farmers standpoint the two 'crop types' are fundamentally different as one is a cash crop and the other a subsistence crop.

Another crisis, of a different nature, facing those farmers who cultivate upland crops concerns finding an alternative to cassava, which is at present easily the most important cash crop grown in the region [1]. For 92% of the cassava grown is exported to the European Economic Community (Business Review,March 1983,p 61) which in 1981 imposed a quota of increasing severity on the level of imports from Thailand (Thailand Business,May 1982,pp 30-31). This has led to a concerted effort by the Thai government (with aid totalling US$ 35 million from the EEC - Financial Times,August 7,1984) to encourage farmers to grow other cash crops such as mungbean, soybean, groundnut and sorghum, and to find alternative markets to Europe

[1] In 1980 cassava accounted for almost 49% of the area planted to "field crops" (MOAC,1981,tables 23 & 88,pp 26 & 160).

and alternative uses to animal feed [1]. To date these efforts have been singularly unsucessful and despite a fall in the price of the crop the production for 1984 is estimated to be approximately 20 million tons (Financial Times,7 August,1984), 21% higher than that of the 1980/81 season (MOAC,1981,table 23,pp 26-31).

It may appear from the preceeding pages that the actions of the farmers of the Northeast are largely determined by the nature of the environment in that region. This would inevitably be an extremely one-sided argument for reports concerning the agriculture of the Isan plateau have identified a multitude of constraints influencing farmers in their decision making [2]. Part of the problem is that the nature of western-orientated research reduces what is in fact a single system (the farm

[1] "The Thais are looking to countries like South Korea, Japan, Taiwan, the Soviet Union and even countries in Africa for fresh outlets. None yet offers an alternative remotely comparable to the EEC. Unlike the EEC some of these countries also subject tapioca and other grains to similar tariffs. As tapioca is a carbohydrate which typically has to be mixed with other grains to create a suitable protein feed there is little incentive to import this commodity rather than others.

Alternative uses for tapioca offer few grounds for optimism. The market for tapioca flour is limited and the cost of conversion into alcohol too high. Mr Sukit (the president of the Thai Tapioca Trade Association) said recently in a local newspaper interview 'the problem is, tapioca really can't be used for anything but animal feed, so if we can't sell it there is little we can do with it' " (Financial Times,Aug 7,1984).

[2] For example: limited labour - Moerman (1968), Mizuno (1978); limited income - Completion Report (1980); cultural constraints - Pendleton (1962), Rubin (1974); economic restrictions - Muscat (1966), Jacobs (1971); historical factors - Keyes (1967).

system) into a number of independent academic disciplines. This means that researchers often indentify what appear to be principal moving forces without looking beyond their particular field of study. The need for a multi-disciplinary approach to research in the Northeastern Region as the best means of arriving at a balanced appreciation of the various forces at work is noted in the most recent detailed assessment of Thai agriculture:

> "Multidisciplinary approaches and feedback systems will hasten answers to farmers problems. The team observed that the Thai agricultural extension and research systems are quite rigidly organised by disciplines. Farmers problems cut across discipline lines" (Executive Summary,US Presidential Mission,1982; quoted in The Nation Review,March 3,1983,p 5).

Determinist analysis is a problem that most disciplines have encountered, and will continue to encounter. It probably derives from a desire to find a single simple explanation for any phenomenon which will apply whatever the circumstances. As most phenomena are the product of complex interactions between forces (which may result in cases of equifinality) it is extremely dubious if this, at least in the social sciences, is ever possible.

In geography, it is probably when the discipline has attempted to explain occurrences which involve the interaction of man and his environment that the problem has become most tortuous; for it is here that the socio-cultural, economic and physical clash. The development of this area of geographic thought illustrates this.

Theory: The Development of the Study of Man and his Environment

Although generalisations about the development of Western thought are necessarily incomplete simplifications of what really occurred they are occasionally useful in determining the broad path that has been taken (see Gellner, 1964). Thus Darwin's 'Origin of Species' published in 1859, coming as it does at the end of a succession of works tending towards the same ends (eg: Malthus,1798; Lyell, 1830 & 1832) can be seen to be the culmination of a trend which changed the way man viewed himself and the world about him. Using a stringent scientific method of analysis (often termed the hypothetic-deductive method) Darwin's treatise emphasised nature's laws and the role of causality and placed man's evolution within the limits of the environment ('survival of the fittest') [1]. As Stoddart has observed:

> "Darwin established a sphere of scientific enquiry free from a priori theological ideas, and freed natural science from the arguments of natural theology...by empirical argument and inductive method, [he] thus dismissed teleology as a live issue in scientific explanation...furthermore [he] sealed the acceptance of uniformitarianism and law in science...and finally, and in this he was alone, Darwin established man's place in nature, both in Huxley's sense and in Haeckel's, and in so doing made man a fit object for scientific study" (Stoddart,Dec 1966,pp 697-698).

Geography, not surprisingly, adopted the hypothetic-deductive method of analysis and embraced the Determinist Darwinian view of struggle and survival. Ratzel's "Anthropogeography" of 1882 was the first

[1] Although it was only later in "The Descent of Man" (1871) that Darwin really investigated the evolution of Homo sapiens (Burrows,1968,p 41).

geographical product of this new era (Ratzel,1882). It stressed the extent to which man lives under nature's laws and regarded culture as being moulded and determined by natural conditions [1]. As a product of this general mood of intellectual thought at the turn of the twentieth century a number of geographers, especially in America, took Ratzel's lead and fostered the study of Environmental Determinism (eg; Ellen Semple, W.M. Davis, Ellsworth Huntington). Human geography became defined, "as the study of the nature and distribution of the relationships between the geographical environment and human activities and qualities (Huntington & Cushing,1934,p 1). H.H. Barrows, in 1923, refined this idea slightly and stated that geography was "human ecology". By this he meant that geography should play a role in which it makes clear the relationships existing between man and his natural environment (Schnore,1961,p 209).

However, environmental determinism quickly fell out of favour the trend arising in the discipline of anthropology in the early 1900's. Boas, Kroeber, Forde and others all objected to the deductive evolutionary approach and believed that socio-cultural phenomena could only be understood in the light of other socio-cultural phenomena with environmental factors, at best, playing

[1] In his later, and arguably greater work, the second volume of Anthropogeography (1891), Ratzel modified his ideas to look not only at the physical influences on man, but also at the historical and socio-cultural influences (Holt-Jensen,1980,p 25).

only a secondary role [1] (Forde,1934;Kroeber,1952 & 1969;Boas,1896 & 1932;Vayda,1969). Vidal de la Blanche was the first geographer [2] to criticise environmental determinism recognising that man's social milieu cannot be set in opposition to the physical environment, with one dominating the other (Holt-Jensen,1980,p 27). As Hollingshead recognised, there is a difference between "an ecological order (which) is primarily rooted in competition" (ie; Darwinian) and, "social organisation (which) has evolved out of communication" (Hollingshead,1940; quoted in Steward,1972,p 122). The result of these objections was the birth of environmental possibilism in which there are no necessities regarding the way the environment moulds man, only possibilities (Febvre,1925,p 171).

The French historian Febvre coined the term 'possibilism' in 1922 (Febvre,1925) and European geographers were quick to adopt the approach (Vidal de la Blanche, Alfred Hettner, Jean Brunhes). However, possibly

[1] Eg; "...social practices of great consequence are relatively indifferent to the physical environment" (Forde,1934,p 6).

"The principle of cultural relativism has long been standard anthropological doctrine. It holds that any cultural phenomenon must be understood and evaluated in terms of the culture of which it forms a part" (Kroeber,1952,p 6).

[2] Anthropology and geography have had a history of opposition when it comes to the debate as to what extent the environment has an influence on man's development. However, much of the debate has been from afar; as Grossman observes, "geography and anthropology have many common problems and interests, but effective communication between the practioners of the two disciplines has been hindered by their insularity and traditional disciplinary concerns" (Grossman,March 1977,p 126).

the best-known advocate of possibilism, at least in the English-speaking world was the American Carl Sauer. He, along with others, did not deny the importance of the natural environment in influencing man's actions but emphasised that man was not inexorably dragged along any particular path. Thus, "the cultural landscape is fashioned from a natural landscape by a culture group. Culture is the agent, the natural area is the medium, the cultural landscape the result" (Sauer,1963,p 343). Sauer was particularly scornful of environmentalists who, as he saw it, attempted to reduce geography to a mechanistic discipline concerned with biophysics and human tropisms:

> "Geography under the banner of environmentalism represents a dogma, the assertion of a faith that brings rest to a spirit vexed by the riddle of the universe...what man does in a area because of tabu or totemism or because of his own will involves use of environment rather than the active agency of the environment. It would, therefore, appear that environmentalism has been shooting neither at cause nor at effect, but rather that it is bagging its own decoys" (Sauer,1963,pp 348-349).

The development of geographic thought with regard to the man/environment debate may appear, from the preceeding pages, to have followed an evolutionary course in which a series of revolutions have rejected one paradigm for another. It would be wrong to see the situation as quite this simple (as Kuhn himself would recognise - see Kuhn,1962,chapter 12,pp 143-158) and it is probably more accurate to view geography upto 1970 as a dual (or even multi) paradigmatic discipline (Harvey & Holly,1981,pp 30-33) in which the determinism of Ratzel and the possibilism of Vidal de la Blanche co-existed with both having its share of disciples [1].

However, during the 1960's and 1970's there was a remarkable change in geographic thought as it turned increasingly towards positivism. The essence of this change was that the ideographic approach to geography (eg; in Hartshorne's 'The Nature of Geography', 1939) which emphasised the uniqueness of phenomena was replaced by a nomological approach which aimed to stress their similarities through generalisations (eg; Chorley & Haggett's 'Models in Gegraphy', 1967; and Harvey's 'Explanation in Geography', 1969). This so-called logical-empiricist approach with its deductive-nomological model of scientific explanation and hypothetic-deductive view of scientific thought (Paterson,1984,p 20) gradually became pre-eminent and human geography, like economics, began to use normative models in which man was assumed to be rational. Thus: "To Harvey, the role of models in scientific investigation was to formalise a theory, using the tools of logic, set theory and mathematics, and to set out a theory's assumptions and hypotheses in a logical framework so as to eliminate any possible inconsistencies" (Paterson,1984,p 27).

The initial criticisms of the 'new geography' were, "directed against its philosophical, methodological and theoretical bases. By its very nature positivism is concerned with aggregate patterns, with the explanation

[1] The ideas presented in the first edition of Ratzel's 'Anthropogeography' were elaborated by such scholars as Huntington, Semple and Davis. Vidal de la Blanche's work meanwhile was adopted by geographers such as Sauer.

and prediction of spatial patterns. In these ventures man is portrayed as rational, and his spatial behaviour as reflections of an organism that follows spatial strategies which maximise some subjective utility function" (Harvey and Holly,1981,p 33). The use of models, laws and methods taken largely from the physical sciences were seen to be inappropriate to the demands of human geography as they were thought to be of "little value in the explanation of real-world human geographical activity" (Bunting & Guelke, Sept 1979,p 4). The reasons for this are made clear in Guelke's paper of 1974 in which he argues for an 'idealist alternative' to positivism.

> "The idea that human geographers ought to attempt to emulate physical scientists in search of theory overlooks the fact that man himself is a theoretical animal whose actions are based on the theoretical understanding of his situation. As man's theoretical ideas change, so will his behaviour. Any attempt to describe human behaviour in theoretical terms seems doomed" (Guelke,June 1974,p 202).

At around the same time that positivism was establishing itself as geography's new paradigm, geographers and anthropologists began to explore two new concepts: the ecosystem and general systems theory. Both of these avenues of thought follow on from, and are a part product of, the determinist/possibilist/probabalist debate in which it was finally accepted that a more flexible and comprehensive method of examining man's role in nature was needed. But in addition to this there was a further stimulus to the rise of the 'system' as a framework for geographical analysis, and that concerned a general dissatisfaction with the manner in which the discipline had searched for a 'professional identity' (Ackerman,Dec 1963,p 431). Ackerman in his important paper of 1963, 'Where is a Research Frontier', felt that geography had taken a course which had led it away from the mainstream of scientific thought, leaving it in a wilderness of intellectual independence and isolation:

> "In our desire to make our declaration of independence viable, we neglected to maintain a view of the advancing front of science as a whole. We acted as though we did not believe more than the broadest generalities about the universality of scientific method. In effect we neglected to appraise continuously the most profound current of change in our time. We neglected an axiom: The course of science as a whole determines the progress of its parts, in their greater or lesser degrees" (Ackerman,Dec 1963,p 432).

Ackerman went on to argue that the discipline should return to the objective of problem solving and the study of human ecology (Ackerman,Dec 1963,pp 434-436). His observations led a number of geographers (eg; Eyre & Jones,1966,pp 1-29) to reaffirm the belief that the discipline should concern itself with, "the mutual relations between man and his natural environment" (Barrows,1923,p 3) and many of these pointed to the system as the best means by which the division between the human and the physical aspects of geography could be overcome and a wide range of interactions be examined:

> "We could suggest that geographical thinking would profit considerably from the adoption of the ecologic rather than the physiographic point of view. The physiographic element in geography, slopes and microclimate, are truly environmental and are independent of, though influencing, biological phenomena in general, and man in particular. Thus they logically constitute a separate and distinct physical geography, for, if it be conceded that man is an essential element in geography, then interest

> logically should center on the biological relationship rather than on the physical one, for it is mainly through the biological relationship that any major link between man and land must be established" (Morgan & Moss,June 1965,p 350).

The Development of the Systems Approach in Geography

Despite isolated calls from geographers such as Sauer ('The Morphology of Landscape') and Barrows ('The Geography of Human Ecology') the development of the study of the relationships between man and environment - both in geography and in anthropology - was delayed. The strictures of the environmental determinism of Semple and Davis, and the possibilism of Boas and Kroeber; the growing popularity of the spatial approach (positivism); and the continued division of geography into its human and physical halves [1] all tended to prevent any progression (Grossman,1977,p 131). It was not until the mid 1950's when, in anthropology, the first coherent product of the growing dissatisfaction with the state of man/environment studies led to the development of 'Cultural Ecology'. As Netting explains:

> "Chiefly it was the experience of fieldwork that convinced younger anthropologists that the processes of human adaptation to the environment had been undervalued and that sound empirical data, some of them quantifiable, were available to document wide-ranging and systematic ecological relationships. The excitement was not that of over-throwing old ideas, but of putting them in a more inclusive context. Functionalism

[1] "...human and physical geographers began to drift apart in the 1930's and were almost totally separated in the 1940's and 1950's. The conception of geography as a brodge between the natural and social sciences was still proclaimed in some text books, but was seldom evident in research" (Mikesell,1974,p 4).

> was extended beyond the social sphere, structural arrangements were seen to have adaptive value in organisation for defence and production, cultural attitudes showed selective advantages in promoting subsistence success. The ability of another set of facts to make sense of what is already known by pointing out further order and meaning is, after all, at the heart of scientific endevor" (Netting,1977,p 6).

The terms of reference for cultural ecology were provided by Steward (Steward,1955) and the approach differs from social and human ecology [1] in that it does not attempt to pre-determine a moving force in the nature/nurture debate. Instead Steward maintained that an attempt should be made to isolate those parts of culture which are most closely linked to, and involved in, the environment. These aspects of culture he termed the "cultural core". Using this method the cleavage between man and nature disappears, thereby dispensing with the conceptual and often arbitrary division of the two. As Geertz says: "One delineates, in short, an ecosystem within which certain selected cultural, biological and physical variables are determinally inter-related, and which will yield to the same general mode of analysis as ecosystems within which human organisms do not happen to play a role" (Geertz, 1963,p 9). The result of the

[1] Hawley's 1950 work represents the clearest statement on social ecology ('Human ecology: A Theory of Community Structure'). Man is seen as reacting to the environment as a cultural rather than as a biological creature, and Hawley concludes that it is historical factors which are primarily responsible for man's behaviour (culture being seen as an historical facet), the environment never being causative. Steward criticises this view, just as the determinists had been criticised, for it promotes culture to the detriment of the environment (Steward,1972,pp 123-124).

approach is that one does not have to ask the question, "do habitat conditions (partly or completely) cause culture, or do they merely limit it", but instead ask, "given an ecosystem defined through the parallel discrimination of cultural core and relevent environment"; - how does it function? How is it organised? How stable is it? And how might it develop? (Geertz,1963,p 10).

By examining swidden cultivation in Indonesia in this way Geertz does not stress the negative aspects of the system (low intensity of cultivation, land inefficient) but instead looks at the way it is perfectly suited to the demands and constraints of the environment. It also manages to clarify and illuminate the functional differences (and the reasons for them) between wet-rice cultivation and shifting cultivation, which represent the two principal cultivation strategies in Indonesia (Geertz,1963).

However, Steward's concept of the cultural core is flawed from a researcher's point of view in the sense that any analyst must pick those aspects of culture which he intuitively feels are most closely concerned with the environment. As the role of the environment, especially in the tropics, is only partially understood it would be likely that the delineation of the cultural core would be, to a degree, a false one. As well as producing this weighting the researcher is also making just the sort of division (albeit a less significant one) that the method of cultural ecology tries to avoid. Further, it is doubtful if any such thing as a "core" of culture actually exists for there must be a spectrum of cultural elements each of which is very slightly less (or more) integrated with the environment than the last. If all these features are included in the core "then the question arises as when a core becomes an entire cultural pattern, and the concept dissolves into mere tautology" (Ellen,1982,p 61).

However, the value of cultural ecology in clarifying the reasons for certain social phenomena is well illustrated in Harris' "The Cultural Ecology of India's Sacred Cattle" (Harris,1966). In this Harris investigates whether the Hindu doctrine of Ahimsa is really (as commonly presumed) a prime example, "of how men will diminish their material welfare to obtain spiritual satisfaction in obedience to non-rational or frankly irrational beliefs" (Harris,1966,p 51). Harris believes that not enough attention has been paid to the positive functioned features of the Hindu cattle complex such as traction, dung (fuel), milk and hide production, in relation to the costs of "ecologically viable alternatives" (p 59). Thus, he concludes: "The probability that India's cattle complex is a positive functioned part of a naturally selected ecosystem is at least as good as that it is a negative functioned expression of an irrational ideology" (p 59) [1].

[1] Although it should be said that Bennet criticises Harris for, "applying a theoretical approach derived from studying highly integrated microecosystems to a complex human macrocosm with many subsystems and exceptions to the rules" (Bennet,1976,p 234).

In geography, it was the physical side of the discipline that first looked to the concept of the ecosystem as a framework for analysis (eg; Chorley,1962,pp 282-300). However, its broader relevance to geographical investigation [1] was quickly appreciated (Davies,1972,pp 256-257), with a principal merit being that, "it (the ecosystem) focuses on the basic properties common to all systems: structure, function, equilibrium and change" (Harris,1969, p 135). As Stoddart explained (Stoddart,1972,pp 159-160), ecosystems are:

1/ Monistic. They bring man, plant, animal and environment into a single framework within which the components can be analysed thereby disposing of geographical dualism and with this the problems of determinism.

2/ Structured. "The essential fact here, for geography, is that once structures are recognised they may be investigated and studied".

3/ They Function. They not only provide a framework for study but also a dynamic one within which changes can be measured (to an extent) and understood.

4/ They are General Systems [2] which tend towards a steady state and obey the laws of open-ended thermo-dynamics. In addition they can be used at different levels of complexity without affecting their integrity so that a researcher may adopt the scale which best fits his requirements.

Systems Analysis in Agricultural Geography

In agricultural geography as early as 1961 Blaut chose an ecological approach to try and define the role of

[1] Stoddart went so far as to state that, "ecological concepts provide a research method which geography so sadly lacks" (Stoddart,1972,p 158).

[2] Note the link here to general systems theory. In many respects the division of "systems analysis" and "ecosystematic analysis" is false because the ecosystem is a sub-set of the system.

the environment in resource use in the tropics (Blaut,1961,pp 47-65). He felt that certain attitudes had led to a situation in which the analysis of the problem had become blurred (p 47):

1/ Framing man/environment relations into environmental "possibilities" and "restrictions".

2/ Hampering assumptions concerning the constraints of the environment as they operate in the tropics.

3/ Sloppy reasoning leading to problems concerning cause and effect. As he notes, "the environmental conditions can operate only in a cultural context which permits it to have an effect on the culture".

To overcome these Blaut proposed placing the three distinguishable elements of resource use - environment (or resources), motivation and behaviour - within an ecological framework. In this way he hoped that the geographers' tendency to overlook the influence of behaviour and the anthropologists' of environment would be overcome producing a view of the farm system which was balanced in terms of culture, "behavioural environment" (Kirk,1963,pp 357-371) and environment.

Since this early paper the use of the systems approach in agricultural geography has developed into a complex morass of methodologies and theories each reflecting a different objective. This diversification can be seen to be a product of the versatility of the concept (the 'system' or 'ecosystem') which allows it to be used to tackle a variety of problems. As Moss has recently observed:

> "On the broadest scale it serves as an organising principle for systematising diverse theoretical material. At another level it can be treated as an object of study in itself in order to develop specific theory of ecosystems.

> Then it can be used as a specific concept defining a problem-solving approach. It can also be used as an empirical category denoting the visible expression of a specific set of ecological relationships. Then the term has been used in a much wider sense to denote almost any set of discernable relationships at the earth's surface" (Moss,1984,p 113).

Thus, within the agricultural literature it is possible to identify studies which take a fairly strict ecoloqical line (eg: Bayliss-Smith, 'The Ecology of Agricultural Systems', 1982, which highlights the flows of energy that link the farmer with his crops and animals), others which use the concept as an approach to problem solving (eg: Geertz, 'Agicultural Involution: The Processes of Ecological Change in Indonesia', 1963), and still others which use it to examine and to classify macro-level phenomena (eg: Duckham & Masefield,1970; Grigg,1974; Ruthenberg,1980). It is arguable that the diversification of the approach is not only due to its adaptability to a variety of uses but also because it is unacceptable to much of geography in its strict ecosystematic guise. Chorley recognised this in 1973 when he argued that unless the concept was stretched it had little to offer contemporary geography (Chorley,1973,pp 162-167). Partly as a consequence, there has occurred the development of what has been termed 'hard' and 'soft' systems analysis. It is the latter which is often adopted when man is to be studied, for not only are social systems inherently different from natural ecosystems (the former are based on positive feedback mechanisms while the latter rely on homeostacy and negative feedback loops; Chorley in Taylor,1984,p 255) but inevitably when man is to be studied a degree of flexibility is always required [1]. Of the many forms that the systems approach in agricultural geography can take, it is Farming Systems Research which forms the broad framework for this study.

Farming Systems Research

The stimulus leading to the growth and development of farming systems research concerned the realisation that there was a need to have a framework of study which was structured so as to illuminate the nature of agriculture rather than to pursue any particular theoretical bent. The demands of, for example, the analysis of agricultural development requires that the total environment (both physical and socio-cultural) is reflected in the results and not just those aspects that are relevant to economics or to soil science or, for that matter to environmental determinism or possibilism. In this sense farming systems research is a product of an attempt to find solutions to a practical problem and its roots lie in the demands of fieldwork rather than in theory.

It should be clear that the methodology is not restricted to any one discipline but can range across agronomy, through geography, and on-to anthropology. In

[1] This applies to all disciplines, not just geography, which deal with social relations: "Much has been written about systems and much overwritten. There is always that yearning for certainty in social science, a reaction to the vagueness of categories that depend, in the last analysis, on mental constructs of reality and not measureable reality itself - that search for hard categories filled with hard data, or for imposing rhetoric and terminology that seems so much better than "soft" language based on interpretation rather than consequence. Systems theory when applied to human affairs unfortunately often feeds these very human but also borderline authoritarian impulses..." (Bennett,1976,p 84).

effect, anything is relevant as long as it adds information to the understanding of a farm system, and in this sense it is multi- or inter-disciplinary. Although it is possible to assemble a group of experts knowledgeable in each sphere (eg;KKU-Ford: 'An Agroecosystem Analysis of Northeast Thailand', Aug 1982) this is usually impractical, and it is here that geography attains particular relevance to the approach. For, as a single discipline, it is geography which comes closest to being multi-disciplinary. Thus it is argued that not only should agricultural geography intimately concern itself with farming systems research (at least in its problem solving guise), but also that it is admirably suited to do so.

Norman and Gilbert see farming systems research as having a primary objective of, "improving the well-being of individual farm families by increasing the over-all productivity of the farm system in the entire range of private and societal goals and given the constraints and potentials imposed by the technical and human elements which determine the existing farming systems" (Norman & Gilbert,1982,p 19). Two types of programme are identified: 'upstream' and 'downstream'. The former involves using a systems approach on experimental stations to provide prototype solutions; while the latter aims at developing and introducing strategies that can be implemented as they stand, giving immediate results (Norman & Gilbert,1982,p 21).

'Downstream' farming systems research embodies four successive stages: description, design, testing and extension. It is the first of these - description - with which the research is concerned. This diagnostic stage is undertaken to "determine constraints, needs and flexibility in the current farming system" (Norman & Gilbert,1982,p 23).

Although some very strict systems analyses adhere closely to the rules that govern General Systems Theory it is often thought that such an approach tells more about the theory of systems rather than the systems themselves (Langton,1972,p 127). This is felt to be particularly pertinent when one is dealing with a complex open system such as that of a farm in which the range and depth of influences and constraints is such that a 'total' examination is impossible (Bennett,1976,p 234). This thesis does not attempt to follow the strictest of lines regarding systems enquiry but does use the systems perspective. Ellen explains the form that such an approach takes:

> "For some writers it has been sufficient that a systems approach supply a framework or perspective, and serve as a general set of organizing principles, or as an aide -memoire in data collection, a means to avoid the 'existential dilemmas' between emphasizing synthesis or analysis, theory or observation, generalization or specificity" (Ellen,1982,p 202).

It is in these terms, using this rather flexible notion of the farm system as the basis for examination, that the study is set. It is hoped that a comprehensive picture can be built-up, mirroring the kind of schematic representation illustrated in figure 1.1. as it is felt that this is the best means by which the aims of the research can be achieved.

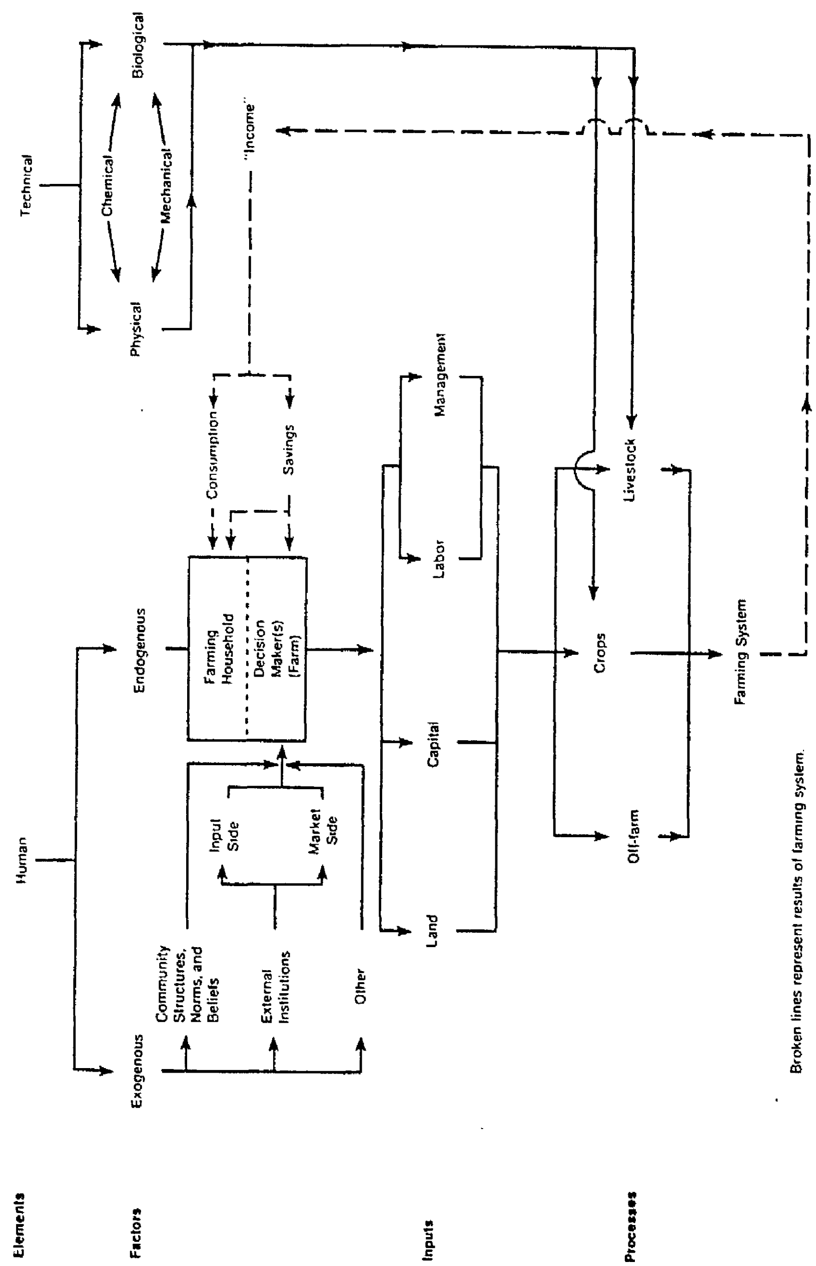


Fig. 1.1. Schematic Representation of Some Determinants of the Farming System

Source: Norman & Gilbert,1982,p 18.

Aims

As was explained in the opening section of this chapter, the Northeastern region of Thailand has always been portrayed as an area where the physical environment plays a large role in limiting the intensification of agricultural production. This said, there are clearly many other influences impinging upon the farmer in his decision-making, especially now that the region has been firmly integrated into the cash economy of the country.

The accurate assessment of this clash between the influence of the environment and that of "culture" (in the broadest sense) is important if relevant development policies are to be formulated. Indeed, it is arguable that the agricultural policies so far initiated are either poorly implemented or are out of tune with farmers' requirements, for a minimal proportion are utilising the resources which the government has (apparently) made available [1]: high yielding varieties of rice are barely used; chemical fertilisers are grossly underused; the cooperative movement has a limited and an unenthusiastic membership; the government rice purchasing bodies have had no impact on the domination of the middleman; and farmers continue to cultivate cassava in spite of efforts directed at encouraging diversification. In the light of this there are two inter-related questions that should be investigated:

[1] It could be that it is the extension network rather than the policies themselves which is at fault. This would mean that the problem lies in the implementation rather than the formulation of the development intiatives.

1/ In a marginal rainfed environment such as that of the Northeastern region of Thailand where the soils are characteristically infertile, what is the balance between man and his environment?

2/ Do the special problems that face the farmers of the region require special solutions? The Thai government has been formulating policies to aid the farmers of the Northeast for very many years. The question is: Have they been successful?

There is, in addition, another question which arises as a result of the first two being posed; and that concerns the agricultural potential of the region. For it is apparent that farmers are increasingly turning towards agricultural activities outside cropping and to non-agricultural income earning opportunities to meet the shortfall between what farmers desire and what rice and upland crop cultivation are able to provide. Therefore:

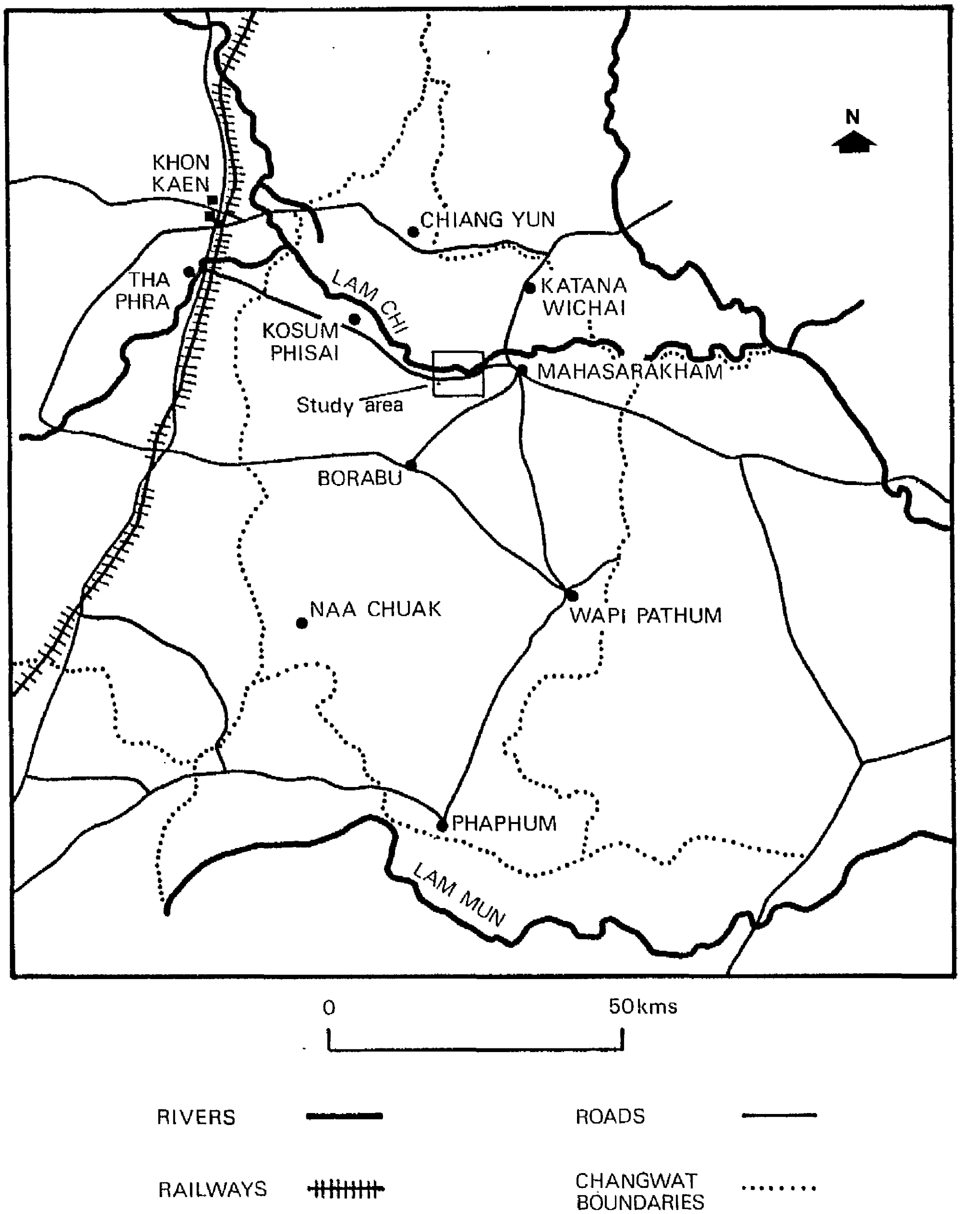
3/ Given the environment, the lack of free land, the rising aspirations and the growing population of the region; what is the potential for increases in production, and if this is limited, what opportunities outside agriculture are farmers turning towards?

The Study Area

Two villages in Tambon Tha Song Korn, Amphoe Muang Mahasarakham were chosen for the research. Both communities were located close to the Khon Kaen - Mahasarakham road lying approximately 9 kilometres west of Mahasarakham and nearly 60 kilometres, by road, east-south-east of Khon Kaen. The Lam Chi, one of the Northeast's major rivers, delineated the northern border of the tambon and a water tank had been built about six kilometres to the south-east (Map 1.2).

Prior to the selection of Baan Noon Tae and Baan Tha Song Korn as the two study sites, a number of other

Map 1.2 Mahasarakham Province



villages in the vacinity of Mahasarakham town were visted and then rejected as being unsuitable. The three principal selection criteria were as follows:

(a) The villagers should cultivate rice as a subsistence crop, and also have a certain amount of upland cash cropping.

(b) The villages should be located in an area of early settlement (or, at least, fairly dense settlement) where there is no longer any free land onto which agriculture can be extended.

(c) The villages should have relatively easy access to a town (ie; a market).

Following the identification of Noon Tae and Tha Song Korn as suitable communities, the phuu yay baan of each was asked for his permission for the research to be carried out. Both willingly gave their consent. It was emphasised at this early point [1] that the work was being done under the auspices of the University of London, independently of the Royal Thai government. This was so that inhabitants would not associate the work with any of the official development agencies or projects.

After this, all the appropriate government offices in Mahasarakham were visited in order to obtain as much information and as many statistics regarding the tambon

[1] In Baan Noon Tae, soon after it was selected as one of the study villages, there was a religious festival at which the purpose and background to the research was explained using the PA system set up by the abbot and his monks.

and the villages, as possible [1]. At the same time, using aerial photographs of the area as a base, a detailed land use map of the 6 km2 surrounding the study site was made. The value of the completed map does not warrant the amount of time put into producing it; however, the task was felt to be useful, as the initial stage of the fieldwork, for a number of other reasons:

It is only by wandering around the fields (this was during the rice harvesting season; October to December) that an understanding of the nature of the environment can be reached (this understanding or appreciation will, even so, be limited and rudimentary). The process also enables the researcher to converse with the farmers quite literally, "in the field", and to become known and recognised by the population. This second point is extremely important if farmers are to answer questions fully and honestly.

Between February and April 1983 a detailed survey of the inhabitants of Noon Tae and Tha Song Korn was undertaken. A questionnaire was constructed with the help

[1] Department of Agricultural Extension (Amphoe and Changwat Offices); Community Development Department (Amphoe Office); Rural Development Department (Changwat Office); Land Department (Amphoe and Changwat Offices); Land Development Department (Changwat Office); Department of Forestry (Changwat Office); Cooperative Department (Amphoe and Changwat Offices); Pig Cooperative (Amphoe and Changwat Offices); Bank for Agriculture and Agricultural Cooperatives (Changwat Office).

of a number of Isan speakers [1] and it was structured in order that there was room for a certain amount of flexibility (Appendix 1.1). This was so that a fertile line of enquiry could, if necessary, be pursued beyond the limits of each particular question.

The preliminary questionnaire was then tested on the two headmen so that they could offer their advice and criticisms [2], any problems be ironed out, and also so that the etiquette of social relations in the villages could be fulfilled [3]. Following this limited pilot

[1] Terms and expressions for such things as categories of riceland vary across the Northeast. Thus, in the research area upper paddy was called thii dorn; middle paddy, thii raap; and lower paddy, thii lum (these are terms which are used quite widely over the region). Grandstaff working in the changwats of Roiet and Chaiyaphum found villages with an assortment of other terms categorising paddyland types: thii tam (low place) and naa kao ("old paddys") identified lower paddys; while thii dong (forest location), thii kyn (places with less water), and thii sung (high place) all referred to upper paddys which suffered from water shortages (Grandstaff,1981,pp 15-16).

[2] eg; it was not certain if questions on income and birth control would be acceptable to the villagers. The phuu yay baan confirmed that they were acceptable and would not cause offence or an excessive amount of embarrassment.

[3] It was felt that it would not be good public relations if the headman discovered that a questionnaire was being conducted without him being told and involved in it. Indeed, the importance of the phuu yay baan and his power to limit the success of projects he did not give his full backing to or did not approve of was, at least in Noon Tae, clear (look to page 433; regarding the CBIRD fish pond project).

study, it was slightly re-written and organised [1], and then duplicated. In addition, although the questionnaire remained essentially the same, there were a number of questions added as the survey progressed. eg; a question on income given to the temple fund, and one on herbicide use. The need to do this demonstrates the advantages of having the time, man power and the facilities to conduct preliminary surveys and representational pilot questionnaires. Following these amendments the questionnaire was ready to be implemented.

Although I was present at every interview an Isan student from Srinakharinwirot University, Mahasarakham, was employed to actually conduct the interviews and to record the responses. This approach was followed because:

1/ If the interviews were given un-supervised, although it would have meant more could have been carried out, the only answers would be those relating directly to the questions. As the questionnaire was intended to be open-ended so that interesting lines of enquiry could be pursued further it was obviously important to have someone present who could identify those replies that warranted further investigation.

2/ It would not have been possible to have conducted the interviews successfully alone due to language difficulties which would have meant too much time spent on asking the questions and understanding the answers, and too little on contemplating the implications of the answers (fertile areas of further questioning would have been ommitted).

3/ Answers often have a qualitative and a quantitative element which requires two people to appreciate. As the research draws heavily on farmers' views and perceptions of various subjects it was important to record the details of every response. This includes such things as emotion

[1] The ordering of the original questionnaire was found to be confusing. In addition the meaning of some of the terms was not exact enough (eg; the distinction between chemical and organic fertilisers).

and hesitation, and the background or lead-up to what might, in the end, be a simple answer.

Each interview took between one half hour, and one hour and a half to complete, and was conducted with, if he or she was present, the head of the household [1]. A household was defined as an unit working and gaining their subsistence from a single "farm". As it turned out this definition (khroop khrua) was an accepted unit of analysis and almost always consisted of a nuclear family. There was no problem, common to many studies elsewhere in the world, with complex extended families. The families were selected using a stratified sample. Each village was divided into a number of similarly-sized segments and an equal proportion of households taken from each. By the end of the survey 37 in Noon Tae and 44 in Tha Song Korn had been questioned amounting to 26.4% and 17.1% of the total number of households respectively. A higher percentage from Noon Tae was deliberately taken as the village had a greater diversity of activities. It is accepted that a larger sample would have been satistically more significant, but limitations of time and manpower prevented this.

The data obtained from the questionnaire was coded-up and analysed at the University of London Computing Centre

[1] This was due to the assumption that the head of the household would be the family member with the greatest knowledge of the farm and its operation; and also because it was thought that it would be politic to do so. Although the latter seemd to be true, the former was not. Indeed it was usually the wives who were able to provide the most detailed information regarding expenditure and income.

using the 'Statistical Package for Social Scientists' (Nie et al,1975) with the SPSS Update 7-9 (Hull & Nie,1981).

An important difference between the developmental input into the two communities was that one of the villages, Baan Noon Tae, had been chosen as a target village for the "Community Based Integrated Rural Development Project" (CBIRD). This project, operating in 60 villages in the provinces of Khon Kaen and Mahasarakham, was under the control of the Population and Community Development Association (PDA) and had been financed largely with foreign aid. Its principal aim was to, "improve the livelihood, employment opportunities, living standards and the quality of life" (CBIRD document) of its target households. If, as suspected, the potential for increasing agricultural production is limited then farmers anxious to meet the demands of a growing population with rising aspirations and expectations will have to turn to alternative income earning opportunities such as CBIRD was providing. An analysis of the success of the project (and other sources of income outside the cultivation of rice and upland crops) could illuminate whether there really is a demand for such a diversification of economic activity and what the possibilities for aiding it, are.

The results of any research are to an extent dictated by the position from which it is conducted. Most commonly this can take the form of an ideological or a theoretical leaning which places an analysis within a particular mould. However, with reference to studies concerned with the problems of development at the village-level it is also possible to examine the situation either from inside the community looking outwards; or from outside looking in. In the first case one adopts the role and the views of the villager (the developed) and in the second those of the government (the developer) . The aims of the two may be similar but the nature of the viewpoint means the picture is very different. In the same way it is possible for a researcher to portray the success of government objectives, and development in general, from two positions. He can either examine the aims of the various government offices and departments and see how far those aims are being realised at the village-level; or he can scrutinise how the farmers perceive the problems they are facing and how far government objectives fit these perceptions. Although the two approaches may appear to be the same thing viewed from different ends, it is argued that the view point makes the outcome very different. With respect to this study the weighting is very much on the side of the villager; it is his views, perceptions and attitudes which are sought, and as a result of this it is inevitable that the problems are viewed largely through his eyes.

A final question that should be tackled is whether Baan Noon Tae and Baan Tha Song Korn can be viewed as representative of the region as a whole [1]. Physically (climate, soil,topography), the characteristics of the area do conform to those of the plateau, or at least to those of its central portion, and indeed, the region is one of the few where it is accurate to talk in terms of physical generalities. There are also similarities between the farm characteristics as revealed by the questionnaire and those for the region as calculated by the Thai government: thus, the average amount of riceland owned per farming household in the region amounts to 20.1 rai (MOAC,1981,tables 88 & 89,pp 160-161 & 162-163); while among those included in the sample survey it was 16.1 rai (80% of the regional figure). The quantity of upland is similarly balanced; 5.5 rai (MOAC,1981,tables 88 & 89,pp 160-161 & 162-163) as against 3.6 rai (65%). Total farm income was calculated to be 26,336 baht per household per year in the Northeast in 1980 (MOAC,1982,table III2,p 66) and this compares with a figure from the questionnaire of 20,990 baht per year. (80% of the regional figure). The regional strategy of cultivating glutinous wet rice for home consumption and growing upland crops, primarily cassava, to earn a cash income was also followed in the study villages; as was the level of fertiliser use on rice (the 1978 census recorded an average application on rice of 4.6 kilograms per rai; the farmers questioned used

[1] It is appreciated that no two villages can ever be truly representative. However, it is possible to say that two villages are close enough to a regional norm or standard (loosely defined) to be used to illustrate the broader problems of a larger area;- in this case the Khorat Basin.

7.9 kilograms per rai) and on cassava (none).

Therefore, in broad terms the inhabitants of Noon Tae and Tha Song Korn can be seen to conform fairly closely to the standards of the region. However, there is one manner in which the study villages do not conform so closely to the 'mean', and that concerns the balance of agricultural to non-agricultural income. In the 1978/79 crop year the Department of Agricultural Economics (MOAC,1981,table 92 & 95,pp 176 & 178-179) calculated that among farm households in the Northeastern Region 54% of their income was derived from agricultural sources;- a suprisingly high proportion in fact. In the study communities the figure was even lower at only 35%. The difference must be seen to relate to the proximity of the town of Mahasarakham which gave farmers income earning opportunities outside agriculture to which the majority of the population of the plateau would not have access. This said, it is arguable that in having a greater proportion of non-farm income the families are merely at the forefront of a trend which will, in time, affect all villages.

Thesis Structure

The thesis consists of ten chapters, including this one, arranged in the following manner:

Chapters two and three will deal with the Khorat Plateau as a region, looking at the physical and socio-economic characteristics which have led many officials within successive administrations to talk of the 'Northeast Problem'. Chapter four will give an over-view of the villages of Noon Tae and Tha Song Korn before going into detail regarding the strategies that farmers adopted with respect to rice and upland crop cultivation in chpaters five and six. Chapter seven will examine the cooperative system in the area with reference to the study villages and will also look at the supply of credit. Following this examination of crop cultivation and the associated institutional framework in the two muubaan (seen as the first 'section' of the research) the thesis will then, in chapters eight and nine, turn to investigate the alternative sources of income to which farmers are turning in their efforts to raise their standards of living (the second 'section' of the thesis). Chapter nine will look particularly at the Community Based Integrated Rural Development Project as a means by which the government can become involved in alternative forms of income generation. Finally, in chapter ten, an attempt at synthesis will be made.

Although it is stressed that the farmers of Baan Noon Tae and Baan Tha Song Korn did not divide up their lives into 'rice cultivation', 'upland cropping' and 'alternative sources of income' it is felt that, for clarity's sake, this is the best format. Chapters five, six, seven, eight and nine can each be seen (chapter nine to a lesser extent) as illustrating sub-systems within the total farm system. Together, it is hoped, they constitute a realistic picture of the constraints and opportunities that the inhabitants face.

Chapter Two

"The Northeast Problem"

Introduction

The Khorat Plateau is the second largest of the four regions that make up the kingdom of Thailand with 32.9% of the land area and over 34% (1981) of the population (NSO,1982,table 7,p 13). However, in terms of wealth the region lags far behind with the per capita GRP (at current market prices) representing only 35% (1980) of the national average (NSO,1982,tables 59 & 61,pp 82 & 84-85) (table 2.1). This relationship of the Northeast to the rest of the country is not a new one and surveys have continually emphasised that relative to the kingdom as a whole the region is impoverished (Carter,1904;Graham,1924; Zimmerman,1931). Zimmerman's economic survey of 1931 calculated that the cash income of families in the region

Table 2.1

Population, Land Area and Gross Regional Product of Thailand, by Region

	Population (millions)	Area (sq km)	Per Capita GRP (1980)
Whole Kingdom	47.9	513,115	16,549
Central Region	15.8	103.902	26,307
Northeast	16.4 (34%)	168,894 (33%)	5,806 (35%)
North	9.7	169,644	9,541
South	5.9	70,715	14,190

- population is the 1981 estimate.
- gross regional product is at current market prices.
- in brackets are the Northeastern figures as percentages of the national figure.

Source: NSO,1982,tables 7 & 61,pp 13-15 & 84-85.

was 29.7% of that for those residing in the Central Plains (Appendix 2.1). The economy of the Isan region is agriculturally based with 87.9% (1980) of the population being employed within the agricultural sector. This compares with the mean for the country of 70.8% (NESDB,1980,table 6.2,pp 114-5). The average size of land holdings is 28 rai (1980) and of the total of 50,092,989 rai over 92% is owner-occupied (MOAC,1981,table 90,p 168). The staple crop is glutinous rice and paddyland covers 71.6% of the area classified as farm holdings. A further 19.8% of farmland is devoted to what are termed "field crops" (table 2.2). Most of the rice grown is used to meet subsistence needs; farmers tending to earn their cash income through the cultivation and sale of upland crops, principally cassava and kenaf.

Table 2.2

Land Use in the Northeast (1980)

	Area (rai)	% of Total Farmland
Total Land	106,391,250	
Farm Land Holdings	50,092,989	
Paddy Land	35,886,374	71.6%
Field crops	9,901,022	19.8%
Trees/Fruit Trees	461,025	0.9%
Vegetables & Flowers	77,407	0.1%
Grassland	214,399	0.4%
Idle Land	1,968,805	3.9%
Other Land	683,944	1.4%
Unclassified	56,298,261	

Source: MOAC,1981,table 88,pp 160-161.

The Opening-up of the Northeastern Region

The Khorat Plateau has had a history of division, and it was only in 1827 that the region became part of Siam [1]. Even then, control did not come directly from Bangkok but was dispersed among a number of semi-autonomous principalities. The process of centralisation began when King Chulalongkorn, or Rama V (1853-1910), acceded to the throne in 1868 and continued until just after Thailand became a constitutional monarchy in 1932 (Keyes,March 1967,pp 14-17).

Coupled with the administrative isolation of the region there was also a great degree of physical remoteness as well as cultural distinctiveness. The first railway link was completed to Khorat in 1900 in response to the growing French presence on the Mekong, the line being extended to Khon Kaen in 1933 and to Ubon in 1938 (Tate,1979,Vol II,pp 498 & 501). Automobile transport meanwhile, did not really expand until after the Second World War and the majority of the region remained isolated until the 1950's and 60's. Zimmerman observed that, except where the railway was built and along some stretches of navigable river, communications were "almost totally lacking" (Zimmerman,1931,p 294).

Ethnically and culturally the bulk of the inhabitants are Lao and are more closely affiliated with the Laoatians

[1] Before that date the, "areas lying along the Maekhong were integral, but secondary parts of the Lao Kingdom for most of the period between the mid fourteenth and early nineteenth centuries, while most of the interior of the Khorat Plateau was politically autonomous" (Keyes,March 1967,pp 12-13).

to the east than the Thais of the Central Valley. They are distinct in dress, food and language. Although this is to an extent academic it has been stated, often with insinuations of revolution or secession [1], that the population regard themselves as more closely tied to their ethnic kin in neighbouring Laos than to the rest of the Kingdom (Turton,1978;Caldwell,1978). But, despite the fact that there are grounds to support the contention that the Northeasterners are neglected, underprivileged and ignored there is a general feeling in the area that, "we are Lao but Thai citizens" (Keyes,1973,p 360).

Even so, in the late 50's and 60's the central government in response to the growing frustrations of the people as well as the increasing influence of the Communist Party of Thailand (CPT) [2] began to implement programmes and policies designed to develop the Northeast

[1] For example: "Thailand is in crisis. Momentum is gathering towards full-scale civil war. A level of class struggle unimagineable until a few years ago when the effects of the integration of Thailand into the world capitalist economy since the 1950's began to take form.....Armed opposition now pervades the greater part of the country, operating from large base areas in all regions of the country, and led by the Communist Party of Thailand with the direct support of many hundreds of thousands of peasants" (Editorial, Journal of Contemporary Asia,Vol 8,1978,pp 3-4).

[2] The CPT's estimated strength reached a peak in 1977 at about 14,000 guerillas (The Nation,Feb 3,1983,p 5). The main force, by some estimates, now stands at less that 2,500 and is still falling (Asiaweek,April 8,1983,pp 16-24), although the recent arrest of Phirun Chartvanitkum (a former student leader who joined the CPT, and rose to become a full member of its central committee) and harrassment of former party members may rekindle dissatisfaction with the establishment (FEER,July 19,1984,pp 26-28).

region and to strengthen the government's presence there (London,1980,p 92). As Vandenbosch explained, the administration was "running scared in the wake of the known subversive threat in that part of the land" (Vandenbosch,1967,p 219).

The development strategy of this period was based on the philosophy that growth would be stimulated if the infrastructure of a modern economy were provided (Grit Permtanjit,1982,pp 124-125) and this led to a tremendous expansion in communications. Undoubtably, military factors were also involved, and the Friendship Highway linking Bangkok and Korat which was completed with US aid in 1958 together with many of the more minor roads were built, in part, for strategic reasons (London,1980,pp 92-94). However, as far as the people of the Northeast were concerned the principal effect of these developments was to bring the mass of the inhabitants into contact with the market econmy of the Central Plains for the first time. Prior to this, farmers cultivated crops to meet their subsistence requirements and for local barter. It was, except in a few locations, impossible due to the absence of transport facilities to sell crops anywhere other than locally and it was only with the advent of widespread communications that farmers began to cultivate crops to give themselves a cash income. As Insor said, the road brought "civilisation, or at least its universal substitute, money" (Insor,1963,p 27).

Migration and Settlement

The river valleys and basins of the Northeast were settled first; this represents the most fertile, and more importantly the most reliable land. Population was historically concentrated in the changwats of Mahasarakham, Roiet, Surin, Sisaket and Ubon (Burcham,1979,p 144) and riverside towns such as Ubon Ratchatani and Mahasarakham flourished. However, population densities remained low and it was not until the mid-nineteenth century that there was any large-scale settlement when, with official encouragement, large numbers of Thais and Laos moved into the area (Dixon,1974,p 37). Even so, the Khorat region still had abundant land and surveys of land use by the Thai government (1937-1939) revealed that less that 7% of the area was cultivated (Burcham,1979,p 149). Traditionally, when local pressures of population grew too great a section of the inhabitants would leave to establish a new village (Keyes,1976,pp 53-54). In fact, the Lao marriage custom in which the bridegroom travels to the house of the bride is, "particularly suited to a pioneering atmosphere", and has played a large role in accelerating the opening-up of new land (Ng,1974,p 3). But, although the region has always been rich in land much of it is marginal or unsuited to rice cultivation and by the start of the twentieth century the most populated changwats were beginning to experience a shortage. Continued population growth meant that during the 1930's, even in the remoter provinces, only marginal riceland remained to be settled.

During the post war period this general pattern of intra-regional migration continued with migrant flows running from the more densely populated central changwats (and to some extent from the southern tier of changwats) to the northern, more peripheral ones (Burcham,1979,p 47). Old population centres such as the provinces of Roiet and Mahasarakham had, "tremendous outflows", and with the spread of cash cropping from the mid to late 50's it seems that comparatively, "the paddy cultivating changwats all lost heavily to those experiencing agricultural commercialisation" [1] (Ng,Dec 1970,p 74). These trends have reduced the differences in density of most to least populated province from a ratio of 1:7 in 1947 (Donner,1979,p 583) to 1:3.6 in 1981 (NSO,1982,table 7,p 14).

At the inter-regional scale there was already a well-established seasonal migration of labour from the Northeast to the farms of the Central Plain by the end of the nineteenth century. This declined for a time between 1905 and 1913 when the rice trade in Thailand suffered a recession and many landowners were unable to pay the wages of their migrant workers, but quickly appeared again when the international market for rice re-asserted itself (Fuller et al,1983,p 26). Since the Second World War this outward movement has continued although measurement is difficult as censuses often fail to record temporary moves

[1] Changwat-level data fails to reveal the large amount of intra-provincial migration from the more to the less populated areas, even in such long-settled changwats as Surin.

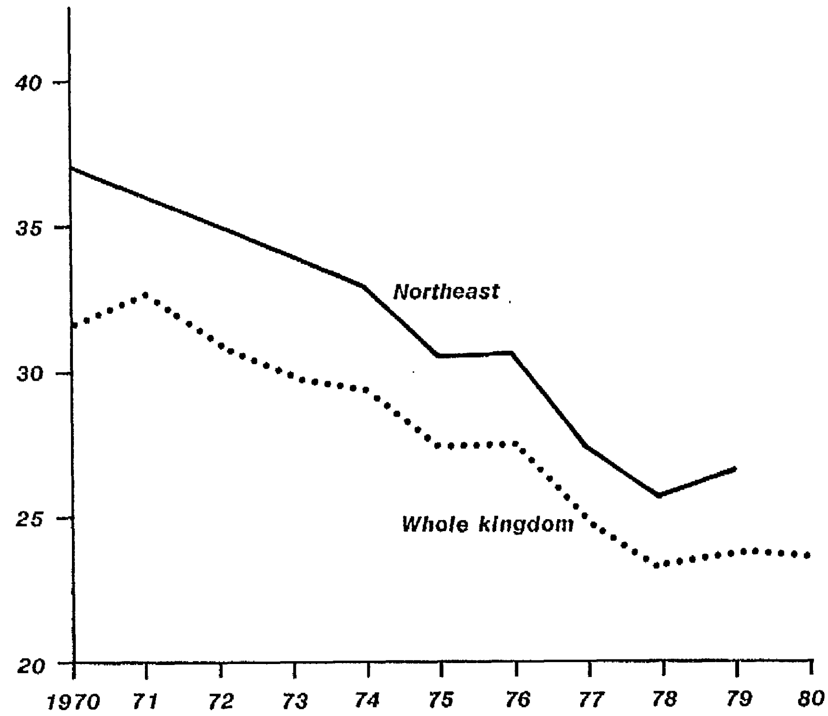
and therefore do not give an accurate indication of total mobility (Fuller et al,1983,p 38). Ng, using data from the 1960 census concluded that "perhaps for want of a meaningful regional system, the emigration from the Khorat Plateau has been over-emphasised" (Ng,Dec 1970,p 75). Conversely Fuller et al, using farm-level anthropological studies and more detailed government surveys that would enumerate temporary moves stated that, "observations from several independent sources indicate that mobility levels are high" (Fuller et al,1983,p 41). Throughout the region temporary moves by individuals in search of jobs, especially to Bangkok, are common and efforts by the government to reduce such flows (stated in the Fourth and Fifth Five Year Plans) have, "failed miserably and will fail again miserably" (Suchart Prasithrathsint,1981,p 13).

Population Growth and Tenancy

In response to the growing population of the country as a whole (Table 2.3) the Thai government implemented a Family Planning Programme in 1970. In 1974 it was expanded and intensified in rural areas through the establishment of the Community Based Family Planning Service (Krannich & Krannich,Oct 1980,p 1026). The latter programme, managed by the charismatic figure Mechai, has been a success and, "despite large gaps between rural and urban residents with respect to income, education and access to public services, a remarkable decline in fertility has occurred throughout Thailand; it has been well characterised as a 'reproductive revolution'"

Graph 2.1.

Livebirths Per 1000 Population in Thailand and the Northeastern Region, 1970-1980



Sources: Statistical Yearbook : Thailand, No.32:1976-1980, National Statistical Office,n.d, and Statistical Summary of Thailand, National Statistical Office,1982.

Table 2.3

Population and Contreceptive Use in Thailand and the Northeastern Region

	Population Whole Kingdom	Population Northeast	New Family Planning Acceptors
1919	9,207,355	3,092,117	-
1937	14,464,105	4,952,288	-
1960	26,257,966	8,991,543	-
1965-68	-	-	186,893
1970	34,397,374	12,025,140	228,578
1975	42,391,454	-	535,023
1980	46,961,338	-	1,120,966
1981	47,875,002	16,393,356	-

Sources: Wilson,1983,pp 32-35; NSO,1974; NSO,1980, NSO,1982,pp 13-15.

(Rosenfield et al,June 1982,p 43). In the Northeast the birthrate has fallen from a figure of 37.0 per thousand in 1970 to approximately 26.5 per thousand by 1979 (Graph 2.1); and a major factor contributing to this decline must be the spread of contreceptive use (table 2.3).

Upto the present the growing population of the Northeastern region of Thailand has been accommodated by expanding the area under cultivation and this is exemplified by the pattern of migration and settlement in the area. The density of population has now reached 97 people per square kilometre, in comparison to the national figure of 93 (NSO,1982,table 7,pp 13-15). Although these two figures are similar, due to the nature of the physical environment on the plateau there is a limited supply of cultivable land and there now exists a situation in which it is a resource in short supply. Ramsson, by projecting the growth in farmland expansion concludes that, "it is certain that the frontier in farmland expansion for this region is on the verge of closing" (Ramsson,1977,p 78).

Land tenure systems, tenancy and landlessness are all connected to varying degrees with land availability and are frequently thought to be important in determining the degree of economic responsiveness among farmers (Suvaphorn,1975,p 118).

In Thailand the rate and problems connected with landlessness are in considerable dispute: it has frequently been stated that tenancy, especially in sections of the Central Plains and the North, has increased dramatically in recent years leading to considerable hardship which has, and will continue to manifest itself, in greater rural political instability (Turton,1978,pp 104-135). However, there is also a body of opinion which holds the view that the empirical evidence does not support the contention that tenancy is becoming a major problem, and even in the Central Plains the increase is in the partial tenant category, and has not necessarily resulted in a spread of poverty (Ramsay,Nov 1982,p 1083).

The Northeastern region has the lowest level of tenancy of all the regions of Thailand with under 4% of the area of holdings being tenanted in any way (Table 2.4). Of this 2.3% is partially tenanted with the landholders owning more than half the land that they work (NSO,n.d.,table 1.2,p 10). These statistics are similar to those from past surveys which have recorded a tenancy

Table 2.4

Land Holdings by Tenure and by Region (1978)

	owner-occupiers	tenants	Part-tenants [1]	Part-tenants [2]
Whole Kingdom	84.4%	5.4%	4.8%	4.2%
North	79.1%	7.4%	6.2%	5.5%
Northeast	95.3%	2.3%	0.8%	0.8%
Central Plain	65.3%	14.7%	8.1%	10.7%
South	92.2%	0.6%	4.6%	1.6%

[1] Partial tenants who own more that 50% of the land that they farm.
[2] Partial tenants who own less than 50% of the land that they farm.

Source: NSO[1],n.d.,table 1.2,p 10.

ratio for the region of 2% in 1937 and 3% in 1947 (Ramsson,1977,p 84) and it is generally accepted that at present it is a problem of little significance (IBRD,Sept 1978,p 40). Nevertheless, as land becomes an increasingly scarce commodity with the closing of the frontier in farmland expansion in the Khorat region, it is likely that the fragmentation of holdings and the proportion of tenants and partial tenants will grow causing tenancy to become a problem for the future (Ramsson,1977,p 150;Krikkiat Phipatseritham,Nov 1979,p 12).

In January 1975 the Agricultural Land Reform Act was passed as a means to solve some of the developmental problems of tenancy through land consolidation (Appendix 2.2). It was initially implemented in the most problematic areas of the Central Plain and was only later extended to the other regions of Thailand. In the Northeast, the Agricultural Land Reform Office is basically concerned with land distribution and the development of communications, water supply, irrigation, agricultural credit facilities and better agricultural production and marketing (US Presidential Mission,April 1982,pp 45-47). This is mainly centred in the Tung Kula Rong Hai area of the lower Northeast where, although tenancy itself is not a problem, there is a need for land consolidation and the systematic authorisation of ownership, as in the past acquisition of land has been arbitrary and uncontrolled (NESDB[1],n.d.,pp 125-126). As yet, the programme has not been successful in accomplishing its aims neither in the Northeast nor in the

Central Plain (Amara Pongsapich,June 1982,p 52;Kemp,1981,pp 19-20;US Presidential Mission,April 1982,p 46).

Land Deterioration

The expansion of the area under cultivation has occurred not only through the need to feed more people, but also due to the desire of the farmers to have a cash income. The provision of an infrastructure as well as giving the subsistence cultivator a means to market cash crops also brought him in contact with the consumer philosophy of Bangkok and the expectation of an ever-improving standard of living. However, "in the process of striving to satisfy these new-found needs, the villager has snatched every cash crop opportunity on a hit-and-run basis" (Ng,1970,p 36), and the result of this "reckless land clearance" (Ng,1970,p 28) is that now numerous problems relating to erosion, loss of fertility and the destruction of forests have arisen.

The soils of the upland areas of the Khorat Plateau are usually sandy, low in organic content, low in fertility and as an anthropogenic climax support dry dipterocarp savanna forest. The removal of the forest cover through clearence (table 2.5) has exposed the soils to weathering and has resulted in their erosion to sterile sands covered in lateritic nodules. In addition, the extensive stripping of watershed areas has increased run-off and therefore heightened the risk of flooding and further accelerated erosion (Pescod,1979,p 180). Since

1940, the amount of forested land in the kingdom has declined from 62% of the total area to 25% (1977) and in the period 1973-1977 the forested area of the Northeast has shrunk from 36% to just over 16% [1] (Bangkok Post,26 July,1980).

Table 2.5

Forested Area of Thailand as Percentage of Total Land Area

	Whole Kingdom	Northeastern Region	Mahasarakham Province
1940	62%	-	-
1952	58%	-	-
1960	51%	-	-
1973	39%	36%	5.6%
1977	25%	16%	0.0%

Source:Bangkok Post,26 July,1980.

A preliminary study by the Department of Land Development has revealed that in the region 85.74% of farm holdings (40.37% of total land) are affected by erosion, 53.26% of these, "very severly" (US Presidential Mission,1982,table 4). In response to this, the Department of Land Development has recommended that the following action be taken as soon as possible (US Presidential Mission,1982,p 35):

[1] Most worrying is the fact that the rate of deforestation has been accelerating:
1940-1952 - 1 million rai/year
1952-1960 - 2.75 million rai/year
1960-1973 - 3 million rai/year
1973-1977 - 10.8 million rai/year

1/ Prepare a land capability map indicating areas zoned for watershed, residential, industrial and agricultural use.

2/ Continue to study problems and preventive measures of soil erosion as it occurs.

3/ Take immediate preventive measures through soil and watershed conservation techniques on land such as forests, watersheds and reservoirs with the cooperation of all government agencies concerned,the private sector and farmers.

4/ Enact legislative measures to support the above, particularly a national land use policy.

It appears that in the 60's farmers believed land to be an infinite resource and acted accordingly [1]. They were, "under no compunction to maintain the fertility of [their] temporary land holdings" and so have contributed " to the systematic deforestation of the region" (Muscat,1966,pp 89-90).

The land that has been planted to cash crops as well as being open to the forces of weathering has also suffered from a loss of fertility through over-cropping - kenaf, maize and cassava, the three primary upland crops, all exhaust the soil rapidly unless steps are taken to prevent this occurring. There is even the possibility that falling fertility accompanied by rising population might lead to a situation in which the Northeast is no longer self-supporting in terms of food production (Alton,1977,p 17).

Poverty and Economic Growth

Kuznets in his presidential address to the American Economic Association in 1954 stated that inequalities in developing countries tend to widen in the earlier stages

[1] NB - In their experience it was an infinite resource.

of growth (Kuznets,1965,p 257). Since then, work by Myrdal, Williamson, Nurkse and Hirschman has supported this observation and the Northeastern region of Thailand represents another such instance where national growth has led to greater inequalities between the richer and the poorer regions. In 1960 the per capita GRP of the region was 53.8% of the national figure (Phisit Pakkasem,1973,p 42); by 1980 (at current market prices) this had dropped to 40.1% (NSO,1982,tables 59 & 61,pp 82 & 85). The differences in income relate not only to a regional bias, but also to a rural/urban bias, specifically with reference to Bangkok. In 1980 the Bangkok metropolis had a per capita GRP three times higher than the national average: 43,423 baht versus 14,475 baht (NSO,1982,tables 59 & 61,pp 82 & 84). Efforts by the government to reduce these inequalities in income have so far failed and the emerging trends in land availability and productivity may lead to, "increasing disparities in the distribution of the benefits of growth ... a worsening of income distribution and even an increase in the extent of poverty in some areas" (IBRD,Sept 1978,p 77).

The World Bank calculated that the incidence of poverty in the country declined from 57% of the population in 1962/63 to 33% in 1975/76 (IBRD,Nov 1979,table 3.1,p 52). In terms of the total number of people living in poverty this represents a drop from 15.8 million to 13.6 million [1]. The problem is primarily a rural one; 80% of

[1] A high population growth rate between 1962 and 1975 means that even with a 24.6% reduction in the incidence of poverty there is nevertheless still a similar number of people classified as poor.

the poor live in rural areas and most of these in the North and the Northeast (IBRD,Nov 1979,table 3.2,p 54) (Table 2.6). As a document from the late 70's explains:

> "Despite the substantial agricultural development of the past 15 years, it is estimated that at least a third of agricultural households (about 9 million people) remain today in absolute poverty with many having had little or no improvement in their income since 1960. In fact, three-quarters of all poverty households in Thailand, or nearly 8 million people, live in the rural areas of the north and Northeast and the vast majority of them grow rice under rain-fed conditions" (IBRD,Sept 1978,p 64).

Table 2.6

Distribution of the Poor Population, by Region and Area

1962/3 & 1975/6 (% of total poor population)

	1962/3	1975/6
Northeast		
Rural	43%	44%
Urban	2%	6%
Total	45%	50%
North		
Rural	22%	19%
Urban	3%	4%
Total	25%	23%
South		
Rural	8%	10%
Urban	1%	3%
Total	9%	13%
Centre		
Rural	15%	7%
Urban	3%	2%
Total	18%	9%
Whole Kingdom		
Rural	88%	80%
Urban	12%	20%
Total	100%	100%

The poverty line is enumerated in terms of household income and amounts to 1,981 baht/capita/year in rural areas, and 2,961 baht/capita/year in urban areas.

Source: World Bank,Nov 1979,table 3.2,p 54.

General health standards are one indicator of standard of living. In Thailand, despite being a country which produces a food surplus, vitamin deficiency and malnutrition are widespread (Table 2.7). Especially important in the development of a healthy population is adequate nutrition during the pre-school years (0-60 months) and it is in this age bracket that the problem is most severe. In the provinces of the Northeast almost 60% of pre-school children have some degree of Protein Calorie Malnutrition (table 2.7) (NESDB,1980,table 2.10.pp 70-71).

Table 2.7

Levels of Malnutrition in Thailand

Whole Kingdom[1] - Proportion of total population afflicted with:

Vitamin Deficiency	-	37%
Malnutrition	-	11%
Severe Malnutrition	-	2%

Northeast[2] - Nutritional Condition of pre-school children (0-60 months):

First Degree PCM	-	41.6%
Second Degree PCM	-	15.2%
Third Degree PCM	-	2.4%

[1] Source: Mahidol University,1982.
[2] Source: NESDB,1980,table 2.10,pp 70-71.

The Genesis of Development Planning in Thailand

Up to 1932 Thailand's growth, primarily in the agricultural sector, has been described as, "autonomous, expansionist, and satellitic" (Muscat,1966,p 26). By this, Muscat, using Hoselitz's scheme of development, means that Thailand's growth was expansionist in that the increase in the gross product flowed primarily from an expansion in the area of exploitation of resources; was satellitic in that production was geared to export and development was funded by foreign capital; and was autonomous in that the government played little role in the growth process (Muscat,1966,p 18-20). Even after 1932, although there were certain fundamental structural changes so that growth became intrinsic [1] rather than expansionist, it remained largely autonomous (Muscat,1966,pp 265-266), and the idea of planned development, which was common in many less developed countries in the early post-war period, was not part of the Thai approach to government (Phisit Pakkasem,1975,p 223).

The first efforts at public development planning occurred with the recession in world trade following the Korean War which badly affected Thai exports and as a result weakened the traditionally strong baht, as well as

[1] "Intrinsic" here means the intensification of resource use. Muscat identifies the following structural changes: "...absorption of all natural flood land in the Central Region, the acceleration in population growth, the rise of population pressure in the lower delta and of fragmentation of holdings, the absorption of natural rice lowlands in the Northeast, Southeast and elsewhere, the spread of shifting cultivation destroying forest cover over large watershed areas [and] the ageing of the rubber trees..." (Muscat,1966,p 266).

turning a trade surplus into a substantial deficit (Silcock,1967,p 15). In response to the situation the Thai government tried to reform its finances and regulate exports but, partly because of a lack of skilled personnel, these early efforts were, "unbalanced, uncoordinated and indicative of a total lack of scientific planning" (Katchamat Suraphol,1978,p 68).

It was not until the late 50's when pressure from the International Bank for Reconstruction and Development (IBRD) and certain individuals in the administration, who recognised the need to intensify and rationalise the country's economic development, led to the creation of the National Economic Development Board (NEDB) in July 1959 (Phisit Pakkasem,1975,p 223). The process was spurred by the deteriorating political situation in Southeast Asia and the heightened communist threat to national security (Katchamat Suraphol,1978,p 70;Muscat,1966,p 3). It is also possible that General Sarit Thanarat who gained control of the country after a coup d'état in October 1958 may have found it politically desireable to unfold a new economic programme, of which the NEDB was a part (Phisit Pakkasem,1973,p 16-17).

The First Four Five-Year Plans (1961-1981)

The First Five Year Plan (1961-1966) was formulated on the basis of recommendations from the World Bank (Grit Permtanjit,1982,p 124) and its importance lies in the fact that it was the first attempt to present national objectives. Public expenditures were concentrated on the development of infrastructural facilities such as irrigation, power, highways, railroads and tele-communications (Shigeru Sugitani,May 1978,p 61), utilising the philosophy that increased output would be most easily secured through the spontaneous efforts of individual citizens, with the government acting as a catalyst by providing services and an infrastructure (Grit Permtanjit,1982,p 124-125). However, this plan was an extremely limited document and contained virtually no aggregate analysis: "Its over-all and sector targets are vague and merely stated without supporting argument. Certain components are ignored entirely (eg; manpower) and very little attention is paid to the private sector" (Muscat,1966,p 281). In many ways though, it would have been suprising if anything more sophisticated had been produced, as the NEDB had few staff and very little experience (Muscat,1966,p 281). Inevitably, the result was a plan which, "in its final form consists of little more than a collection of ministerial projects" (Muscat,1966,p 281).

The Second Five Year Plan (1966-1971) was much more comprehensive and, like the first, continued to emphasise the development of communications and transportation (Shigeru Sugitani,May 1978.p 63). Significantly, it also stressed the social aspects of development and its objectives were specifically directed at the "promotion and maintenance of social justice; the preservation of social stability, national institutions, customs and culture; and the provision of relief to people in isolated areas..." (NEDB[1],n.d.,p 34). In terms of its macro-economic content the plan was a great improvement on the first but even so, "it does not seem unfair to characterise Thai planning in the later part of the 60's as being inconsistent and uncoordinated" (Phisit Pakkasem,1973,p 22).

During the period of the first two Five Year Plans Thailand's growth rate was impressive, the GDP expanding by 7.9% each year (BBMR,Jan 1981,Vol 22,No 1,p 15). However, the Northeastern region's already small share of the national GDP decreased further from 18% (1960) to 16.8% (1969) (Phisit Pakkasem,1973,table 2.4,p 36). This reflects the interplay of two trends; firstly the declining national importance of agriculture , the Northeast's dominant sector, from 37.4% of GDP in 1961 to 29.8% by the end of the Second Plan in 1971 (Phisit Pakkasem,1975,p 231); and secondly the slow rate of growth of the agricultural sector in the region in comparison to the rest of the country, its share dropping from 27.1% of the national figure in 1960 to 24.7% in 1969 [1] (table 2.8). In addition, the rapidly growing manufacturing sector of the nation failed to expand significantly in the Northeast and, in fact, the region's share of this part of the economy dropped 1.7% between 1961 and 1969, to 8.3% (table 2.8).

[1] The Northeast did not draw many benfits from public investment in irrigation in the first two plans, and the increased intensity of production through the greater use of fertilisers, high yielding seeds, pesticides and machinery, which was spreading in the Central Plain, failed to affect the farmers of the region.

Because of the failure to stimulate the economy of the Northeastern region, and due to growing worries about the political loyalty of the area, the government created the Northeastern Economic Development Project (NEED) in 1968, with the intention that it should produce a plan for the region, "in the light of the deficiencies of the First and Second Five Year Plans" (Phisit Pakkasem,1973,p 46). However, the Third Plan was not drawn up within a comprehensive regional planning context (Pakkasem,1973,p 53) and the recommendations of NEED were therefore reduced to the national level where spatial priorities are ignored.

Table 2.8

Change in the Northeastern Region's Share of the Gross Domestic Product: 1960-1969

(at constant 1962 prices)

Sector	1960	1969	Change
Agriculture	27.1	24.7	-2.4
Manufacturing	10.0	8.3	-1.7
Construction	15.1	21.4	+6.3
Transport & Communications	7.5	11.0	+3.5
Trade	14.6	15.7	+1.1
Services	14.2	16.1	+1.9

(All figures as percentages)

Source: Pakkasem,1973,table 2.6.p 39.

The Third Plan (1971-1976) coincided with the realisation by the World Bank that in Thailand, "the trickle-down development effect" was not being successful in distributing the benefits of growth (Grit

Permtanjit,1982,p 126). The policies of the Third Plan were therefore structured in an attempt to rectify, among other things, the problems of uneven growth:

> "1/ To reconstruct the economic system and to promote economic growth;
>
> 2/ To maintain economic stability
>
> 3/ To promote economic growth in the rural areas and to reduce income disparities;
>
> 4/ To promote social justice;
>
> 5/ To develop manpower resources and to create employment;
>
> 6/ To foster the role of the economic sector in economic development."
>
> (NESDB[3],n.d.,p vi)

However, despite these efforts the Third Plan, and indeed the entire period of the first three plans (1961-1976), was one in which regional needs were subordinated to national objectives. The growth of production in the country averaged 7% per year but the "nature of growth led to further income disparities among various income groups and regions..." (NESDB[2],n.d.,p 5).

The Fourth Plan (1977-1981) was designed during the libertarian civilian administration of Prime Minister Seni Pramoj and although a dramatic right-wing coup d'etat in October 1976 led to Thanin Kraivichien being installed in power the plan remained unaltered and was implemented in its original form. Instead of "emphasising just economic growth, the Fourth Plan [stressed] rather heavily the importance of promoting social justice by reducing socio-economic disparities and improving mass welfare" (NESDB[2],n.d.,p 3). But, partly perhaps because it was designed by an administration very different from the one who had the job of implementing it, the impact of the plan failed to match up to its stated objectives with economic progress only benefitting certain parts of the country (NESDB[1],n.d.,p 1).

The Third and Fourth Plans were also affected by external factors outside the country's control which led to their financial estimates and targets being upset. The quadrupling of the price of oil between 1973 and 1978 meant that the ratio of the trade deficit to the gross domestic product increased from 5.0% in 1973 to 6.4% in 1978 (IBRD,June 1980,p 30) and the further doubling of oil prices between 1978 and 1980 increased this still more, to an average figure of 7.6% of GDP during the period of the Fourth Plan (1977-1981) (NESDB[1],n.d.,p 20). This led to a rise in the current account deficit from 4.6% of GDP in 1971 (NESDB[2],n.d.,pp 44-46) to 5.8% in 1977 and 6.5% in 1981, representing a growth of over 800% from 5.8 to 53 billion baht (NESDB[1],n.d.,p 6). A further factor contributing to the continuously deteriorating terms of trade has been the loss of foreign exchange earnings related to the American presence in Thailand during the Vietnam War (IBRD, June 1980, p 3). The present five year plan (1981-1986) aims to solve these problems

[1] The changes being identified in the Fifth Plan as, "changes in the price of oil and fluctuation of the international financial market [which] have led to high inflation, world economic recession and high unemployment all over the world" (NESDB[1],n.d.,p 17).

recognising that the, "Thai economy has not adjusted itself to these changes [1], resulting in over-spending at the national, governmental and household levels" (NESDB[1],n.d.,p 17).

It may not, however, be merely the content of the plans that has been at fault; for there has always been the recognition that the Northeast region is a problem area in need of special assistance. Instead, it is arguable that the very nature and form that planning takes in Thailand is suspect:

> "There is...little evidence that Thailand's development plans systematically guide or govern the actions of departments or, for that matter, the cabinet itself, in the day-to-day conduct of government affairs. ...the frequency and extent to which development plans appear to be disregarded in the allocation of financial and administrative resources and in the introduction of new policies, programs and projects is indicative of a lack of full commitment to the concept of development planning. In recent years it has become increasingly difficult to discern a sense of direction and purpose in public sector behaviour that is in any way comparable to its stated functions and objectives" (IBRD,September 1978,p 28).

Three Development Programmes

During the period up to the end of the Fourth Plan there were a number of government initiatives designed specifically to help rural areas; three of the most important were the Community Development, the Accelerated Rural Development and the Tambon Development Programmes:

1/ The Community Development Programme

The concept of community development in Thailand can be traced back to 1942 when, during the administration of Prime Minister Phibun Songkhram, 400 community development workers were trained and sent to work at the local-level in various tambons around the country. But, it was only in 1960 that the Bureau of Community Development was established as part of the Ministry of the Interior, being elevated to the status of a full department in 1962 (Dusit Dheppitoon,Dec 1973,p 186) and, in the same year, being adopted as an integral part of the National Development Plan (CDD,Feb 1983,preface).

The essence of community development is self-help with the government only providing material and technical support:

> "The people will have active roles in analysing community problems and in planning appropriate actions. They will be aroused to feel responsible for their own village development. The government will provide assistance on things that are beyond the capability of the people. Therefore the people will form an integral part of the programme..." (CDD,Feb 1983,p 10).

However, rural development during the First through to the Third Five Year Plan lacked definite direction and there existed no bias to help the poorer areas of the nation (US Presidential Mission,April 1982,p 42). In recognition of this problem the present Five Year Plan is area specific and calls for consideration of the varying intensities of poverty through the country. As a result, 216 districts and 30 sub-districts in 37 provinces of the Northeast, North and South have been specified as target poverty areas (NESDB[1],n.d.,p 281).

The new rural development strategy emphasises low-cost self-help programmes with maximum participation by the people (NESDB[1],n.d.,p 278). The Community Development Department is inextricably linked to this effort and at the tambon level organises the following projects as part of the Rural Poor Development Project:

1/ Child Development Plan
2/ Youth Development Plan
3/ Community Education Centre Plan
4/ Women Development Plan
5/ Voluntary Development Plan
6/ Public Property Development Plan
7/ Spiritual Development Plan

(CDD,Feb 1983,pp 33-36;NESDB[1],n.d.,p 287)

2/ <u>The Accelerated Rural Development Programme</u>

The Office of Accelerated Development (ARD) was established in the mid-60's and to begin with was essentially an office of engineering and construction with the role of giving access to previously isolated areas, particularly in the Northeast (Caldwell,1974,p 56;MOAC,April 1980,p 133). USAID contributed large sums of money as the United States government was strongly supportive and vitally interested in reducing the insurgency threat in rural Thailand and felt that providing communications was crucial in controlling areas of potential instability (Mickelwait et al,June 1979,p A1). Later on the programme diversified and began to involve itself in other aspects of rural development:

- Village Development Projects
- Medical and Health Projects
- Potable Water Supply Projects
- Business and Agricultural Assistance

The philosophy of the ARD programme, at least initially, was that the economic development of rural areas was the key to counter-insurgency; "If stomachs are full, people do not turn to communism" (Deputy Prime Minister,quoted in Caldwell,1974,p 137), and in material terms much was achieved. However, it is questionable whether increased loyalty on the part of the villagers, the essential aim of the programme, was accomplished (Caldwell,1974,pp 144-149), and Caldwell believes that the political and security bias reduced its overall effectiveness.

3/ <u>The Tambon Development Programme</u>

The initial Tambon Development Programme (TDP) only operated for two years from 1975-1976, but in terms of funds made available was extremely ambitious; 2,500 million baht in the first year of operation and 3,500 million baht [1] in the second (Poot,1979,pp 15-16). Its purpose was to "help farmers increase their incomes...in order to reduce their sufferings...The plan is to provide funds from the national budget to the tambon council for

[1] This represents 300 million baht more than the annual budget of the entire Royal Irrigation Department, one of the largest departments in the Thai adminstration.

hiring local labour to dig canals, build small dams..." (PM's address to the House of Representatives,19 March 1975;quoted in Snit Smuckarn,June 1979,p II-6). Undoubtably though, the TDP was also established as part of the nation-wide democratisation process and had a political goal of cultivating local support (Supachai Panitchpakdi,June 1979,p III-5).

It is generally agreed that the impact of the initial programme did not reflect the amount of money invested in it. The constrained time schedule for project design and implementation meant that coordination was poor, and there was no overall plan to give the programme guidance (Payungsak Sesavej,June 1979,p II-23). It also lacked qualified personnel, and funds failed to reach the areas most in need with the Northeast, the most poverty afflicted region, receiving the lowest per capita investment (table 2.9) (Department of Labour,June 1979).

Table 2.9

Tambon Development Programme Funding Per Capita, by Region

	Baht/Capita 1975	Baht/Capita 1976	Baht/Capita Average Income
Central	88	115	2,633
North	69	86	2,141
Northeast	65	75	949
South	95	105	1,670

Source: Supachi Panitchpakdi,June 1979,table 5,p III-8

In 1978 the TDP was "re-created" with the intention that it should once again present a bottom-up approach to rural development by giving funds to the lowest level of administration, the tambon council, and planning each tambon's projects in cooperation with its inhabitants. Unlike the initial programme scheme, villages were categorised according to wealth, the poorer ones receiving proportionally more (The Nation,August 18 1981,p 4).

The scheme was later integrated into the Fifth Five Year Plan (1982-1986) and now forms the basis on the 'Poverty Alleviation Plan', targeted at 7.5 million rural poor in the Northeast, North and South. There are four main elements to the programme: The Rural Job Creation Plan, Village Development Activities, Basic Services Provision and the Production Plan (NESDB[1],n.d.,pp 283-294). The entire scheme has been budgeted over 7,000 million baht for the five year period for which it is to run and through it, it is hoped the "people will be assisted in overcoming their poverty related problems such as hunger, sickness, ignorance and general deprivation" (NESDB[1],n.d.,p 283). Whether or not its aims will be achieved is yet to be seen, but already a number of possible problems and drawbacks have been highlighted:

1/ The identification of the target areas through comparison of districts in the same region may not be a good method because it fails to account for differences between villages and population groups within the districts themselves.

2/ There are no clear measures to decentralise authority. The new strategies are to be implemented through the old government administration system and the local level committees and councils are unlikely to be in any way autonomous.

3/ The programme is fragmented and this could lead to inconsistencies between rural and national development odjectives.

4/ It is doubtful if the strategy will be effective at the implementation stage as the original government agencies involved with running the scheme remain unreformed and essentially unchanged.

Adapted from:BBMR,October 1982,Vol 23,No 10,p 422.

Agricultural Devlopment in Thailand: The Emphasis on Irrigated Rice Cultivation

Until recently the Thai government has followed a strategy of improving rice cultivation and increasing output based around a policy of expansion of irrigation. In 1947 the area of the country under irrigation amounted to 608,000 ha, by 1969 this had increased to 2,224,000 ha (Ingram,1971,p 276) and at the end of 1980 to 3,015,294 ha (MOAC,1981,table 84,p 153). However, although the Central Plains are suited to such an approach to agricultural development, it is uncertain how far water control can really be improved on the Northeastern Plateau. It has been observed that the topography and the drainage of the area is not conducive to large-scale irrigation works (Pendleton,1962,p 148) and even more limited projects face handicaps. At present the Northeast has the lowest proportion of irrigated land [1] and the maximum area that could, potentially, be irrigated is estimated to be only 11.5% of cultivable land (Sanan Chantkam,Oct 1981,table 1,p 4) (table 2.10). Even so, the development of irrigation facilities in the area is a major objective of the Fifth Plan (1982-1986), with particular emphasis being placed on pump irrigation projects which are estimated to provide an additional 200,000 rai of irrigated land each year (NESDB[1],n.d.,p 49).

[1] Of the total irrigated land in the country only 12.1% is located in the Northeastern Region.

Prior to 1969 tanks were the principal source of irrigation in the region [1] but, "few of these appear to be functioning with any degree of success, generally because of their small live capacity" (Dixon,1977,p 219). Many "were built before the necessary hydrological studies had been completed; faulty design, ommission of spillways for instance, have made some of them useless, and in other instances the area flooded by the tanks is much larger than the area to be irrigated below the dam" (Platennus,1963,p 35).

Table 2.10

Estimates of Water Storage Potential and Irrigable Land in the Northeast

Total Area of Region	106,391,000
Land Use (1980) [2]	
Paddy	35,886,000
Other Crops	10,439,000
Total Cultivated Land	46,325,000
Potential Land Use[3]	
Land Suitable for Paddy	22,640,000
Land Suitable for Upland crops	39,920,000
Total Cultivable Land	62,560,000
Irrigable area [3]	
From Exisitng Resources	4,205,495
From Planned Resources	2,973,195
Potential Irrigable Area	7,178,690

All areas in rai

[2] Source: MOAC,1981,table 88,pp 160-161.
[3] Source: Sanan Chantkam,1982,table 1,p 4.

[1] Royal Irrigation Department began to build the tanks in 1951. A target of 1,000 was set; by 1967, 144 had been completed (Yuavares Tupbun et al,May 1980,p 1).

In addition to the tanks, seven large reservoirs have been built irrigating almost 1,200,000 rai (Vivat Shotelersuk,June 1981,p 123). Like the tanks these storage dams have not totally fulfilled the expectations of them (Donner,1979,p 629), and the land which is effectively irrigated is far less than that which was planned. A number of reasons for this state of affairs can be identified: to begin with the nature of the Northeast is not wholly appropriate to such projects; secondly, poor design and inferior construction has hampered their effectiveness; thirdly the day-to-day running and maintenence of the systems has usually been below standard; and finally the extension services have often failed, at least initially, to meet the demands of the farmers they serve.

The most successful and the most recent form of irrigation has been pump irrigation (Johnson,1979,p 35). Projects of this type do not have to rely on stored water, and are far more effective at providing controlled amounts of irrigation on demand. By 1980 a total of 167,376 rai of land was irrigated by pump for the second rice crop (MOAC,1981,table 85,p 154) and the method is being stressed in the present Five Year Plan. Even so, the potential area suited to the construction of such projects in the Northeast is small and the method will never benefit more than a fraction of the population.

It may be that irrigation in the region should be designed to stabilise water supply in the wet season rather than prolonging its' availability to the extent where double cropping is feasible. This would give farmers the opportunity to use HYV's and chemical fertilisers to their full potential, while at the same time representing an approach that is, perhaps, more in tune with the nature of the physical environment. As Ng writes, "A transformation from the present rain-fed agriculture to supplementary irrigation for the main rice cultivating season, should remove one of the most serious constraints in what is now an unsatisfactory production function" (Ng,1973,p 185) [1].

Closely allied with the policy of expanding irrigation has been the government's rice breeding programme [2]. Intensive rice breeding began in 1950 and a seperate Rice Department, now the Rice Division, was established in 1954 (Feeny,1982,p 110). The early selection efforts were concentrated on producing varieties for irrigated areas, the first, RD-1 and RD-3 (both non-photosensitive and non-glutinous), being released in

[1] Even here though, the maximum area that could conceivably receive such "supplementary" water supply would not exceed 10% of the cultivated area of the Region.

[2] The decision by the Thai government to set up its own breeding programme rather than use the already developed 'IR' high yielding varieties of the International Rice Research institute in the Philippines was because:

1/ Thailand was (and is) a rice exporter and cannot afford to grow 'inferior' rices which might affect their reputation.

2/ Only 10% of Thai farmers used chemical fertilisers, and even then not in sufficient quantities to grow the IR rices optimally.

3/ The majority of fields lacked the degree of water control necessary to grow IR rices.

4/ The government was following a policy of development on a broad front in terms of increasing rice yields, not just by relying on new rice varieties (Adapted from:Yamada,1978,p 10)

1969 (Chung et al,1978,p 4). However, these cultivars were unsuited to the rainfed conditions of the Northeast and the rate of adoption in that region was negligible.

As early as 1969 the World Bank questioned the notion that irrigation should be the primary means of developing agriculture in the region:

> "...the Northeast is merely the most striking example of the widespread predisposition to disregard the potential for rainfed agriculture - at least at the official level" (quoted in:Donner,1979,p 629).

As a result of the change in thinking regarding irrigated versus rainfed agriculture, development efforts on the Khorat Plateau switched to place far more emphasis on providing help to the great majority of farmers who cultivate rice under rainfed conditions.

Agricultural Development in the Northeast: Rice Cultivation in a Rainfed Environment

In the crop year 1980/1981 the Northeast had an average paddy yield of 224 kilograms per rai (for the major crop); this contrasts with 290 kilograms per rai for the country as a whole (US Presidential Mission,April 1982,p 13). On average, 80% of riceland is planted and of the sown area 80%-90% is harvested. Therefore only 64%-72% of riceland in the region actually produces a crop (MOAC,June 1980,p 1). There are three major reasons for these low and fluctuating yields:

1/ Erratic rainfall
2/ Low soil fertility
3/ Poor water holding capacity of the soil

(MOAC,June 1980,p 1)

In response to the problems of rice cultivation on the Plateau the Thai government, in cooperation with the International Bank for Reconstruction and Development, set up the Rainfed Rice Improvement Pioneer Project (RRIPP) in 1973 in an attempt to both stabilise and increase rice yields by breeding varieties that were more suited to the physical conditions of the area, and by improving cultivation techniques (MOAC,June 1980,pp 1-7). The priorities of the breeding programme were to produce rice cultivars with the following attributes:

"1/ Good plant type with high tillering ability.
2/ Sensitivity or insensitivity to photoperiod.
3/ Resistence to major economic pests and diseases.
4/ Acceptable grain appearance and cooking quality in both glutinous and non-glutinous types.
5/ Wide adaptability to environmental conditions."
(MOAC,June 1980,p 17)

In 1976 these objectives were reviewed and highest priority was given to wide adaptability (tolerance to flood and drought); even so, no appropriate useable alternative system of rainfed rice culture was presented to the farmers for evaluation and acceptance (MOAC,June 1980,p 76). As an annual report of the programme explains:

> "Traditional or intermediate type varieties usually exhibit a higher than average yield stability...and there is little doubt that in rather poor environmental conditions prevailing in the Northeast, they still usually fare better" (MOAC June 1979,p 43).

Presently, over the country, only 12% of the rice growing area is planted to official release varieties (US Presidential Mission, April 1982, p 7), and in the

Northeastern region the figure is considerably less [1].

The use of chemical fertilisers on rice in Thailand is low; in 1980 the average application for the main and second crops combined was only 6.65 kilograms per rai (MOAC,1981,tables 17,18 & 61,pp 14-15 & 91). This compares with the rate of application (on all arable crops) in such Asian countries as Burma, and is signifcantly less than that for Indonesia, Malaysia and Vietnam (table 2.11). In the Northeast useage is even more limited with the 1978 agricultural census recording an average application of only 4.6 kilograms per rai (table 2.11).

Table 2.11

Average Rates of Fertiliser Application in Thailand and Other Selected Asian Countries

Thailand- (data from 1978 census)	Application kg/rai	Application kg/ha[7]	Yields kg/ha[6]
Whole Kingdom [1]	7.4		
Northeast [2]	4.6		
Central Plain [3]	18.8		
South [4]	7.0		
North [5]	2.6		
Laos	0.1	0.6	1,494
Burma	2.7	16.7	3,085
Indonesia	12.0	75.0	3,769
Malaysia	16.3	102.1	2,857
Philippines	4.6	28.8	2,470
Thailand	2.9	18.3	1,972
Vietnam	8.1	50.6	

[1] Source: NSO,n.d.,tables 2.3 & 8.3,pp 24 & 108.
[2] Source: NSO,n.d.,tables 2.3 & 8.3,pp 24 & 86.
[3] Source: NSO,n.d.,tables 2.3 & 8.3,pp 28 & 102.
[4] Source: NSO,n.d.,tables 2.3 & 8.3,pp 24 & 76.
[5] Source: NSO,n.d.,tables 2.3 & 8.3,pp 24 & 92.
[6] Source: FAO,June 1984,table 7,p 14.
[7] Source: FAO,1984, table 10, pp 44-55 (NB; refers to application on all 'arable land and permanent crops').

[1] In 1973 it was estimated that 0.09% of the area of rainfed paddy in the Northeast was planted to RD varieties of rice and 0.15% of the irrigated paddy (Framingham, 1982,p 32).

Agronomically, the traditional and intermediate varieties of rice, which are grown over almost all of the region, although they respond well to small applications of chemical fertilisers [1], tend to lodge and show smaller increases in yield when heavily dosed (Mekong Committee,Nov 1979,p 12). For this reason farmers, even when they have the disposeable income to purchase more, apply small quantities of fertiliser to their land and will continue to do so until a viable, fertiliser responsive, alternative rice variety is presented to them. The Mekong Committee, studying the characteristics of both the HYV's and the traditional varieties of rice in the Northeastern region concluded that, "in the wet season none of the new hybrid varieties can sucessfully compete (both agronomically and economically) with some of the traditional varieties" (Mekong Committee,Nov 1979,p 47).

Although agronomic factors have a great bearing on the low rate of fertiliser use in Thailand it is hard to clearly separate them from the equally important economic constraints:

For, despite the fact that at the present time fertiliser prices are fairly competitive in global terms and are only minimally controlled by the government [2],

[1] Sanpathong (an intermediate variety) has been shown in field trials to out-yield RD-5 upto the dose of 45 kg/rai, and shows a particularly high response with small applications of 10-12 kg/rai (Mekong Committee,Nov 1979,p 12).

[2] The transport costs are partially subsidised, although the subsidised supply was estimated to satisfy only 20% of total demand in 1980 (US Presidential Mission,April 1982,p 9). In the past fertilisers were actually taxed: during the period 1968-73, when the domestic nitrogenous fertiliser industry was in its infancy, the government placed a tariff on all imported nitrogen-based fertilisers (Bertrand,April 1980,p viii).

the authorties do depress the farm-gate price of rice through a number of export tariffs. These, as well as directly taxing the farmer, have also had the effect of impeding technological change by altering the product/input price relationships (IBRD,Sept 1978,p 11), thereby making the use of fertilisers (and also pesticides and farm machinery) less profitable or, in many cases, unprofitable. It has often been stated that this "discrepency between fertiliser and farm-gate prices is a main impediment to increasing the intensity of production per rai" (USAID,May 1982,p 5).

The Rice Premium

The Rice Premium was instituted in 1955 following the dissolution of the government Rice Marketing Monopoly (Corden,1967,p 159). The premium imposed a levy on the export of the crop and was intended to provide both additional income for the government and to keep the price of rice in the cities down. Between 1955 and 1966 the premium was at a rate of about 40% of the FOB price, which implies a tax of slightly more than 80% at the farm-gate (Bertrand,1980,p viii). Since 1966 the premium has flucuated wildly, largely following the international market, but also with the intention of meeting the dual aim of placating the urban population while at the same time keeping farmers incomes at a reasonable level [1].

[1] The political weight of the urban population is such that successive governments have implicitly admitted that the policy of keeping urban prices depressed is vital to their own continued existence (Sungsidh Piriyarangsan, n.d.,p 1).

However, these two objectives are largely irreconcilable (Kanok Wongtragan,April 1982,p 12), and it is generally believed that the burden of the tax has been borne by the Thai farmer (USAID,1982,p 1; Feeny,1982,p 115).

Since August 1975 the Royal Thai Government has experimented with targets and guarantees, intending to maintain a minimum farm-gate price for rice producers [1] (Holtsberg,1982,pp 177-178). This policy has been unsucessful except in those years (eg; 1980/81) when a buoyant international market has itself forced the farm-gate price above the government-set minimum level. The failure to control the price of paddy has been largely due to insufficient funding (USAID,May 1982,pp 2-4) coupled with poor planning and abuse of the system by officials, mill owners and merchants [2].

However, although the Premium has been a crucial factor in determining rice cultivation strategies in Thailand as a whole, it should be appreciated that the

[1] Funds are provided to the public purchasing bodies (the MOF, PWO and the Cooperatives) to buy paddy at the support price, thereby hoping to create enough demand to push the market price upto the government level. Unfortunately, the funding has always been insufficient to have such an effect on the market, and in any case the government's policy of then selling the rice (often inter-governmentally) rather than storing it defeats the object of the exercise as this process would, if the quantities were large enough, bring the price back down once again.

[2] In fact, since the fieldwork was undertaken the support price has been abolished. In January 1984 the RTG decided to end its market intervention scheme noting that it had been unable to influence the rice price to any extent. This was largely blamed on the limited budget which meant that the purchasing bodies could only buy a fraction of the total harvest (FEER,12 April 1984,p 52).

Northeastern region itself has been far less influenced by the tax, for very little of the rice grown (most of it is glutinous for which there is an extremely limited market) is actually sold.

Agricultural Development in the Northeast: The Spread of Upland Cropping

The remarkable expansion in the area of upland cropping that ran parallel and in conjunction with the growth in communications (IBRD,Nov 1974,Annex 1,p 4) is an indication that the constraints to cash cropping, at least intially, were economic rather than cultural or physical. This development represents one of the most vivid examples of 'ignorant peasants' responding rationally to an economic incentive and it is particularly not able that the government, except through reducing the isolation of the farmer from the market by improving communications, played virtually no role in the process (Bertrand,1980,p viii; IBRD,Sept 1978,p 12). As Fedderson wrote of the cassava trade:- it is "a text book example of how the free enterprise system recognises a demand and fills it by creating an economic situation resulting in large-scale farmer interest in growing the product" (Fedderson,June 1981). Undoubtably, the expansion in upland cash cropping has been the single most important occurrence in the agriculture of the Northeastern region this century.

The upland crops did not impinge upon the traditional glutinous rice lands of the lower and middle terraces, but were grown on the sandy and infertile soils of the higher ground. These uplands had previously only been used for shifting cultivation, grazing and the collection of forest products, and indeed, the bulk of that cleared was virgin land (Dixon,1974,p 41).

Important during the early years of cash cropping was maize cultivation when the Northeast produced over 57% (1952) of the total production for the nation (MOAC,1970,table 17,p 55). However, from the mid 50's through to the early 60's there was a remarkable change in the distribution of the crop, as cultivation shifted westwards to Nakhon Ratchasima and a block of adjacent changwats on the north-eastern edge of the Bangkok Plain and in the center and east of the Upper Plain (Behrman,1974,p 130). Why this occurred is not agreed upon although a number of hypotheses exist of which the most pertinent as far as the Northeast region is concerned is that farmers were turning from maize to the more profitable, kenaf (Behrman,1974,p 136). Today, maize remains concentrated in the central changwats of the Upper Plain, and only the Northeastern changwats of Nakorn Ratchasima and Loei produce significant amounts of the crop [1].

[1] However, because it is such an important crop in Thailand as a whole, the region's 24% share of total production (1980/81) has a farm value of 1,777 million baht, almost twice that of kenaf (MOAC,1981,tables 20 & 21,pp 20-23).

Table 2.12

Area Planted to Kenaf in the Northeast: 1950-1980

1950	30,100 rai
1955	49,800 rai
1960	849,300 rai
1965	2,366,300 rai
1967	2,139,500 rai
1973	2,641,872 rai
1975	2,486,351 rai
1980	1,055,100 rai

Sources: MOAC,1970;MOAC,1977;MOAC,1981.

Kenaf was first reported as a commercial crop in 1947, although the real expansion in cultivated area began in the late 50's and continued through to the 70's (table 2.12). By 1959 it had spread right across the region with the highest production being recorded in the province of Ubon Ratchatani (Silcock,1970,p 78). The rapid growth was stimulated by a surge in world demand for fibre following the disastrous jute harvests in East Pakistan (Bangladesh) during the 1960-1961 season (Silcock,1967,p 247) and Thailand quickly attained the position of the world's third largest exporter (BBMR,July 1981,p 255). But, since 1975 when production peaked the crop has become increasingly unpopular among the farmers of the Isan region and now Thailand is virtually a net importer of the commodity (table 2.13).

Table 2.13

Exports and Imports of Jute & Kenaf: 1975-1980

Year	Imports	Exports
1975	2.3	157,601
1976	29.4	138,361
1977	484.4	81,231
1978	101.1	91,059
1979	6,016.6	78,922
1980	28,834.4	30,169

(tons, washed and dried fibre)

Source: BBMR,July 1981,p 256

The main factor contributing to the drastic decline in production during recent years is the switch by farmers from jute and kenaf to cassava, which gives relatively higher net returns (BBMR,July 1981,p 255), and is not subject to such dramatic price fluctuations (MOAC,April 1980,p 38). Today, although 98.6% of kenaf is grown in the Northeastern region (1980/1981), it only covers 1.05 million rai with a farm value of 906 million baht as against cassava's value at 7,507 million baht (MOAC,1981,pp 24-31 & 60-63).

Cassava was first planted in the Southern region about one hundred years ago from where it expanded to the provinces along the Eastern Seaboard (Tinnakorn Dararattanasilp,April 1982,p 1). By 1956 production had reached 396,000 tons of raw root (MOAC, 1970,p 58) and was highly localised with 69% of the total between the years 1956 and 1963 coming from the East Coast province of Chonburi alone (Behrman,1974,p 120). Even as late as 1973 the central Plain remained the primary cassava producing region and the Northeast's output represented only 25% of the country's total (Somsak Chaewsamoot,1974,p 3) (table 2.14). Since then however, although the production of the Central Plains has actually grown from 4.79 million tons (1973) to 5.95 million tons (1980), as a proportion of the Kingdom's total it has fallen to 36%, while the Northeast's output by comparison has expanded to over 10 million tons of fresh tuber, 60% of all production (Somsak Chaewsamoot,1974,p 3;MOAC,1981,pp 26-31). Most of this is concentrated in the changwats of Nakhon Ratchasima, Nong Khai, Udon Thani, Kalasin, Khon Kaen and Buriram (MOAC,1981,pp 26-31).

Approximately 95% of Thailand's cassava is exported, and although second to Brazil in production, Thailand is

Table 2.14

Area Planted and Production of Cassava in the Northeastern Region

	Area Planted in Northeast	% of Total	Production of Northeast	% of Total
1957	4,300	1.8%	7,000	1.7%
1960	33,800	7.6%	60,100	4.9%
1971	189,000	12.4%	506,000	13.8%
1973	816,000	30.8%	1,574,000	25.0%
1975	1,585,000	-	2,195,000	-
1977	3,621,000	68.4%	6,738,000	56.9%
1978	4,584,000	62.9%	9,698,000	59.3%
1979	3,396,000	64.2%	6,952,000	62.2%
1980	4,535,000	62.5%	10,009,000	60.5%

(Area in rai, production in tons of raw root)

Sources:MOAC,1981,pp 24-31;Somsak Chaewsamoot,1974,pp 2-4.

is the worlds largest exporter of tapioca products having about 90% of the global market (Tinnakorn Dararattanasilp,April 1982,p 1). The great majority (92%) is shipped to the European Economic Community where it is used as a major ingredient in animal feed (Business Review,March 1983,p 61).

The switch from kenaf and maize to cassava in the Northeast, as stated earlier, was primarily motivated by economic factors relating to profitability; kenaf prices declined while the market for tapioca products boomed. However, profitability was not the only stimulus; agronomic factors were also involved:

Kenaf is fairly demanding of soil nutrients and continuous cropping without fertiliser inputs had led, by the 1970's, to decilining fertility accompanied by declining yields (table 2.15). Cassava however, can be grown on the poorest of land, and the sandy, slightly acidic soils of the upland areas of the Khorat Plateau were well suited to its cultivation (BBMR,April 1981). Other attributes of the crop which make it attractive to the farmers of the region are:

1/ It is easily propagated - seeds or roots are not required; propagation is through planting the stalk cuttings.

2/ It is high yielding.

3/ It is relatively inexpensive to produce - it needs little weeding because of its leafy canopy; it can produce adequate yields without fertilisation; and it does not have a critical planting or harvesting date and is therefore not season-bound.

4/ It is a good risk aversion crop - its hydrocyanic acid content makes it extremely resistant to insect and animal attack; and it is drought resistant and can be grown with very little skill or attention.

(Partly adapted from: Somsak Chaewsamoot,1974,p 1)

Table 2.15

Kenaf: Five-Year Moving Average 1962-1971

(Northeastern Region)

Area (million rai)	Yield (kg/rai)
1.7	218
2.1	218
2.1	206
2.2	198
2.2	187
2.1	176

Source:IBRD,Nov 1974,Annex 1,p 5.

The Marketing of Upland Crops

The marketing of upland crops in the region prior to the provision of an infrastructure must have been difficult, and where middlemen did make inroads the absence of choice on the part of the farmer would have led to a degree of monopsonistic exploitation. However, with the development of communications the relationship between farmer and middleman became more equitable, with greater competition among buyers and an increase in the amount of marketing information available to farmers causing prices to tend towards a competitive norm (Lui,1973,pp 57 & 59). But, despite the mass of empirical evidence showing that today marketing at the local-level is acceptably fair and competitive (Bertrand,1980,p 198; Usher,1967,p 223; Phaisal Lekutai,Jan 1982,p 164; Vasantha Narendran,1980,pp 68-69), "the most commonly expressed sentiment in Thailand by practically everyone, particularly RTG officers, is that the existing system is very inefficient and that middlemen are taking excess profits form unsuspecting, uninformed farmers"(US Presidential Mission,May 1982,p 2).

This rather peculiar situation relates partly to the fact that the small middleman is invariably of Chinese descent and represents an easy political target on which the problems of the farmer and the inadequacies of the government can be pinned. If the farmers are exploited, it is much more likely to be due to the large exporters and middlemen in Bangkok who, because of their small number, have far greater ability to manipulate prices and take excess profits (Phaisal Lekutai,Jan 1982,p 164); and regarding cassava, "there is little doubt that groups of commercial interests have made excessive fortunes from the export of tapioca products" (Actman,July 1981).

Upland Crops: Future Developments

Recently, the Royal Thai Government has been encouraging farmers in the region to both diversify out of cassava and into other upland crops such as mung bean, soybean and groundnut [1], and in addition, to improve their cultivation through the use of rotations, intercropping and greater chemical and organic fertiliser applications (KKU-IDRC,1977, Annual report;Sanan Chantkam,Oct 1981;Asian Business,June 1981,pp 49-52). This is because the present monocropping of cassava, and previously kenaf, has led to serious problems of land deterioration which, if left unchecked, will result in an increasing accumulation of sterile wasteland. The crops

[1] The government has an 'Action Plan' to encourage the diversification of cropping out of cassava. The plan is set to run over a six-year period from 1982 with a finacial investment of US 350 million (Thailand:Business,May 1982,p 34).

being suggested are often leguminous [1] and the cultivation techniques are aimed at reducing rates of soil degredation and raising fertility [2].

The need to present viable alternatives to cassava has become even more urgent since 1980 when the EEC demanded that a quota be imposed on the import of the commodity into the Community [3]. This resulted in an agreement which will reduce exports over a six-year period, 1981-1986:

1981-2: 5 million tons per year with 10% allowance for over-runs in production.

1983-4: 4.5 million tons per year with 10% allowance for over-runs in production.

1985-6: to be decided.

(Source:Thailand:Business,May 1982,pp 30-31)

However, although the agreement has prompted some analysts to predict that the long-term prospects for cassava are poor (Actman,July 1981), at present the crops

[1] Legumes have the ability to 'fix' atmospheric nitrogen in symbiosis with the Rhizobium bacteria and are particularly useful in maintaining fertility (Webster & Wilson,1980,pp 204-209).

[2] The 1978 agricultural census shows that the average application of chemical fertilisers on 'field crops' in the Northeast to be a minimal 1.44 kilograms per rai (NSO,n.d.,tables 3.5 & 8.3,pp 42-43 & 86).
NB- 'Field crops' include: field corn, sesame, sorghum, mung bean, black pea, rice bean, peanut, soybean, Job's tears, kenaf, jute, cotton, cassava, yam bean, tobacco, castor bean, mulberry, sugar cane and pineapple.

[3] The European market for cassava has been strong largely due to the crop's special position in the tariff system of the European Economic Community: because of the high price guaranteed for home-grown cereals there is a 'barley levy' on imported grains. This does not apply to cassava however, which enters the Community at a maximum tariff rate of 6%. Animal feed merchants and producers, anxious to keep their costs and prices down therefore naturally turn to cassava as the cheapest source of starch (Bennison,Jan/Feb 1984,pp 91-92).

being promoted represent only a minimal proportion of the total farm value of field crops in the Northeastern region, and only when farmers can be persuaded that other, equally profitable crops exist, will they be willing to change (table 2.16).

Table 2.16

Importance of Various Upland Crops in the Northeast Region of Thailand (Crop year 1980/1981)

	Production (tons)	Farm Value (million Baht)
Mung Bean	10,984	64.14
Soybean	5,302	30.63
Groundnut	24,824	198.87
Sorghum	5,105	11.68
Cassava	10,008,873	7,505.00

(the value of the 1980/81 crop of mung bean, soybean, groundnut and sorghum combined is 4.1% of that for cassava)

Source:MOAC,1981.

As part of this effort to change the pattern of cropping in Thailand and to have a greater influence in affecting the ways in which farmers utilise their land, in 1972 the Office of Agricultural Economics divided the country into 19 'agro-economic zones':

> "These zones were developed as aggregations of adjacent changwats with similar agricultural resource uses and potential. The objective in mind when these 19 zones were being delineated from the 71 changwats was to provide an accounting of agricultural potential and extension guidelines for identifiable areas of Thailand. Programs could then be developed in these zones to promote production of specific target commodities where they would have the highest potential for success" (Kinyon et al,1982,p 34).

The criteria used to divide-up the country were: rainfall, temperature, soil type, type of farm and principal income of the farmer (MOAC,Sept 1972,p 5). Suitable crops were recommended for each zone and it was hoped that cropping patterns could thus be guided along avenues that the government felt were beneficial to the nation as a whole. However, "the distribution pattern of the planted area of most crops has been relatively unaffected by the declaration of the agro-economic zones" and "a thorough review of the existing concept is required" (US Presidential mission,April 1982,pp 26-27). A number of possible reasons have been suggested for the inability of the plan to influence farmer strategy:

1/ The Royal Thai Govern ment lacks the capability to monitor and regulate activity in the zones.

2/ The boundaries of the present zones may not be appropriately specified.

3/ The concept of agro-economic zones may be an inappropriate tool to affect changes in agriculture in Thailand.

(Source:US Presidential Mission,April 1982,p 27)

The Provision of Credit and the Establishment of a Cooperative System

Although the Khorat Plateau of Thailand is commonly portrayed as an area where a harsh physical environment exerts severe limitations on agriculture it has become apparent in recent years through numerous studies that social and economic factors also have a crucial role to play. In 1973, Ng analysed the importance of social and economic variables in the determination of rice yields in the Northeast. Regarding the economic complex [1], he found that, "they [the variables] alone determine over 60% of the variations in yield of the 15 sample villages. The physical or environmental constraints...can at best explain less than 40% of the local variations in yield" (Ng,1973,p 182). As a means to overcoming these economic constraints the government has, for some time, been attempting to stimulate the formation of cooperatives and improve and extend the availability of credit.

The first agricultural credit agency in Thailand was a credit cooperative established in 1916 in the changwat of Phitsanulok (Kirsch,1981,pp 7 & 12). Its role was to provide members with funds for agricultural production and to help refinance their old debts. However, as more credit cooperatives came into operation so a shortage of funds became a problem and in 1947 the government was forced to establish a central agricultural credit agency, the Bank for Cooperatives (APRACA,Dec 1982,p 8). This was replaced in 1966 by the Bank for Agriculture and Agricultural Cooperatives (BAAC) which was given a brief to provide low interest agricultural loans, "emphasising supervised rather than collateralised credit" (Sunantar Setboonsarng et al,Jan 1982,p 49). At present it is estimated that approximately 64% of the total farmers' debt is borrowed from institutional creditors, and the

[1] The variables in the economic complex were: cost of rice production; cash inputs as a percentage of total inputs; cost of nursery preparation; cost of land preparation; cost of fertilisers, pesticides etc; cost of harvesting rice.

remaining 36% from private or non-institutional sources (APRACA,Dec 1982,p 9).

In the Northeast farmers have traditionally increased production by extensifying cropping. As this is essentially a strategy in which cash inputs do not form a part, the farmers have been able to expand their agricultural output without needing to borrow money to finance it (Tongroj Onchan & Meyer,April 1980,p 19). Where crop failures have forced families to borrow they have tended to turn to such informal sources of credit as neighbours, relations, and if necessary, merchants and middlemen.

However, as land shortages have spread with the growing population, so farmers have been forced to increase production through intensification and this has necessitated that families borrow money to purchase inputs. At present, the evidence suggests that the BAAC has been unable to benefit the small farmer to any great degree and it was estimated in 1973 that over 80% of loans went to medium and large-scale establishments (Direk Patmasiriwat,1981,pp 40-42). Where the farmers have been incapable of meeting the credit requirements of the institutional lenders they have be forced to either go without funds or to turn to non-institutional sources and the high, often userous, interest rates that go with them (table 2.17). This has led to a situation in which the lack of credit facilities for the small holder has created a barrier to the adoption of new farming techniques (Mabry,1979,p 410).

Table 2.17

Interest Rates on Agricultural Credit in the Northeast: Formal and Informal Sources

	Annual Interest
Formal Sources [1]:	
BAAC	14%
Cooperatives	14%
Farmers Associations	14%
Commercial Banks	
Informal Sources [2]:	
Neighbours	60.5%
Landowners	57.3%
Relations	50.4%
Merchants	35.2%

[1] Source: BAAC,1982 Annual Report.
[2] Source: Direk Patmasiriwat,1981,p 17.

The restricted availability and use of credit in the Khorat region is partly due to a lack of articulation between credit policy and the broader objectives of food and agricultural policy, so that although the government has, for many years, stated one of its main concerns to be the development of the small farmer, this is not reflected in the BAAC's loan requirements which tend to favour the wealthier clients (Tongroj Onchan & Meyer,April 1980,p 3). It is arguable that, at least to begin with, credit should be extended to the smaller farmers as a social service which does not have profitability as one of its objectives (Trakarn Thakranonthachai,Dec 1982). But, although small-farmers are often unable to borrow money they are, in many cases, also loath to even try; as Platenius wrote so lucidly in 1963:

> "It has been argued that the income of the farmer is so small that he cannot save; it would be more to the point to say that he cannot afford to be in debt" (Platenius,1963,p 55).

The first cooperative in Thailand was a village credit cooperative established in 1916 based on the German Raiffeisen model. The success of this institution led to a growth in numbers, although it was not until 1932 that other types began to appear (Kirsch,1981,p 7). By 1928 expansion had been such that the Cooperative Societies Act was passed, designed to control and regulate the groups and provide them with sufficient legal basis (Demaine,1976,p 1). In 1968 a second Cooperative Societies Act was promulgated, repealing the Act of 1928, in order to facilitate further growth. The legislation led to the amalgamation of all cooperatives and the establishment of the Cooperative League of Thailand (CLT) (Pradit Machima,March 1976,p 1). The CLT is o stensibly an independent association for the promotion of the cooperative movement (it is a member of the International Cooperative Alliance). However as Kirsch points out "although the League is officially a private and independent association, it is in actuality little more than an extension of the Cooperative Department", and, "the influence of the government was firmly established by law from the beginning" (Kirsch,1981,p 100).

In 1979 a NESDB Committee published a report analysing the past and future development of agricultural cooperatives; it stated: "After 61 years of effort and expenditure of vast governmental resources, agricultural cooperatives are universally regarded as a failure"

(NESDB,Feb 1979,p 1). The report identified seven problems which needed to be overcome:

1/ The pervasive government influence has stunted the growth of cooperatives, and success or failure has been dependent on the largesse and controls of the Cooperative Promotion Department rather than the degree of participation by the members.

2/ Many farmers regard cooperatives as government charities, and too much attention has been paid to the quantity rather than the quality of the groups.

3/ Dual and competing governmental organisations have led to confusion and inefficiency.

4/ The number of farmers served by the cooperative system is small.

5/ Cooperatives have been established due to policy decisions by the government rather than any analytical work.

6/ Profound disagreements exist between the Cooperatives Promotion Department and the BAAC.

7/ No effort has been made to provide agricultural extension advice equitably and systematically to all farmers.

(adapted from; NESDB,Feb 1979,pp 3-7)

Despite the identification of these problems cooperatives in Thailand are still ineffective in meeting their stated aims regarding the provision of agricultural credit, inputs, marketing facilities and advice and at present only 39% of the country's farming households have formed themselves into cooperatives (US Presidential Mission,April 1982,p 11). In fact, they are "neither fundamentally important in rural Thailand, nor is the cooperative as a self-help organisation known in all areas" (Kirsch,1981,p 103).

Summary

Within Thailand, the Northeastern region has historically been viewed as the 'Far Province', peripheral to the nation both culturally and economically. It was not until the 1960's that the government felt it was necessary to develop policies that would narrow the inequalities between it and the rest of the kingdom and integrate it with the country as a whole. The principal means by which the government expressed its intentions was through a succession of Five Year Plans, beginning in 1961. The efforts arising out of these plans have had a mixed degree of success; for although an adequate communications system has been provided and irrigation has been expanded to cover just over 12% of the area currently used for rice cultivation, it would not be unfair to see the region's development as being essentially autonomous and independent of government initiatives.

This is well-illustrated in the evolution of rain-fed agriculture which has developed largely through the independent actions of individual farmers. As the majority of the population happen to be farmers cultivating rice and upland crops in rain-fed conditions, the necessity to investigate the problems and constraints that this portion of the inhabitants are facing is clear; and it is particularly pertinent when one considers that a hiatus, of sorts, has appeared in which farmers are being forced, due to the closure of the land frontier, to move from extensive to intensive modes of production. What actions households are taking to intensify production; what the possibilities are for future increases; and what alternative strategies are open to them are the principal questions into which the following chapters will enquire.

Chapter Three

The Khorat Region and the Province of Mahasarakham: Their Physical Characteristics

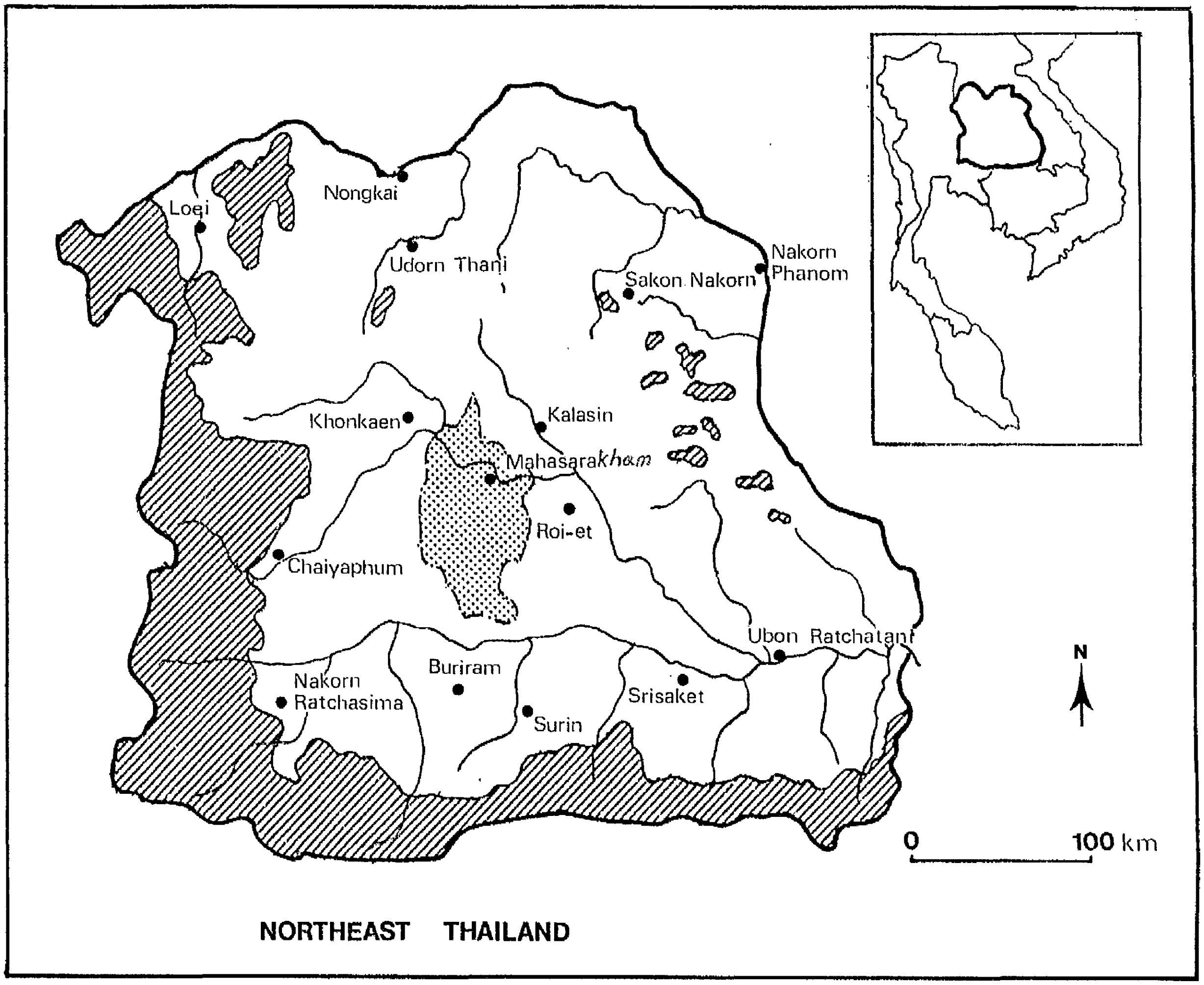
Introduction

The Khorat Region of Thailand is a large saucer-shaped plateau, bordered to the north and to the east by the Mekong river, and to the south and to the west by the Phnom Damrek and Phetchabun Mountains respectively. Most of the area (the 'Khorat Basin') is drained by the Mun and the Chi rivers which flow southeastwards and discharge into the Mekong. The smaller northern section is drained by the Nanwan, Luang and Songkhram rivers which run north and northeastwards and likewise into the Mekong (map 3.1).

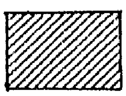
Geology and Topography

The bedrock of the region consists of Cretaceous rocks such as sandstone, shale, limestone, metamorphosed limestone and conglomerate of the Triassic and Jurassic from which most of the soils are derived. These beds are overlain with Tertiary and Quaternery alluvial deposits which have been eroded to form a succession of terraces (fig 3.1) (Pendleton,1962,p 54;Donner,1978,p 554):

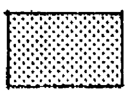
The flood plains which border all the rivers and streams of the area represent the youngest cycle of erosion and consist of recent and semi-recent riverine alluvium (Donner,1978,p 576;Dept of Land Development,1972). The plains are normally narrow, and in fact barely exist along



Source; Ng. 1970 p.25



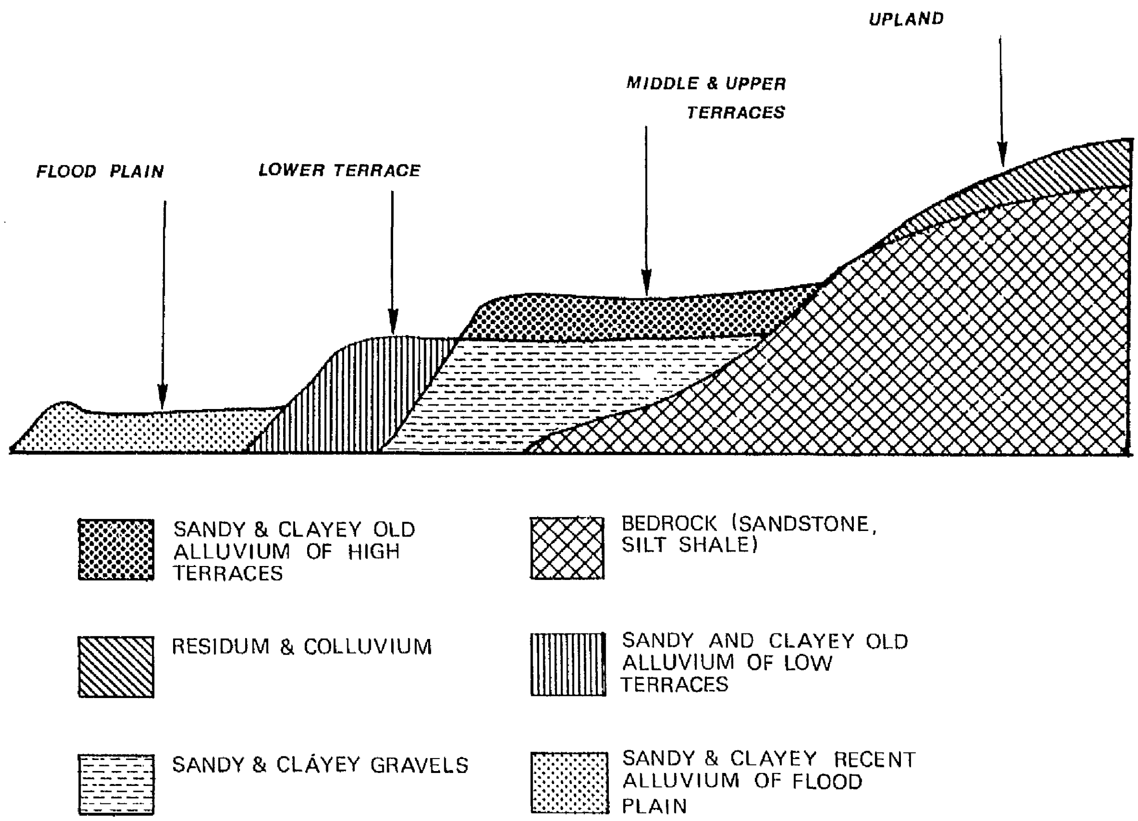
Land over 500 ft



Changwat Mahasarakham

Map 3.1 The Northeastern Region of Thailand

Fig. 3.1. Idealised Cross-Section of River Terraces



Adapted from: Donner, 1979, Fig.104,p555 much of the Mekong, but may widen to over 20 kilometres in parts of the Mun-Chi river system (Dixon,June 1978,p 3).

At a slightly higher elevation are found the flat to slightly undulating Lower Terraces which are composed, like the Middle and High Terraces, of older alluvium (Dept of Land Development,1972). This formation is less prone to flooding and despite having soils of lower fertility, is more suited to paddy farming due to its topographical position.

The Middle Terrace has an undulating to rolling topography (Donner,1978,p 557) and still poorer soils. It represents the margins of rice culture and is susceptible to drought (Dixon,June 1978,p 3).

Above the Middle Terrace lies the oldest of the formations, the Upper or High Terrace. Here the soils are sandy and extremely low in fertility, the area only being suited to the cultivation of drought resistant upland crops. This terrace, which now only exists in small remnants, gradually gives way to upland proper (Donner,1978,p 577).

During the end of the Triassic period, crustal movements created the two major basins of the region, the Khorat and Sakon Nakhon basins. Water accumulated in these depressions and over time became increasingly salty, eventually evaporating to form massive salt and gypsum beds which were later covered by clay, sand and alluvial deposits (Lamoreaux et al,1959,p 13). The presence of these beds, coupled with wet rice cultivation which has tended to raise water tables and draw dissolved salts upwards, has led to the formation of saline soils over 8 million rai of lowland in the Northeast (Vivat Shotelersuk,June 1981,p 118). The salt affected soils are primarily found along the central portion of the Mun-Chi river system with the situation being especially serious in the Tung Kula Rong Hai, an area of lowland straddling the borders of the provinces of Buriram, Mahasarakham, Surin, Roiet, Si Sa Ket and Yasothon. The degree of salinity varies considerably and accordingly the effect on production varies: 700,000 rai has been classified by the Mekong Committee as 'heavily affected', where few crops can survive; approximately 3 million rai as 'moderately affected', causing rice yields to be heavily reduced (the average production is about 15 kilograms per rai); and the rest 'slightly affected', leading to minor reductions in output (Vivat Shotelerusuk,June 1981,p 118).

To help rectify this situation the present Five-Year National Development Plan (1981-1986) has a target to improve 4.8 million rai of saline soil in the region (NESDB,n.d.,p 48). in addition, the Tung Kula Rong Hai has been designated a special development zone by the Thai government, and its improvement is one of the major objectives of the Plan (NESDB,n.d.,pp 125-127).

Topography and Irrigation

The central portion of the plateau undulates gently between 100 and 200 metres, "dotted here and there by low hills and small shallow lakes" (Pendleton,1962,p 43). This fragmented topography makes water control difficult and has resulted in a scattered distribution of wet rice farming. It also means that the construction of large integrated irrigation works, except in a few areas which have already been exploited, is difficult. Even the smaller projects on which the government has recently been concentrating its resources are of doubtful value as they, "will at best only provide supplementary water" (Johnson,1979,p 36) and are often economically unviable (Johnson,1979,p 35). It is generally accepted that the potential for the expansion of irrigated land is limited [1] and of the 4.56% of farm holdings currently classified as such (MOAC,1981,table 84,p 153) only 2% are under controlled irrigation (USAID,1981,p 3). This has led to a greater emphasis being placed on the improvement of rainfed agriculture as the basis for increasing agricultural production.

Climate

The climate of the Khorat Plateau is monsoonal being in comparison to the Central Plains, "far more continental" (Pendleton,1962,p 127). It is characterised by having a seasonal rainfall regime that limits rain-fed rice production to only half of the year. Thus, the Amphoe of Muang Mahasarakham, the district in which the research was conducted, had an average annual precipitation for the 24

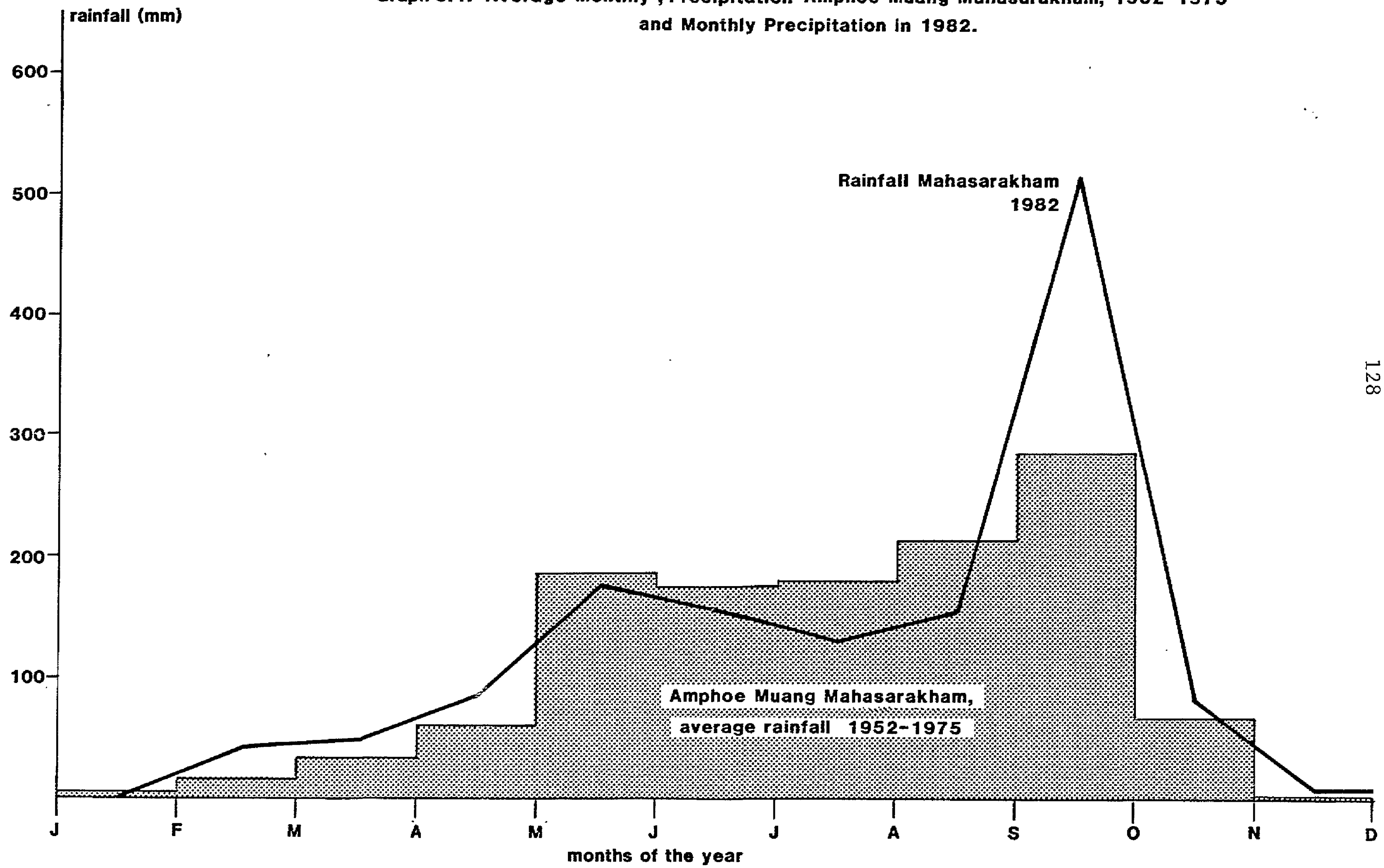
[1] Of the total land area suitable for cultivation in the Northeast (62,560,000 rai) the 'total potential irrigable area' is 7,178,690 rai or 11.5% of that figure (Sanan Chantkam,Oct 1981,table 1,p 4). NB: not all of this would be 'controlled irrigation'.

years from 1952 to 1975 of 1,228 mm (Dept of Land Development,Oct 1979,p 33); slightly less than the average for the whole region of 1,368.5 mm per year (Donner,1978,p 567). However, 84% (1,036.2 mm) of this fell during the five months from May to September, and if April and October are also included the proportion rises to 95% (1,164.3 mm) (graph 3.1).

In addition to this seasonality there is also considerable variability in rainfall within each month, year to year (table 3.1). Such variability, combined with the seasonality, makes rainfed rice cultivation marginal and limits upland cropping to those cultivars that can withstand a degree of moisture stress. The Mekong Committee, using daily rainfall data for the years 1952-1971, calculated the possible farming periods based on effective rainfall by changwat, for the period of the rainy season (April - October). In the case of Mahasarakham, all the months from May to August were found to be marginal to rainfed rice cultivation with only September having sufficient reliable rainfall for rainfed paddy production to be classified as 'possible' (table 3.2) (UN-ESCAP,1974,table 8,p 19).

In the rainfed areas of the Northeast precipitation determines the timing of all farming operations and in response to the uncertainties connected with rainfall there has evolved a flexible cultivation strategy, socially and agronomically. The aim of such a strategy is to stabilise production from year to year at an appropriate subsistence level (Morss et al,1976,pp 49-52).

Graph 3.1. Average Monthly , Precipitation Amphoe Muang Mahasarakham, 1952-1975 and Monthly Precipitation in 1982.



Sources: Unpublished Mekong Secretariat figures and Department of Land Development, 1979 Table 1 p.33

It is often stated that the risks involved in farming with such irregularity of rainfall results in farmers being unwilling to innovate and spend money on agricultural inputs, especially when profit margins are small (IBRD,Nov 1974,p 12).

Table 3.1

Standard Deviation, Maximum, Minimum and Mean of Rainfall, Changwat Mahasarakham, by Month: 1971-1982.

Month	Sample Standard Deviation	Mean (mm)	Maximum (mm)	Minimum (mm)
January	9.502	4.3	33.1	0
February	30.040	29.1	74.8	0
March	35.291	39.8	114.0	1.6
April	68.197	67.6	241.5	9.1
May	74.469	162.5	329.6	72.5
June	94.089	175.8	415.3	63.4
July	73.285	191.7	302.4	98.2
August	68.380	193.0	280.5	84.2
September	126.148	282.6	519.2	51.5
October	57.234	81.2	201.0	0
November	8.147	6.0	25.4	0
December	8.273	3.9	29.0	0
TOTAL		1,238	2,565.8	380.5

Source: Unpublished Mekong Secretariat figures

Table 3.2

Possible Rainfed Farming Periods based on Effective Rainfall: Changwat Mahasarakham

April	May	June	July	Aug	Sept	Oct
-	*	*	*	*	*	-
(-)	(-)	(-)	(-)	(-)	(*)	(-)
.....	.....	.....	.....	.....	____	....

*	ER more than 75mm per month
-	ER less than 75mm per month
(*)	ER-σ more than 75mm per month
(-)	ER-σ less than 75mm per month
.....	rainfed paddy cultivation marginal
_____	rainfed paddy cultivation possible

ER (Effective Rainfall) defined as: the "portion of Basic Effective Rainfall, excluding overflow and infiltration which increases soil moisture but which has not yet appeared as free surface water. In other words, ER is the increment in the positive water depth in the paddy field after each rain" (p 14).

(*) ER- : less than 16% risk that the Effective Rainfall, as defined above, will not fall.
(-) ER- : greater than 16% risk that the Effective Rainfall, as defined above, will not fall.

Possible Rainfed Paddy Cultivation defined as: "at least 75mm of effective rainfall...during each month of the wet season to ensure continuous farming without damage" (p 18).

Source:UN-ESCAP,1974,table 8,p 19

Important, from the point of view of rice cultivation are the rains at the beginning of the season which must be prolonged and heavy enough to saturate the soil and allow the land to be prepared. Also critical is adequate water supply during reduction-division and early heading, at which stages the plant is particularly susceptible to moisture stress and other environmental and nutritional variables (Matsushima,1976,p 312). In fact, 70% of the brown rice yield of traditional varieties and 90% of that of HYV's is determined during the late growth period which includes the stages of reduction-division and early heading (Matsushima,1976,pp 311-312). There have been a number of attempts to identify the optimum period for rice cultivation given the vagaries of rainfall. However, the results have been inconclusive (MOAC,June 1980,pp 31-32) and in any case it is doubtful if any "meaningful relationship among the many rainfall stations or between rainfall and various agricultural parameters" could actually be established (UN-ESCAP,1974,p 1).

In the crop year under study, 1982/83, the region suffered from delayed rains at the start of the season and flooding in the latter period (September/October) (graph 3.1). Of the climatic factors it is rainfall which presents the greatest problems to the farmer and "under rain-fed subsistence agricultural production every aspect of rural life, work and well-being is determined by these uncertainties of natural water supply" (Ng,1970,pp 25-26).

Temperature meanwhile, "with an average annual figure of 22.9 degrees centigrade over the past twenty years, imposes no constraint on double cropping or even multiple cropping of most tropical and sub-tropical crops" (Ng,1970,p 24). In fact, the extreme low temperatures recorded at stations in Khon Kaen and Roiet, two neighbouring provinces to Mahasarakham, for the years 1976 - 1980 were 8.5 and 9.4 degrees centigrade respectively (MOAC,1981,table 82,p 144).

Soils and Land Use

The soils of the region are, on the whole, strongly weathered and leached sandy or alluvial soils low in fertility and exhibiting an organic matter content that rarely rises above 1% (IBRD,Nov 1974,p 11). Land suitability studies have shown that of the Northeast's total land area of 106.3 million rai (17 million hectares) only 62.56 million (59%) consists of cultivable arable land of which 22.64 million rai is suitable for paddy and 39.92 million rai for upland crops (table 3.3) (Sanan Chantkam,Oct 1981,table 1,p 4). Even the land which is classified as 'cultivable' is rarely of high fertility and the Khorat fine sandy loams, "form one of the most extensive soil groups and at the same time one of the most infertile soil groups in the kingdom" (Pendleton,1962,p 71).

The paucity of the soils (especially with reference to those of the uplands) and the seasonality of the rainfall of the plateau are to some extent reflected in its vegetation. Dry deciduous dipterocarp forest or savanna forest, the most important single formation in

Thailand (46% of total forested area) dominates the region accounting for almost 80% of the forest vegetation (Stott,1978,p 168). The formation is characteristic of areas with hot bioclimates, a dry season of five to six months and an average rainfall of between 1,000 and 1,500 mm per year (Gaussen et al,1967; quoted in Stott,1984,p 319). Further, the soils of the dry deciduous dipterocarp forest are, "typically 'dry', being usually free-draining members of the Red-Yellow Podzolic or Grey Podzolic groups, with a high sand fraction, and often relatively thin and stony" (Stott,1984,p 322). The humus content tends to be very low, the pH ranges from 5.0 to 6.2 while the C/N ratio, measured at 12.7, indicates a low rate of decomposition and nitrification (Stott,1984,p 322).

Rice, as the main subsistence crop, is grown on the entire area classified as suitable for paddy and, in addition, on much of the marginal land which might be better suited to other crops (table 3.3). Most of this marginal riceland is upper terrace where there is an intermittant supply of water (MOAC,April 1980,p 23) and it is only during wet years that a rice crop can be planted, leaving the land idle for much of the rest of the time. Farmers tend to reserve these paddys so that when rainfall is excessive and the main crop on the lower land is damaged, the deficit can be made up by production from the upper fields (MOAC,1980,p 6). The strategy represents a classic case of risk aversion (risk minimisation) and it is often stated that only when yields can be stabilised on the true riceland will farmers be willing to plant other, agronomically more suitable, crops on these marginal upper terraces (MOAC,1980,p 1 & pp 25-26).

Table 3.3

Land Suitability and Land Use in the Northeast

	Land Suitability	Land Use [2]
Total Area of Region	106,391,250	106,391,250
Area Cultivable	62,560,000	
Paddy	22,640,000	35,886,374
Upland Crops	39,920,000	9,901,022 [*]

[*] 'Field crops'.

Sources:Sanan Chantkam,1982,table 1,p 4;MOAC,1981,table 88,p 160.

It should be noted that fertility is not a determinant in deciding where rice cultivation is feasible; the crucial factor being the interplay of topography and drainage: Drainage or permeability is dependent on the clay/silt content of the soil which is highest in the depressions, decreasing as one travels up onto the higher ground. Topography meanwhile has the tendency to cause rainfall to gather through seepage from the surrounding countryside, on the lower land. These two factors combine so that it is only in those areas where the nature of the soil and of the topography allows the accumulation, and thus the impoundment of water, which are physically suited to wet rice farming.

On the upland soils, erosion and the loss of fertility is becoming an increasing problem as farmers strive to boost their income through the cultivation of cash crops without the application of fertilisers or the use of measures to curb the processes of soil degradation. The northern, southern and eastern parts of the region are affected most severely, but even on the central portion of the plateau erosion is 'moderate' (US Presidential Mission,April 1982,p 34) and soils are deteriorating (table 3.4). The three major upland crops, cassava, maize and kenaf are all demanding in terms of soil nutrients with cassava having an especially bad reputation:

Cassava has a high requirement for potassium (Chan,1980,p 82) and among the micro-nutrients, for magnesium (Howeler,1980,p 63) and zinc (Onwueme,1978,p 131), and its intensive cultivation without proper management will lead to a rapid loss of fertility. As Shelton and Puket note: "Any crop which has a large weight of plant material removed from the field at harvest, can be expected to remove a proportional amount of plant nutrients from the soil" (Shelton & Puket,1974,p 8). In addition, inadequate ground cover due to the slow closure of the canopy and the high proportion of bare soil between the plants combined with the loosening of the soil during harvesting enhances and accelerates the processes of soil erosion (Weber et al,1980,p 10; Howeler,1980,p 60).

However, cassava does seem to be an adaptable crop, and nutrient requirements in different soils are highly variable with researchers being unable to provide general fertiliser recommendations (Weber et al,1980,p 11). This has led some people to state that even under continuous cropping without the use of fertilisers there is a certain point at which the nutrient levels stabilise and degradation halts (Sunthorn Rajvongsuek,Aug 1977,p 29). This disagreement over what effect cassava has on the soil nutrient status is largely because there does not exist a consistent body of useful information relating to the subject, and up-to now studies have been uncoordinated, ranging over varying soil types, climates and cultivars (Coursey & Booth,1977,p 79; Weber et al,1980,pp 11-12). Also, cassava's reputation as a vigorous nutrient depleter may be linked to the fact that it is one of the few crops that can be grown on eroded and exhausted soils, and it is therefore presumed to have created the condition in the first place. It should be noted that any crop, if no attempt is made to restore nutrients, will impoverish the soil sooner or later (Chan,1980,p 82) and in Northeastern Thailand this applies to kenaf and maize, just as it does to cassava.

Table 3.4

The Extent of Erosion in the Northeast and in Mahasarakham Province

	Total Area (rai)	Farm Holdings in 1980 (rai)	EXTENT OF EROSION(area & % of holdings)			
			Moderate	Severe	Very Severe	TOTAL
Northeast	106,391,250	50,092,989	7,342,277 (14.7%)	12,731,051 (25.4%)	22,875,301 (45.7%)	42,948,629
Mahasarakham	3,568,110	2,371,280	292,696 (12.3%)	1,114,561 (47.0%)	58,539 (2.5%)	1,465,796

Soil Erosion Classifications

Category	Soil Loss (ton/rai/year)
Moderate	5.01 - 20.00
Severe	20.01 - 100.00
Very Severe	100.01 - 966.65

Source: US Presidential Mission, April 1982, table 3, p 36, p 37, Annex 2, p 220.

The Soils of Mahasarakham

The nature of the soils of the Khorat Basin can be exemplified through the case of one province, Mahasarakham; and, in turn, the soils of that changwat are revealed in the small area around the study villages. Indeed, the soil series present in the research area cover over 93% of the changwat (table 3.5).

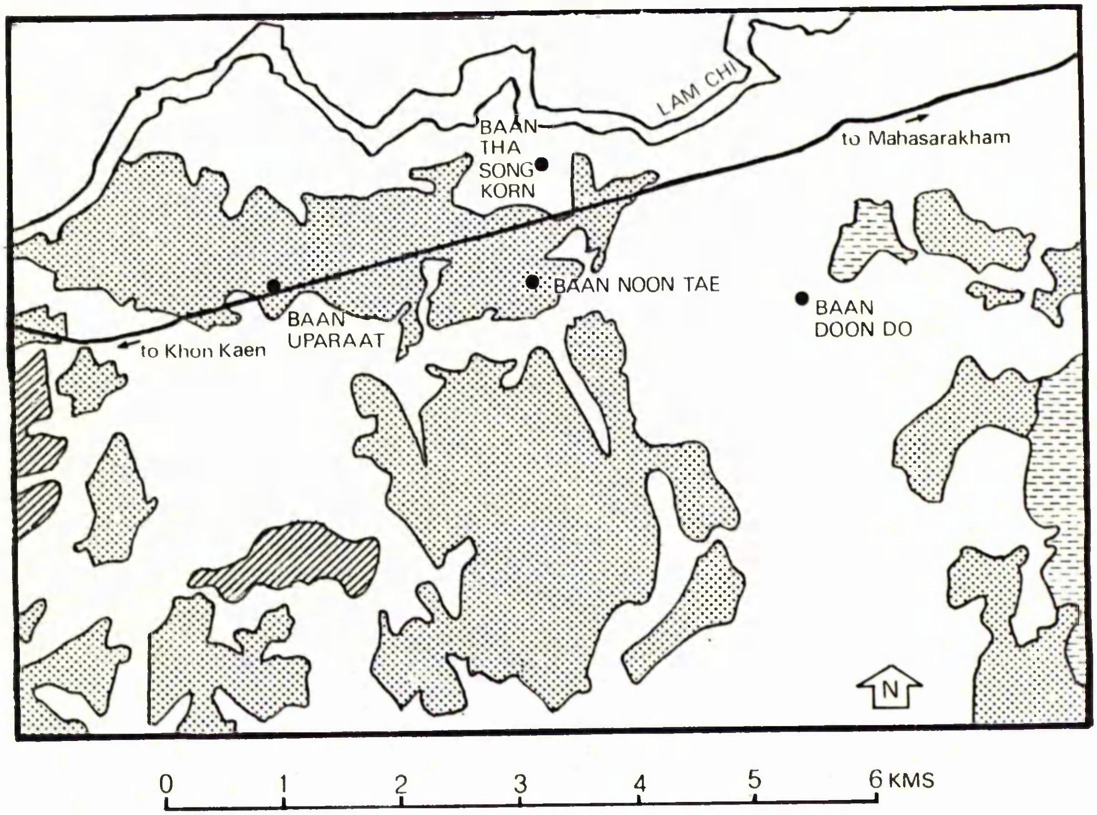
Four soil series dominate the area surrounding the villages of Baan Noon Tae and Baan Tha Song Korn; namely, Roiet and Roiet Loamy Variant which are found on the lower riceland, and Korat and Warin occupying the higher ground (Map 3.2). All four are either deep sandy loams or loamy sands, low in fertility and organic content. The two lowland soils drain poorly and are physically suited to wet rice farming, while those found on the upland are more permeable making the impounding of water impossible (tables 3.6a & 3.6b; Map 3.3) (Dept of Land Development,1972)

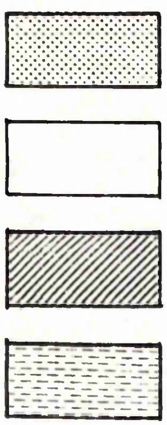
The other soils of the area show a similar general pattern of either being suited to rice or to upland crop cultivation (Map 3.3 & Map 3.4), although a clear delineation between the two types of land does not occur and in reality there exists a zone of transition. This zone is the marginal paddy land which the farmer, in his strategy of risk minimisation, reserves for the years when the main crop on the lower land is damaged through flooding.

The suitability of the soils of the research area for rice and upland crop production is clearly reflected in

Land Use

Base Map (3.2, 3.3, 3.4,)





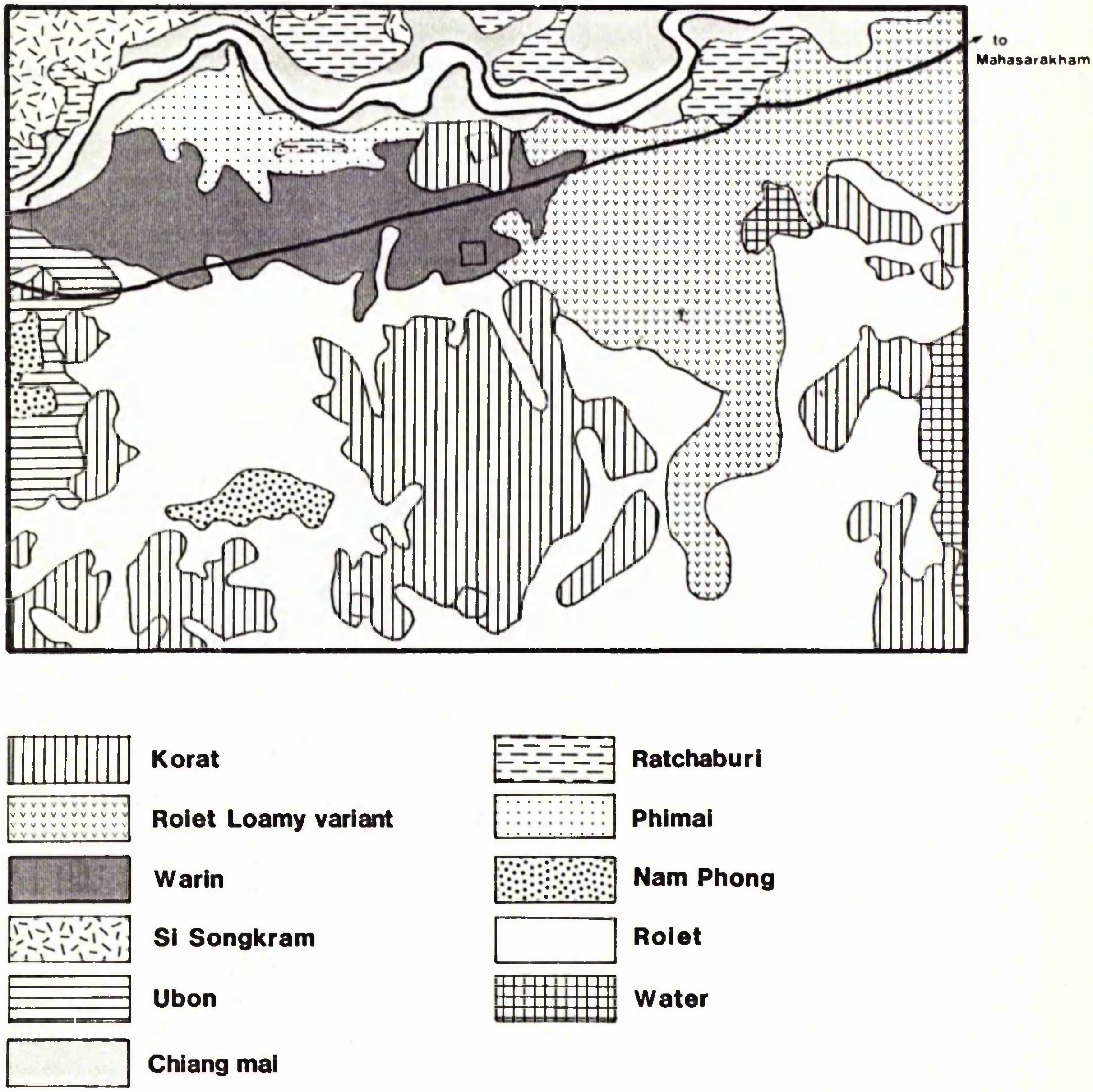
Thii rai - Upland Cropping

Thii naa - Padiland

Grazing

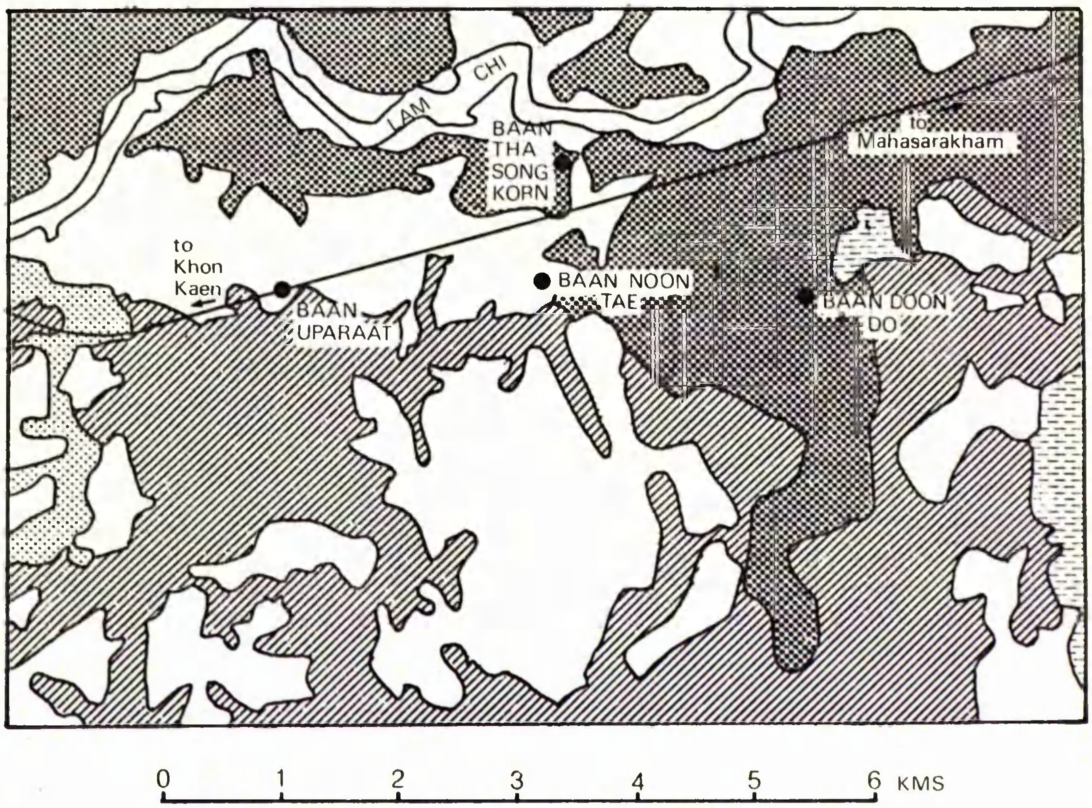
Areas of Water

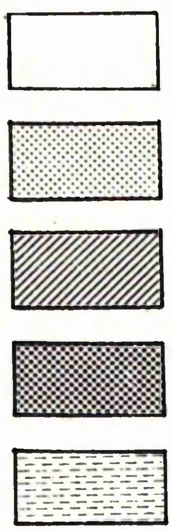
Map 3.2. Soil Map of Area Surrounding Study Villages



Source:Land Development Department 1972

Map 3.3. Land Capability Classification for Rice





Land capability classification Vt.
Land which is not suited to the cultivation of rice.

Land capability classification IVs . Land which is minimally suited to rice cultivation, because it is sandy and water rarely collects. Land also has low fertility.

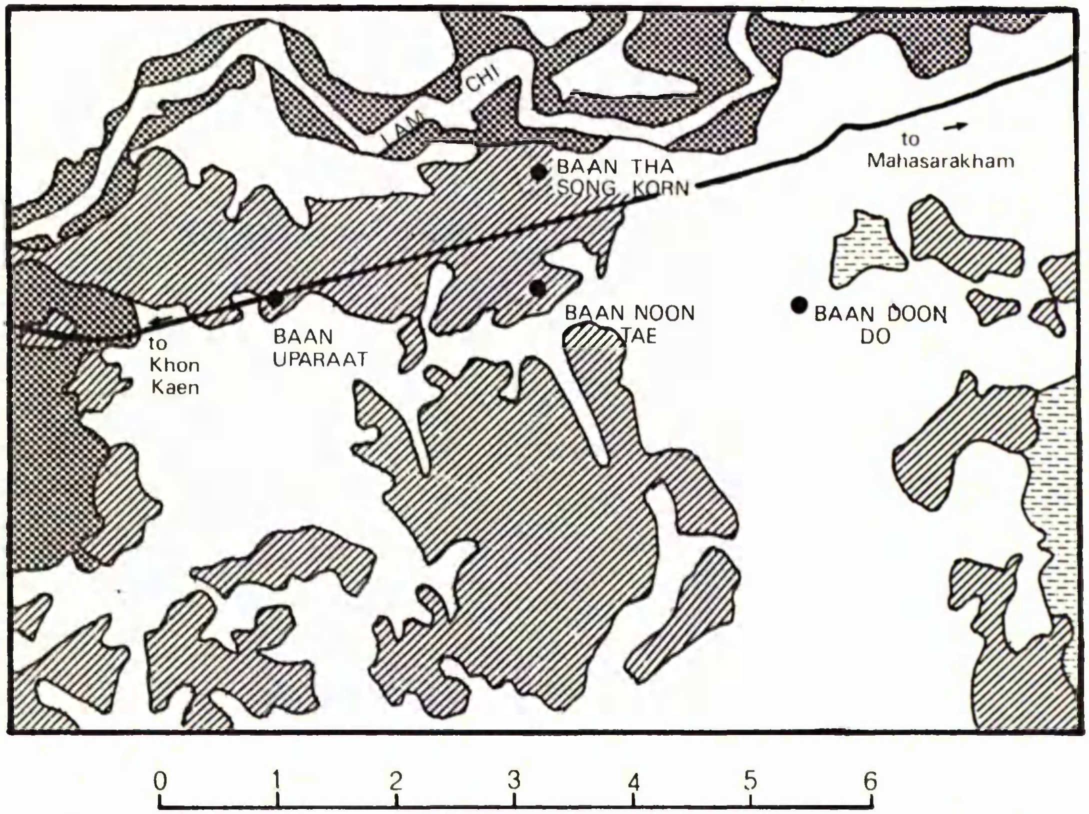
Land capability classification III s .Land which is of average suitability for the cultivation of rice but the soil is low in fertility and must have fertilisers applied to increase production.

Land capability classification III f. Land which is well suited to rice cultivation , but might be affected by flooding.

Areas of permanent water

Source: Land Development Department 1977

Map 3.4. Land Capability Classification for Upland Crops



Land classification IVd. Land minimally suited to the general cultivation of upland crops because the soil is poorly drained and water accumulates in the rainy season.

Land capability classification III's. Land which is of average suitability for the general cultivation of upland crops, but should have fertilisers because the land has low fertility. Production maybe limited at times by low rainfall.

Land capability classification IIf . Land which is well suited to the general cultivation of upland crops , but might be affected by flooding in some years.

Areas of permanent water.

Source: Land Development Department 1977.

Table 3.5

The Soils of Mahasarakham

Soil Series	Area(rai)	% of Total Area		
Alluvial Complex	17,860	0.50%	FLOOD PLAIN	RECENT & SEMI-RECENT RIVERINE ALLUVIUM
*Chiangmai	42,015	1.17%		
*Chainat & Ratchaburi	92,430	2.57%		
*Phimai	65,120	1.81%		
*Si Songkhram	63,020	1.75%		
*Roiet	1,304,040	36.26%	LOW TERRACE	OLD RIVERINE ALLUVIUM
Roiet, High Phase	13,130	0.37%		
*Roiet, Loamy Variant	203,250	5.65%		
Roiet & On	78,250	2.18%		
Kula Ronghai	12,600	0.35%		
*Ubon	284,260	7.92%		
Udon	1,050	0.03%		
*Korat	744,720	20.71%	MIDDLE TERRACE	
Phon Phisai	7,615	0.21%		
*Nam Phong	529,650	14.73%		
Satuk	60,130	1.67%	HIGH TERRACE	
*Warin	19,170	0.53%		
Yasothon	26,780	0.74%		
Yasothon,Gravelly Phase	2,630	0.07%		
Ponds	22,580	0.63%		
Swamps	5,250	0.15%		
TOTAL	3,568,110 rai			

* : Soils present in the study area.

Source:Dept of land Development,1972; Dept of Land Development,1975,p 24.

Table 3.6a

Characteristics of the Soil Series in the Vicinity of Baan Noon Tae and Baan Tha Song Korn

Soil Series	Classification [1] 1/ USDA 1970 2/ National	Range of Slope	Effective Soil Depth [2]	Textural Profile	a:Drainage [3] b:Permeability c:Surface Runoff	Organic Matter (% carbon x 1.724) 0-30cm [4]	CEC (meq/100 gram soil) a: 0-30cm [5] b: more than 30cm	Available Phosphorous (ppm of P) a: 0-30cm [6] b: more than 30cm	Available Potassium (ppm of K) a: 0-30cm [7] b: more than 30cm	Reaction (pH 1:1 H20) a: 0-30cm b: more than 30cm
Ratchaburi	1/ Aeric Tropaquepts 2/ Hydromorphic Alluvial soils	0-1%	very deep	silty clay or clay over clay	a:somewhat poorly b:slow c:slow	moderately low (1.2%)	a:high (24.0) b:very high (37.8)	a:very low (2.9) b:very low (2.9)	a:very high (173.3) b:very high (177.8)	a:5.3-5.7 b:5.3-5.7
Phimai	1/ Vertic Tropaquepts 2/ Hydromorphic Alluvial soils	0-1%	very deep	clay throughout	a:poorly b:slow c:slow	low (1.0%)	a:very high (32.5) b:very high (32.6)	a:low (4.9) b:low (3.5)	a:very low (19.2) b:very low (25.8)	a:5.0-5.4 b:5.3-5.4
Si Songkhram	1/ Vertic Tropaquepts 2/ Hydromorhic Alluvial soils	0-1%	very deep	silty clay loam or clay loam over clay loam, silty clay or clay	a:poorly b:slow c:slow	moderately high (3.1%)	a:very high (44) b:very high (40.9)	a:moderately low (8.3) b:very low (2.4)	a:low (32.4) b:very low (19)	a:4.9-5.0 b:4.6
Ubon	1/ Aquic Dystropepts 2/ Hydromorphic Regosols	0-3%	very deep	loamy sand over sandy loam below 60cm grading to sandy clay loam below 30cm	a:moderately well b:rapid c:slow	very low (0.3%)	a:very low (1.2) b:very low (2.7)	a:very low (2.6) b:very lw (2.1)	a:very low (29.2) b:low (32.6)	a:5.2-7.2 b:5.5-6.9
Nam Phong	1/ Ustoxic Quartzipsamments 2/ Regosols	3-10%	very deep	loamy sand throughout or at least to 80cm over sandy clay loam	a:somewhat excessively b:rapid c:slow	very low (0.4%)	a:very low (1.6) b:very low (0.4)	a:low (4.4) b:very low (1.9)	a:very low (24.4) b:very low (28)	a:6.4-8.0 b:5.5-6.0
Roiet	1/ Aeric Paleaquults 2/ Low Humic Gley soils	0-3%	very deep	loamy sand, sandy loam over sandy clay loam or sandy clay	a:poorly b:rapid over moderate c:slow	very low (0.5%)	a:low (3.3) b:medium (13.8)	a:very low (2.5) b:very low (2.8)	a:very low (19.4) b:very low (13.9)	a:4.5-6.2 b:6.2-6.3
Roiet, Loamy Variant	1/ (as above)	0-1%	very deep	fine sandy loam, loam or silt loam over clay loam	a:poorly b:slow c:slow	very low (0.2%)	a:low (5) b:medium (10)	a:very low (2.7) b:very low (2.9)	a:low (48.2) b:low (37.2)	a:5.8-6.3 b:6.2-6.3
Korat	1/ Oxic Paleustults 2/ Gray Podzolic soils	0-3%	very deep	sandy loam over sandy clay loam	a:moderately well b:moderate c:rapid	very low (0.4%)	a:very low (2.9) b:very low (2.5)	a:low (5.7) b:very low (2.8)	a:low (46.2) b:medium (86.8)	a:5.9-4.2 b:4.3-4.0
Warin	1/ Oxic Paleustults 2/ Red-yellow Podzolic soils	2-5%	deep	sandy loam over sandy clay loam	a:well b:moderate c:medium to rapid	very low (0.13%)	a:very low (2.6) b:low (3.5)	a:very low (2.6) b:very low (2.2)	a:medium (70.7) b:high (102.8)	a:4.1-4.3 b:4.1-5.1
Chiang Mai	1/ Typic Ustifluvents 2/ Alluvial soils	1-2%	very deep	sandy loam, loam or sandy clay loam to clay loam throughout or loam to sandy clay loam over clay loam	a:moderately well b:rapid c:slow	moderately low (1.3%)	a:medium (14.8) b:medium (14.6)	a:moderate (22.1) b:moderate (15.9)	a:medium (77.7) b:medium (73.7)	a:5.3-6.2 b:5.3

Footnotes to Table 3.6a

[1] Classification:
a: United States Department of Agriculture, 1970.
b: National Classification (based on "Major Soils of Southeast Asia", Dudal & Moormann,Jour of Trop Geog, Vol 18, 1964.

[2] Effective Soil Depth:
Refers to rooting zone. range of depth ratings as follows:

Rating	Depth (cm)
Very shallow	< 25
Shallow	25-50
Moderately deep	50-100
Deep	100-150
Very deep	> 150

[3] Permeability
Slow: soils expected to have hydraulic conductivity < 0.5 cm/hour.
Moderate: soils expected to have hydraulic conductivity of 0.5-15 cm/hour.
Rapid: soils expected to have hydraulic conductivity > 15 cm/hour

Surface Runoff
Slow: surface water flows away very slowly. Free water lies on surface for considerable periods or immediately enter the soil. Much water passes through soil or is lost to evaporation. Soils subject to little or no erosion

Medium: surface water flows away at such a rate that moderate amount enters profile and free water lies on surface for only short periods. Water lost through runoff does not seriously reduce supply available for plant growth. Erosion hazard: slight to moderate.

Rapid: a large or very large proportion of the rainfall flows over land surface. Erosion hazard: moderate, high or very high

[4] Organic Matter (USDA)

Rating	Range %
very low	<0.5
low	0.5-1.0
moderately low	1.0-1.5
medium	1.5-2.5
moderately high	2.5-3.5
high	3.5-4.5
very high	>4.5

[5] CEC (USDA)

Rating	Range (me/100gm soil
very low	<3.0
low	3.0-5.0
moderately low	5.0-10
medium	10-15
moderately high	15-20
high	20-30
very high	>30

[6] Available Phosphorous (USDA)

Rating	Range (ppm)
very low	<3
low	3-6
moderately low	6-10
medium	10-15
moderately high	15-25
high	25-45
very high	>45

[7] Available Potassium (USDA)

Rating	Range (ppm)
very low	<30
low	30-60
medium	60-90
high	90-120
very high	>120

Source: Dept of Land Development, 1972.

Table 3.6b

Soil Analysis: Changwat Mahasarakham

Soil Series	Depth	Particle Size Analysis USDA (%)			pH(H2O)	Carbon	Exchange Capacity & cations					P	K
		Sand	Silt	Clay	1:1	%	Ca	Mg	K	Na	CEC Soil	ppm	ppm
Roiet	0- 6 cm	79.5	14.7	5.8	4.5	0.16	1.1	0.3	0.1	0.2	2.4	3.2	22
	6-17 cm	82.0	14.1	3.9	4.85	0.11	1.0	0.2	0.1	0,2	2.3	2.8	22
Roiet, loamy variant	0-13 cm	47.3	46.7	6.0	5.8	0.10	0.6	0.2	0.1	0.2	1.5	2.5	46
	13-18 cm	39.3	35.7	25.0	6.0	0.18	2.3	0.4	0.1	0.4	5.2	2.2	40
Korat	0-14 cm	81.0	6.7	12.3	5.75	0.40	2.1	0.5	0.2	0.1	2.7	8.2	13
	14-21 cm	81.3	6.4	12.3	4.7	0.25	0.8	0.3	0.1	0.2	2.0	4.1	72
Warin	0-10 cm	68.1	16.4	15.5	4.3	0.30	0.9	0.2	0.1	0.1	2.8	3.4	34
	10-27 cm	66.7	19.1	14.2	4.3	0.16	1.0	0.3	0.1	0.2	2.2	2.2	90

Source:Dept of Land Development,1975.

various Thai government surveys [1]:

On the land closest to the Lam Chi, four very deep alluvial soils are found: Chiangmai, Ratchaburi, Phimai and Si Songkhram. Geomorphologically, the area is a flood plain and consists of recent and semi-recent riverine alluvium (table 3.5). The Ratchaburi, Phimai and Si Songkhram series are all poorly drained and are defined as being well suited to wet rice cultivation although there exists a risk of flooding in some years. The tendency for water to collect during the rainy season makes them unsuited to the growth of upland crops. The fourth series, Chiangmai, however has the reverse classification of being unsuitable for rice but well-suited to upland crop cultivation. This reflects the fact that drainage is good and the permeability of the series rapid, preventing the accumulation of surface water.

In terms of chemical content the four soils of the floodplain show great variation (tables 3.6a & 3.6b); the available potassium in the top 30cm ranges along a spectrum from 'very low' on the Phimai series to 'low', Si Songkhram; 'medium', Chiangmai; and to 'very high' on the Ratchaburi. In a similar fashion phosphorous in the top 30cm reveals no pattern with Ratchaburi having a 'very low' content; Phimai, 'low'; Si Songkram, 'moderately low'; and Chiangmai, 'moderate'. Of more significance are the differences in CEC and organic matter content of the

[1] All the information in the next passage is taken from the following references: Dept of Land Development,1972; Dept of Land Development,1975; Dept of Land Development,1977.

four soils and those on the higher ground, and in this a trend is discernable: the four soils have a much higher CEC than those of the lower, middle and high terraces, and although organic matter content is described as 'low' (1.0%) and 'moderately low' (1.2% and 1.3%) for three of the series and 'moderately high' (3.1%) for the fourth, Si Songkhram, in comparison to the other soils these percentages are high.

On the old alluvium of the lower terraces occur three soils: Ubon, Roiet and Roiet Loamy Variant (table 3.5; tables 3.6a & 3.6b). Ubon is classified as a hydromorphic regosol and because of its extremely low fertility and sandy nature, which results in rapid drainage and problems of water supply, is minimally suited to both rice and to the general cultivation of upland crops. The humic gley Roiet and Roiet Loamy Variant however, although they are likewise very low in fertility, with their high clay/loam content allow water to be impounded and are therefore favourable to the cultivation of rice and unfavourably suited to upland crops. The loamy variant is rather less permeable and this leads to the risk of excessive inundation (flooding) in some years.

With respect to their chemical and organic matter content, the three soils are very similar exhibiting a dearth of nutrients (tables 3.6a & 3.6b): available phosphorous and potassium in the top 30cm of the soils, as well as the organic matter, is in all cases classified as 'very low'. CEC for the regosol, Ubon, is also 'very low', while for the Roiet and Roiet Loamy Variant it is 'low'.

Korat, a podzol and Nam Phong, a regosol, on the middle terrace as well as Warin, another podzol, on the high terrace all drain at least moderately well and are unsuitable for rice cultivation (table 3.5; tables 3.6a & 3.6b). As far as upland crops are concerned the two podzols are of average suitability, although fertiliser applications are advised due to their low inherent fertility. Production may also be affected during periods of drought as their topographical position and moderate permeability reduces water retention and often leads to problems of moisture stress. The regosol Nam Phong meanwhile, due to its characteristic of 'excessive drainage' coupled with poor fertility is, like the Ubon series, only minimally suited to the general cultivation of upland crops.

Chemical analysis shows that the three soils are similar to those found on the lower terraces (tables 3.6a & 3.6b): they have a 'very low' organic matter content, and 'low' or 'very low' CEC, while available phosphorous and potassium in the the top 30cm is also 'low' or 'very low'.

The soils of the Northeast characteristically have a low organic matter content and this is clearly portrayed in the study area where the four major series each contain less than half of one percent (tables 3.6a & 3.6b).

"Organic matter influences physical and chemical properties of soils far out of proportion to the small quantities present" (Brady,1974,p 137), and the lack of it throughout the region is a major constraint limiting the increase in yields (table 3.7). Especially important would be the improvement of the upland areas where a higher soil organic matter content would increase the water holding capacity of the soil (organic particles are hygroscopic) and so reduce the effects of drought, as well as improving its structural properties. Furthermore, organic colloids hold and exchange anions and nutrient cations in the soil thereby directly contributing towards a high cation exchange capacity. This would, in turn, make fertilisers more effective, with the added nutrients being held in the soil rather than leached through.

In addition to these improvements, the supply and availability of the plant nutrients nitrogen, phosphorous and sulphur is also closely related to the organic matter content and in consequence of this are also generally in short supply.

Table 3.7

Influence of Soil Organic Matter on Soil Properties

- Effect on soil colour; brown or black
- Influence on physical properties:
  a) Granulation encouraged
  b) Plasticity, cohesion etc; reduced
  c) Water holding capacity increased.
- High cation absorption capacity:
  a) Two to thirty times as much as mineral colloids
  b) Accounts for 30-90% of the absorbing power of mineral soils
- Supply and availabilty of nutrients:
  a) Easily replaceable cations present
  b) Nitrogen, phosphorous and sulphur held in organic forms
  c) Extraction of elements from minerals by acid humus

Source: Brady,1974,pp 150-151.

Nitrogen "is clearly the most important organic nutrient" (Faniran & Areola,1978,p 200), and 90-95% is stored within this medium (Faniran & Areola,1978,p 27). However, to be absorbed by plants nitrogen must be converted into the nitrate anion through the mineralisation (nitrification) process whereupon it becomes prone to leaching, immobilisation in the bodies of micro-organsisms and denitrification (Brady,1974,pp 423-426). On cultivated land "there is a direct relationship between the amount of nitrogen in the soil and crop yields" (Faniran & Areola,1978,p 201), and therefore it is not suprising to find both rice and upland crops exhibiting low productivity per rai.

"With the possible exception of nitrogen, no other element has been as critical in the growth of plants as has phosphorous" (Brady,1974,p 456). Like nitrogen it is rendered unavailable to plants through fixation and this is amplified in acid soils such as those prevalent in the study area, and over much of the region [1] (table 3.5; tables 3.6a & 3.6b) (maximium phosphate availability to plants is obtained when soil pH is maintained in the range 6.0-7.0; - Brady,1974,p 460-467). Crops largely depend on

[1] The application of lime to reduce the acidity of the soils of the plateau (most are 'medium acid'. Donahue et al,1977,p 118 classify soils as follows: pH 5.0-5.5, 'stongly acid'; pH 5.5-6.0, 'medium acid'; pH 6.0-6.5, 'slightly acid') would be beneficial in a number of respects: it would give the soil a more granular structure, increase the availability of certain nutrients (eg; phosphorous and potassium) while reducing the toxicity of others, and would also stimulate the formation of humus (Brady,1974,pp 413-414).

phosphorous returned from the soil organic matter (Faniran & Areola,1978,p 201) and where it is low, problems of reduced availability arise. This is accentuated on land which is continuously cleared and cultivated, and will directly lead to lower yields (Faniran & Areola,1978,p 201).

Sulphur is only of secondary importance in comparison to nitrogen and phosphorous, but nevertheless is an essential growth-promoting element (Faniran & Areola,1978,p 201). It is particularly important in the growth of jute (kenaf) and groundnuts (Cruikshank,1972,p 207) two common upland crops of the Northeast, and as cultivation continues without fertilisation, so sulphur deficiency will spread.

Summary

The principal physical variable affecting the cultivation of wet rice is adequate water supply. In the Northeastern region of Thailand a seasonal climate coupled with a great degree of variation in precipitation within any rainy season means that the bulk of farmers who grow rain-fed paddy cannot ensure a reliable supply in their fields. In addition, the nature of the topography not only means that the opportunities for irrigation are limited, but also that the lower terraces and flood plain suffer from a proneness to flooding while the middle and upper terraces suffer from drought. This is further accentuated by the tendency for the soils of the lower lands to have a high clay/silt content and thus be impermeable, and those of the upper fields to be sandy and so drain excessively rapidly.

The fertility of the soils is characteristically low with an extremely limited organic matter content being particularly debilitating, especially with regards to the true uplands. However, this said, in comparison to the ways in which rainfall, topography and soil inter act to affect water conditions in the paddys, simple fertility (that is with exception of the uplands) is of minor consequence.

Chapter Four

The Villages of Baan Noon Tae & Baan Tha Song Korn

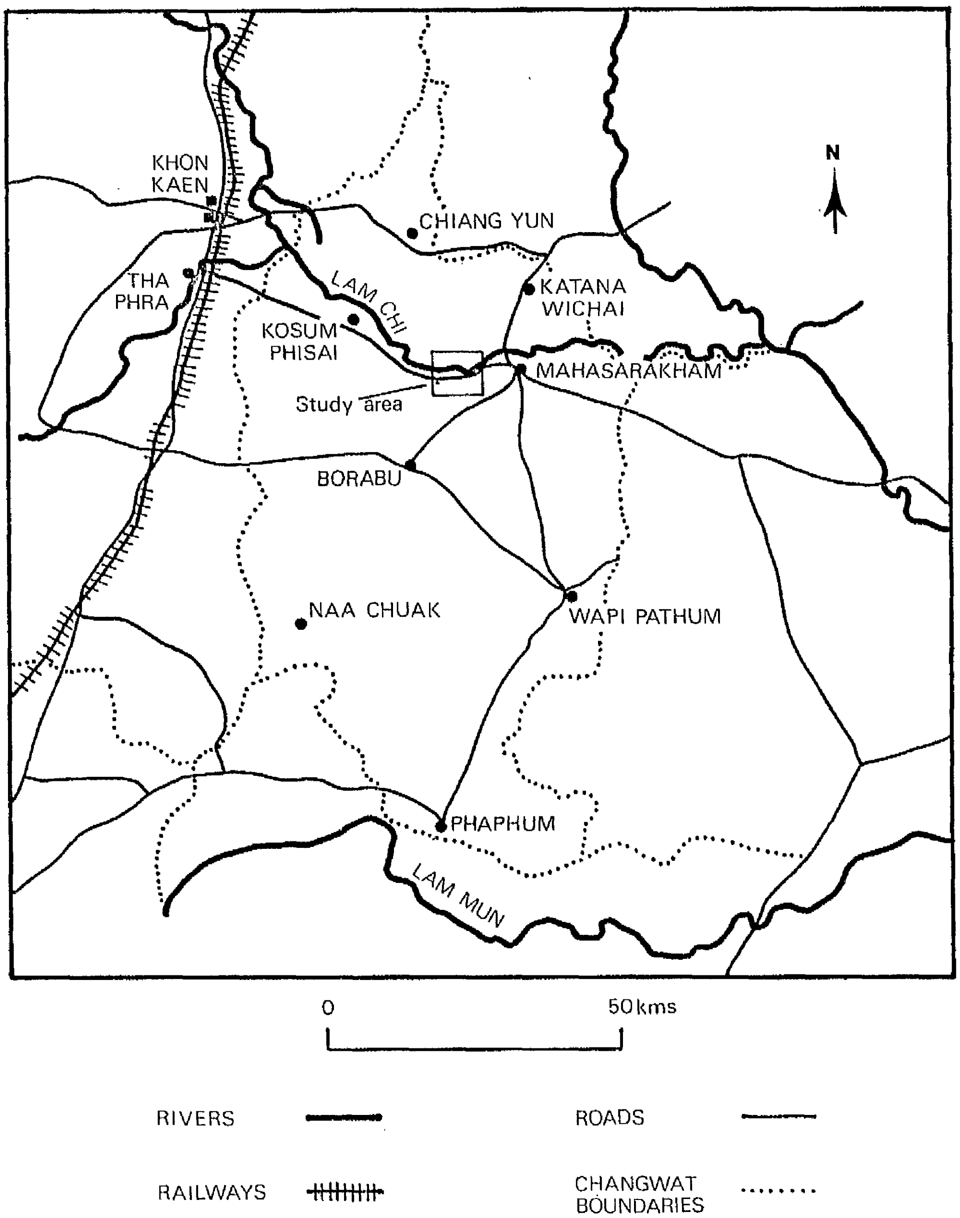
Introduction

The two study villages of Baan Noon Tae and Baan Tha Song Korn are located in Amphoe Muang, Changwat Mahasarakham (map 4.1). They lie on either side of the main road to Khon Kaen approximately nine kilometres from the town of Mahasarakham, the capital of the province. Both villages are part of Tambon Tha Song Korn, a commune that comprises 14 villages with a total population of 10,792 (1983) and covering an administrative area of 33,197 rai (5,311.5 Ha) (map 4.2).

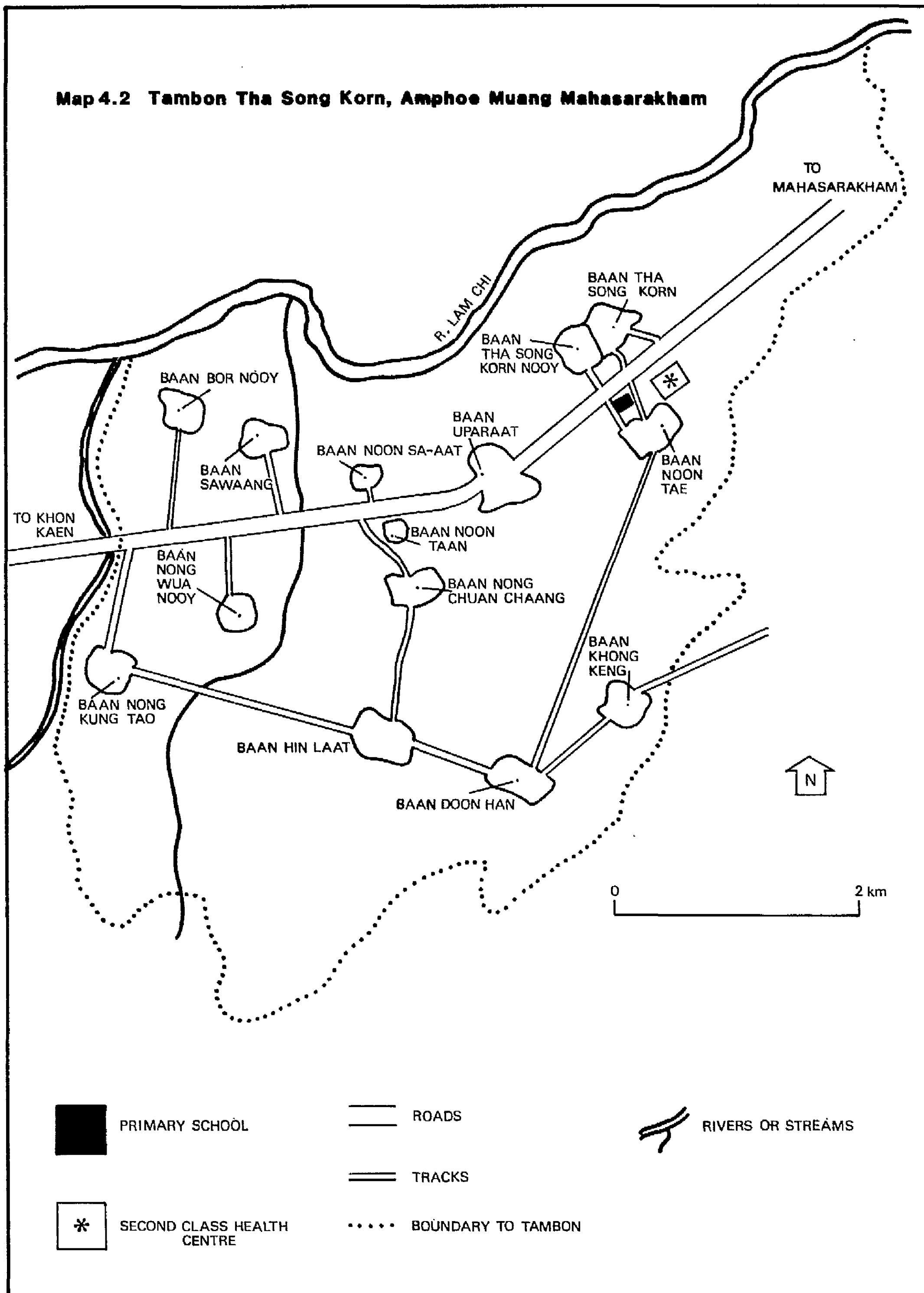
The communities are situated close to the Lam Chi (map 4.2), a major river of the Northeast, which drains, along with the Lam Mun, a major potion of the plateau. The river valley represents one of the original zones of settlement in the region and population growth in conjunction with an expansion in the area of farm holdings means no free land remains [1]. The villages, like most on the plateau, are sited on one of the lower terraces to protect them from flooding during the rainy season and are linked to the main road by means of laterite tracks that can take vehicular traffic throughout the year. In configuration the villages are nuclear, although in the case of Baan Tha Song Korn there has been some growth

[1] Tambon Tha Song Korn has a land area of 9,405 rai. Of this, 7,370 rai or 78% is used agriculturally (1982). The man:land ratio for the tambon is 1:3.1 (rai). This compares with a figure for the whole kingdom (1981 data) of 1:6.7, and for the Northeastern region of 1:6.5 (MOAC,1981,table 88,p 160; NSO,1982,table 7,pp 13-15).

Map 4.1 Mahasarakham Province



Map 4.2 Tambon Tha Song Korn, Amphoe Muang Mahasarakham



Source: District Agricultural extension office: Amphoe Muang Mahasarakham along the Khon Kaen - Mahasarakham road giving it a mixed nuclear/linear form.

Baan Noon Tae, the smaller of the two communities, has 849 inhabitants in 140 households. It was not established until 1917 when a number of families headed by Mr Oon Khaay Naam moved there and formed a new village. The muubaan grew as other families migrated to the site and in 1941 the government officially recognised the hamlet as Muu Thii Sii (village number four) [1] , tambon Tha Song Korn. The method by which Baan Noon Tae was established follows a pattern that has been characteristic of the region: as population increases so farmers begin to take up land on the periphery of the community [2]. Finally this is consumed and leads, "eventually to [the] founding of satellite villages whose inhabitants moved from the mother village in order to be closer to their fields" (Keyes,1976,p 53). Baan Tha Song Korn meanwhile has a population of 1,574 in 257 households and has grown to physically fuse with another village, Baan Tha Song Korn Nooy. The two sections have kept their identities though and are administratively separate, with different headmen and village numbers.

Both villages are farming communities with 93% of the households being officially defined as 'agricultural'. Rice is grown to meet subsistence needs on 82% of the

[1] Every village is assigned a number; Baan Noon Tae is village number four in the tambon, and Baan Tha Song Korn is village number one.

[2] The 'periphery' being defined as land near enough to be reached by foot, and cultivated.

farmland (crop year 1982/83), the remainder being planted to upland cash crops, fruit trees and vegetables. An important difference between the two which has already been mentioned, is that Baan Noon Tae had been chosen as a target community for the PDA's pilot project, 'Community Based Integrated Rural Development'.

In a general sense individuals within the villages can be grouped into two associations: the household, and in spatial terms, the compound. It is usual to find a household comprising a nuclear family (large extended families are rare) living in a compound with other households who are often in some way related. In the case of the two study villages the average household size was 6.1 members although they are fluid entities with husbands, sons and daughters leaving and returning with regularity.

Services and Amenities

Baan Noon Tae and Tha Song Korn are well-provided with services and amenities; a number of village shops exist selling a limited variety of general merchandise (fruit & vegetables, kanom, bottled drinks, washing powder, cigarettes etc;) and each has its own wat. Both villages have electricity and within one kilometre are located a Second Class Health Centre and the tambon primary school (map 4.2).

The town of Mahasarakham is easily accessible by means of a half-hourly bus service (fare: 2 baht) that runs from Khon Kaen to Mahasarakham, and villagers commonly travel there to buy goods unavailable in their own communities or to sell agricultural produce and crafts at the market or to middlemen and merchants. In addition, being a provincial capital, Mahasarakham has all the changwat-level government offices, a sophisticated hospital, secondary schools, an agricultural college, a teacher training college and a university (Srinakharinwirot Mahasarakham).

Health and Sanitation

The second class health centre is staffed by a midwife and a sanitarian and is able to provide minor medical care and distribute contraceptives. More serious injuries and illnesses are referred to the provincial hospital in Mahasarakham which is staffed by doctors and equipped with an operating theatre. At the village-level, the Ministry of Public Health (MOPH) has implemented two programmes to improve the health of children, namely; a vaccination and anti-biotics programme and a nutrition programme for pre-school infants (aged 1-5 years old) [1]. The Community Development Department (CDD) has also become involved in this aspect of development and the nation-wide Women Development Plan which is aimed in part at improving the general health of pregnant mothers, as well as the Children Development Plan, are geared at eradicating

[1] This is possibly in response to the alarming national and regional statisics regarding malnutrition among pre-school children; in 1980 in the province of Mahasarakham 62.4% of children aged between one and five had some form of protein-calorie malnutrition, the figure for the region being 59.2% (NESDB,1980,p 70-71).

infant mortality and malnutrition (CDD,Feb 1983,pp 33-36).

The provision of clean drinking water and adequate sanitation is also closely related to the general health of any community and the MOPH, CDD and the Population and Development Association (PDA) have been involved in providing, for a fee, rainwater tanks and jars, and lavatories. Now virtually all the households in Noon Tae and Tha Song Korn have some method of rainwater collection and storage, and 43 of the households in Baan Noon Tae have had lavatories built with the help of the PDA [1].

Education

In Thailand, primary education covering six years is both free and officially, compulsory [2]. In the households interviewed all of the children apparently entered primary school [3] and in contrast to some previous studies which have indicated a rapid drop out rate (eg; Leonor Jr,1982,pp 105-125), they also all seemed to have attended throughout the six year period. The

[1] Lavatories are not built directly by the PDA but through the CBIRD project; as this project does not operate in Baan Tha Song Korn, the number of latrines there is far fewer than in Noon Tae.

[2] The Primary Education Act of 1921 obligated parents to send their children to primary school for four years. In 1960 the length of primary education was extended to seven years (Kieatviboon Chomkhair,June 1981,p 206). The present National Scheme of Education was adopted in 1977 and follows a 6:3:3 pattern: six years of compulsory primary education followed by six years of optional secondary education divided into two three-year portions; Lower and Upper Secondary Education (Uma Sukonthaman & Sucharit Pienchop,Chulalongkorn University documents)

[3] Although one must assume a degree of over-reporting.

notion that schooling is free however, is only accurate in that no fees are levied and parents within the villages claimed there were significant outlays in terms of school uniforms, books, stationery and additional charges to pay for such things as ingredients during cooking lessons. In addition, there is the important factor that a child as young as six years of age represents an economic resource who, traditionally, would have been a member of the household labour force employed, most commonly, looking after the buffalo and cattle.

If a child from Noon Tae or Tha Song Korn is to continue his or her education and go to secondary school or further he or she has to travel to Mahasarakham nine kilometres away, to attend. The percentage of children doing so is small with 14% of those interviewed going onto secondary education (many of these only to complete the Lower Secondary stage) and only a handful further than that [1]. The fact that secondary schooling is not free and has fees totalling 1,500 baht per year together with a greatly increased bill for clothes, books, stationery and travel must significantly reduce the number of families able to afford it. Indeed, many parents when asked what they considered to be their largest cash outlays during the year identified schooling as one. Also, by the time a child is ready to go to secondary school at twelve or more years old, he or she is beginning to become a potentially

[1] It should be remembered that a larger proportion of those now in primary school will go onto secondary education and further.

full member of the work-force, and is therefore that much more of a lost asset. For how long a child attends school is not only dependent on a family's financial status, but also relates to their perception of the relevance of schooling to everyday life in a farming community. A number of villagers saw little benefit deriving from schooling past bor hok (the sixth year) and some even thought it to be undesireable, turning students into people "with cold hearts, like those in the towns". The inhabitants of Noon Tae and Tha Song Korn may be correct in holding this view that education does not serve their needs; the syllabus is designed and imposed from outside the villages and in many ways bears little relation to the nature of problems at the farm-level. As Axinn notes utilising material from Nepal, India, Indonesia and Thailand: "The large-scale centrally controlled literary and book orientated educational imports from abroad have failed to serve rural development in Asia" (Axinn,June 1977,p 487).

Authority and Administration: The Village Headman and Village Development Committee

The lowest level of authority in Thailand lies with the phuuyaybaan or village headman who is voted into the position democratically and keeps it until the age of 60 when he is obliged to retire (he may be removed if he loses the confidence of the other villagers). He receives a small government stipend of 419 baht per month and is empowered to settle minor village disputes and keep the vital statistics of the community. In the study villages the headmen were both respected and fairly influential men; this was especially true of the phuuyaybaan of Baan Noon Tae who was viewed by government officials and villagers alike as an especially able and committed man. He was 56 years old and had held the position for eight years. Unlike most of the rest of the inhabitants he was a relatively educated man with ten years of schooling, and as well as owning land he and his wife ran a small general store in the village. The headman of Baan Tha Song Korn meanwhile was 48 years old and had held the position for two years; as with the majority of the older inhabitants he had received schooling for four years to the level of bor sii.

The phuuyaybaan is critical as a link between the villagers and the government (Nehr,1974,p 46) and where his decisions are respected he may be an extremely important factor in the success or failure of development initiatives. In the case of Baan Noon Tae one of the officials involved in the CBIRD programme stated that any project which did not receive the support of the headman was unlikely to be adopted by the villagers; and indeed, the project managers were reluctant to choose a village as a target community unless they obtained the full cooperation and support of the village hierarchy (usually this meant the headman).

The study villages each have a Village Development Committee chaired by their respective headmen and, in both cases, consisting of nine members. The committees are creations of the Community Development Department and are expected to provide the Community Development Officer, who visits the meetings, with information regarding the needs of the village. In Noon Tae the group met approximately once a month, and in Tha Song Korn four to five times a year. The committees receive no funds from the government and represent informal groupings with few responsibilities and little power. However, both headmen were of the opinion that the committees could have a more significant role to play if communications with government officials were improved, and certainly the government is making attempts, at least on paper, to disperse decision making downwards (eg: Fifth Five-Year plan).

Authority and Administration: The Kamnan and Tambon Council

In each tambon the headmen of the villages elect one of themselves to be Kamnan or tambon headman:

> "The tambon headman can be considered a quasi-agent of the central government. He is responsible for transmitting to the people the directions of the government as handed through the chain of command. His specific functions include the supervision of law and order in the tambon, the supervision of agricultural projects, participation in ceremonial duties, the recording of vital statistics, tax collection and ex-officio membership of the tambon council" (Narong Sinsawasdi,1980,p 14).

In Tambon Tha Song Korn the headmen had chosen the phuuyaybaan of Baan Nong Chuan Chang to be their kamnan.

The kamnan, as well as assuming a number of other duties, is automatically the chairman of the Tambon Council. In the commune of Tha Song Korn this council consisted of 29 members, two from each of the 14 villages of whom one was the village headman; and the tambon doctor. The council received no direct funds from the government but was supposed to be involved in the decision-making process with respect to the design and implementation of projects in the tambon. In fact, one of the objectives of the present Five-Year Plan is to strengthen, improve and give greater responsibility to the Tambon Councils in the Poverty Areas of Thailand, of which Mahasarakham is one (NESDB[1],n.d.,pp 283-294). Even so, the headman of Noon Tae was not impressed by the degree of cooperation between the council and government officials and felt that decisions were made independently of it with little notice being taken of their views.

Authority and Administration: Religion

Thailand is a predominantly Buddhist society and, "apart from the family, the wat is the next most important institution in Thai rural life...standing as a symbol of the committment of the people to Buddhism and as the core of village unity" (Somboon Suksamran,1977,p 19). The Sangha are highly respected and authority in a rural community lies not only with the phuuyaybaan but also with the abbot of the wat, and to a lesser degree with the bhikkhus (monks) under him. Due to this, as well as being the religious focus of the village, the wat and its monks also have an important secular role to play; councilling the villagers, arbitrating in the settlement of disputes and generally aiding in the process of modernisation

(Klausner,1982,pp 144-153; Somboon suksamran,1977).

Each of the study villages had a wat containing, in Baan Noon Tae, three monks and an abbot, and Baan Tha Song Korn, seven monks and an abbot. Both institutions represented important elements of village life with the inhabitants respecting the bhikkhus and seeking guidance, advice and information from them, and the bhikkhus appreciating their potentially significant role in the development of the communities. This was especially true of the abbot of Baan Noon Tae, an innovative and able 30-year old, who was deeply involved in the modernisation of his village and was, according to the Community Development Officer, one of the primary reasons (along with the phuuyaybaan) why the community had been so successful in terms of 'development'. To illustrate this: the abbot encouraged two of his bhikkhus to help dig and build a road in the village, something that Klausner states should never happen:

> "One must always carefully distinguish between appropriate Sangha behaviour in disseminating information, playing the role of 'foreman', and direct physical involvement in the program in question. Monks have encouraged the building of roads and wells and given such technical advice as necessary. In the case of wells, the rural monks will often help place the well rings in proper position. However, the monks are forbidden to dig as they might inadvertently kill a living creature" (Klausner,1982,p 152).

This seems to be an example of an instance where the constraints of religion have clashed with the interests of development, and, in this case, it is the latter which has, so to speak, won the day.

As well as supplying the Sangha with food, gifts and other necessities, the inhabitants of Noon Tae and Tha Song Korn also contributed a portion of their income to their respective 'Temple Funds'. Of those interviewed regarding this aspect of expenditure, the average outlay represented 3.9% of the stated annual income of the villagers of Baan Noon Tae and 5.1% of that for those of Baan Tha Song Korn (average: 4.4%). The resources of the funds seemed to be used in a variety of ways; for example: to repair and expand the wat, to subsidise festivals and to support both the religious and the secular activities of the Sangha.

Land, Topography and Soils

Reflecting the fact that the study site occupied the valley bottom of the Lam Chi the area surrounding the villages consisted primarily of lowland suitable for the cultivation of wet rice (map 4.3). Farmers classified their riceland into three categories: thii lum, lower riceland; thii raap, middle riceland; and thii dorn, upper riceland. In addition, thii lum was further divided into the seasonal classification thii prang, irrigated riceland (fig 4.1). Except for thii prang which represents a special division of minor importance in the villages, the three categories reflect the varying degrees of water availability found in the area, and depend largely (as mentioned previously) on the inter-play of two variables: permeability/drainage and topography, the two invariably being closely connected.

Map 4.3. Land Use: Area Surrounding Study Villages

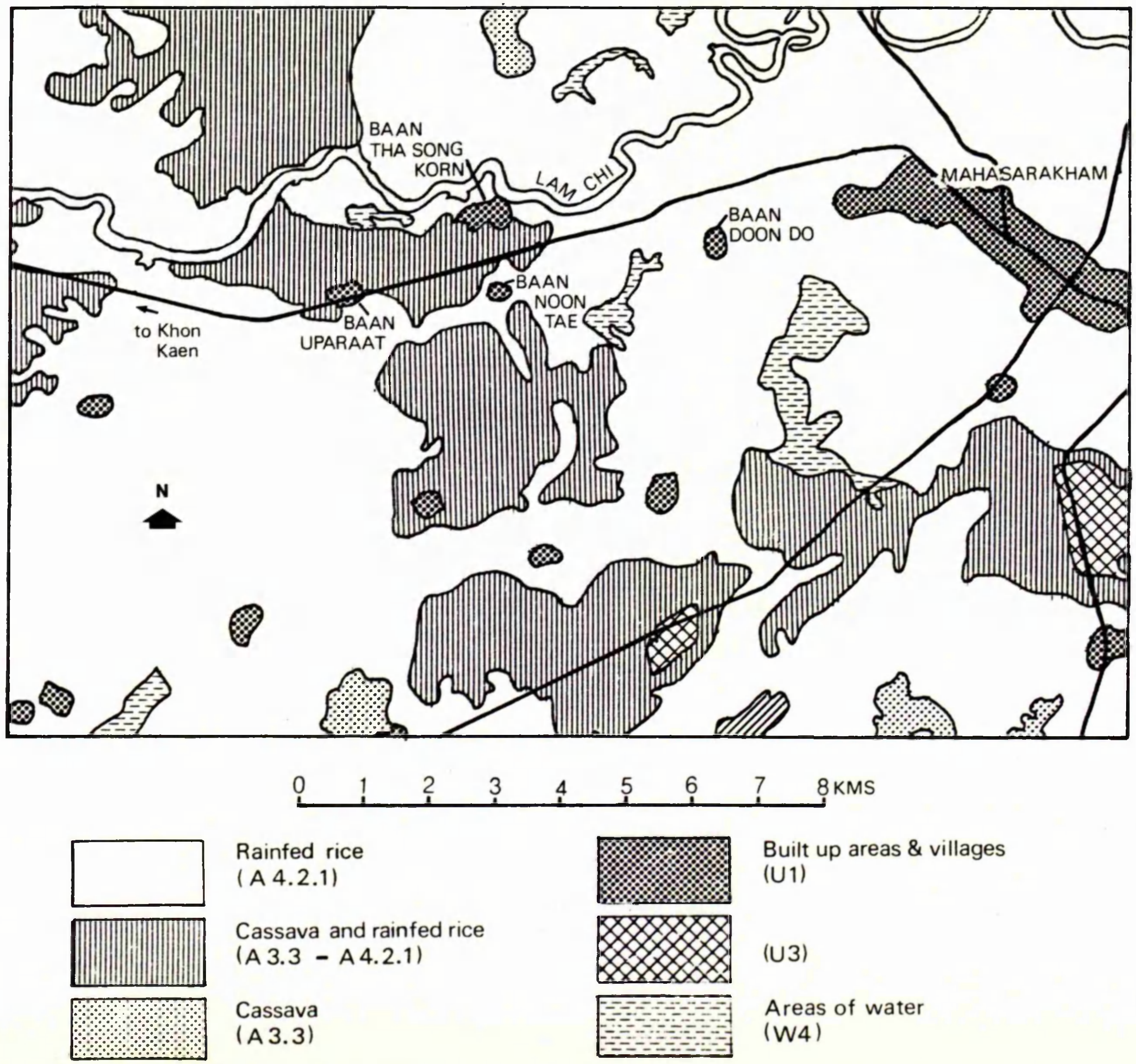
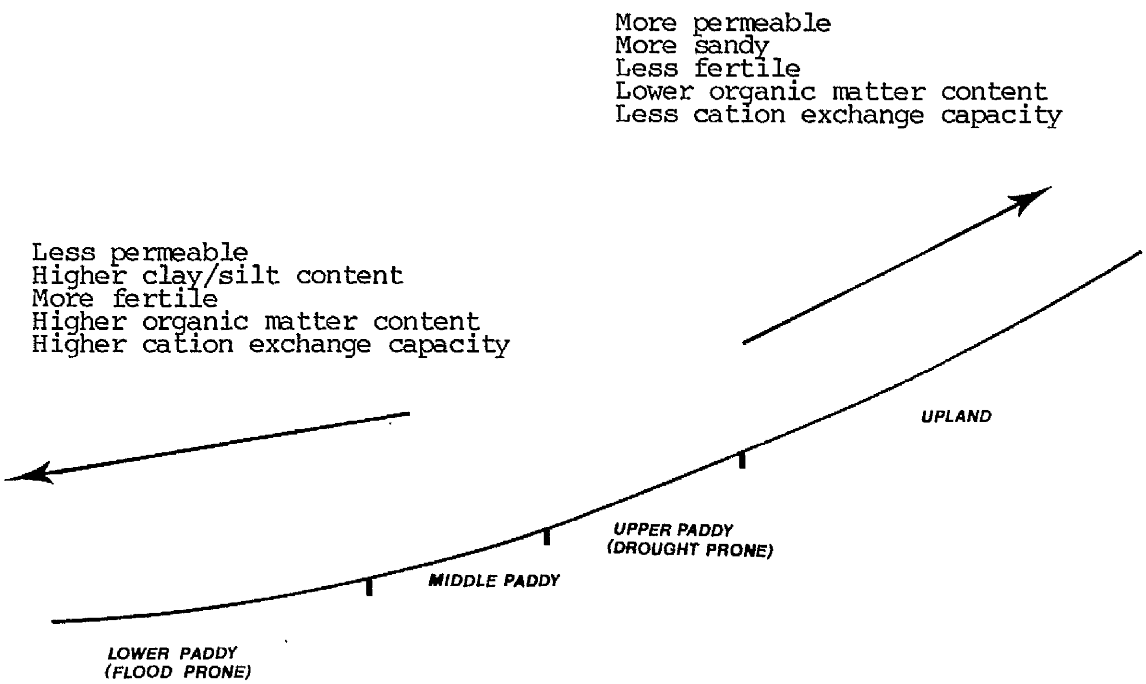


Figure 4.1

Land Categories and Characteristics



Although there is clearly a continuum in which water becomes more, or less, available the three types of rainfed riceland which the farmers identified and labelled, in effect neatly encapsulate the ways in which water supply, the primary factor on which the success of wet rice cultivation depends, can depress yields: thii lum is prone to excessive inundation and thii dorn to drought, while thii raap, the land lying between the two, can normally be expected to have reasonable stability of water supply. However, even though the divisions have a very real resource related impact with relation to water conditions, the altitudinal difference between lower and middle, and middle and upper paddy may be very small - feet, or even inches.

The questionnaire revealed that farmers perceive 64% of their riceland to belong to the category thii lum, 19% thii raap, and 17% thii dorn, with irrigated lower paddy land accounting for only 0.5% [1].

Above the upper riceland is found thii rai - upland proper. This land has conditions of drainage and permeability which prevents the impoundment of water and the area is suitable only for the cultivation of drought resistant upland crops. However, as on the riceland, the strict division of land into one type or another is

[1] Water is provided on this land during the dry season through pump irrigation. The project however, only affects a very small number of farmers in Noon Tae and Tha Song Korn, and the season 1982/83 was the first it had been in operation.

obviously a false one and in reality zones of potential rice cultivation fade into zones of potential upland cropping. The area of transition from one to the other (in the majority of cases) is presently reserved as padiland even though a number of authorities (eg: Ng,1973) have observed that such marginal thii dorn might be better planted, both physically and economically, to upland crops [1] (farmers asked were of the opinion that, on average, this band of transitional riceland/upland could only be planted to paddy one year in three).

Figure 4.1 illustrates the distribution of land and land characteristics along the progression from thii lum to thii rai. It is important to realise that this

[1] In this thesis upland is defined as that land planted to upland crops (cassava, kenaf, sugar cane), lying above the upper padiland. The inhabitants of Noon Tae and Tha Song Korn called such land thii rai. It is important to realise that the definition is not a loose one but refers to a specific band of land above the upper paddy and below the forest line (in the case of the study villages there was virtually no forest remaining so it encompassed almost all the land above the upper paddy). The only occasion when the term did become a little flexible was during the few instances when farmers had planted thii dorn (identifiable by the presence of bunds) to upland crops. Where the land had permanently been turned over to such crops (often the bunds were left unmaintained and were being eroded away) farmers tended to have reclassified it as thii rai; where it was only a temporary measure the farmers would continue to call the land thii naa dorn, although they would qualify this by saying that it had been planted to an upland crop.

progression and the associated topography is not peculiar to the study area but common to the entire central portion of the Northeastern region of Thailand.

The soils of the study site are characteristic of those of the changwat and their general properties have been described in the previous chapter. However, given the shortcomings of Thai government surveys and the variations that can occur when small areas are being examined in detail, it was felt that a limited analysis of the soils of the research area would be useful.

Soil samples were taken from three progessions from riceland to upland (table 4.1) in an attempt to illustrate the changes that occur in the nature of the soils from <u>thii lum</u> through <u>thii raap</u> and <u>thii dorn</u> and up onto <u>thii rai</u>. It was hoped that this approach would show that a relationship existed between soil type and land use. To be more explicit, it was expected (as government surveys and other reports indicate) that the progression from <u>thii lum</u> to <u>thii rai</u> would reveal the following trends: a fall in the organic matter; a decline in fertility; an increase in the proportion of sand and finally, a drop in the clay/silt content.

Each of the fifteen samples consisted of 6-8 minor samples of equal quantity. There was a tendency to sample along the contour lines rather than across them as it was envisaged that the soils wouls change more dramatically up and down the slopes than along them. Tree stumps, boundaries to fields and padis, areas beneath trees, depressions and other factors which might have a caused a distortion in the results were avoided. The samples were tested for organic matter content, phosphorous, potassium, nitrogen and acidity at the Northeastern Regional Office of Agriculture at Tha Phra. In addition, four of the samples were also analysed for their particle distribution (texture).

The results show that all the samples are infertile and low in organic matter, thus conforming to the 'characteristic' Isan soil (table 4.1):

The organic matter content never rose above 1% with the highest reading of 0.910% coming from unused upper paddy and the lowest of 0.420% from harvested kenaf land. The average for the 15 samples was 0.691%. Using the USDA classification [1] these results range from 'very low' (less than 0.5%) to 'low' (0.5% - 1.0%), with the mean lying in the 'low' grouping. Reflecting the fact that nitrogen and organic matter are closely related, the nitrogen content of the samples was also low, varying from 0.0210% on kenaf land to 0.0455% on unused upper paddy and with a mean of 0.0349%. As far as phosphorous is concerned both the highest (12.5 ppm) and the lowest (1.5 ppm) readings came from samples taken from upland, the analysis recording an average of 4.9 ppm. This, using the USDA classification, is defined as 'low'. The potassium

[1] Source:Department of Land Development, 1972.

Table 4.1

Soil Analysis of Three Progressions from Riceland to Upland

	Progression One	Progression Two	Progression Three	Average
Thii Lum/Raap	(rice)	(rice)	(rice)	
pH(H20)	5.8	5.8	5.1	5.6
Organic matter	0.840	0.490	0.735	0.688
Nitrogen	0.042	0.0245	0.0367	0.0344
Phosphorous	4.0	5.0	6.1	5.0
Potassium	12.3	11.3	16.5	13.4
Thii Dorn	(unused)	(unused)	(unused)	
pH(H20)	5.6	5.7	5.2	5.5
Organic Matter	0.735	0.735	0.910	0.793
Nitrogen	0.0367	0.0367	0.0455	0.0396
Phosphorous	2.5	6.1	4.0	4.2
Potassium	15.5	26.9	23.8	22.1
Thii Rai	(kenaf)	(kenaf)	(wasteland)	
pH(H20)	5.3	5.5	5.1	5.3
Organic Matter	0.700	0.420	0.735	0.618
Nitrogen	0.035	0.021	0.0367	0.0309
Phosphorous	1.5	5.0	4.0	3.5
Potassium	12.3	46.7	14.4	24.5
Thii rai	(kenaf)	(cassava)	(cassava)	
pH(H20)	5.7	5.9	5.5	5.7
Organic Matter	0.500	0.700	0.665	0.622
Nitrogen	0.028	0.038	0.0322	0.0331
Phosphorous	1.5	7.6	3.0	4.0
Potassium	12.3	21.7	18.5	17.5
Thii Rai	(cassava)	(cassava)	(cassava)	
pH(H20)	5.9	6.0	5.6	5.8
Organic Matter	0.700	0.735	0.770	0.735
Nitrogen	0.035	0.0367	0.0385	0.0367
Phosphorous	4.5	12.5	6.0	7.7
Potassium	24.8	21.7	21.7	22.7

In brackets: Land use at sampling point.

Acidity (pH):	H20, 1:1
Organic Matter:	percentage
Nitrogen:	percentage
Phosphorous:	parts per million (Bray P2)
Potassium:	parts per million (NH4 Acl N.pH 7)

content of the soils meanwhile ranged from 11.3 ppm on middle padiland to 46.7 ppm on harvested kenaf land. The average concentration of 20.0 ppm, again using USDA criteria, is 'very low'. All the samples were moderately acidic (Brady,1974,p 34) with pH varying between 5.1 and 6.0.

The four samples that were tested for texture represented one progression from upland Korat soil down onto the lower Roiet series. All showed a similar particle distribution placing them in the soil textural class 'loamy sand' (table 4.2).

Table 4.2

Soil Analysis: Particle Disrtibution

	Sand %	Silt %	Clay %	Soil Class
Thii Lum/Raap	87.31%	6.59%	6.10%	Loamy Sand
Thii Dorn	88.03%	6.37%	5.60%	Loamy Sand
Thii Rai	88.60%	6.28%	5.11%	Loamy Sand
Thii Rai	87.31%	7.11%	5.58%	Loamy Sand

Although in general terms these results conform to what might be expected, the analysis reveals no trends in the nature of the soils from riceland to upland. There is no pattern regarding any of the tests conducted (including particle distribution), taking either the individual progression or an 'average' of the three (table 4.1). Because of this, it is impossible to identify any relationship between soil type and land use, or between soil type and topography. Instead the results reveal a group of samples homogenous in their infertility.

AGRICULTURE

Baan Tha Song Korn and Baan Noon Tae are farming communities cultivating glutinous rice to meet their subsistence needs and growing upland cash crops to supplement their income. Despite the importance of non-agricultural sources of income among many of the households included in the questionnaire, the inhabitants of the villages viewed themselves first and foremost as, chaaw naa; rice farmers.

The average land holding of the two villages amounted to 19.7 rai; 82% or 16.1 rai of which was riceland and the remainder, 3.6 rai, upland (table 4.3). These figures are slightly lower than the government statistics for Mahasarakham as a whole , but given that the research area is located only nine kilometres from the capital of the province in an area of intense cultivation, this is not suprising (table 4.3). Individually, the villages show some variation: Baan Noon Tae, although it has a similar average size of land holding, has a higher proportion of upland; 27% (5.5 rai) versus Baan Tha Song Korn's 12% (2.3 rai) (table 4.3).

Reflecting the fact that the area is one of long settlement, most of the land of the households questioned had been inherited, with only 6% of the riceland plots having been bought by the family-heads now cultivating them. Interestingly, the proportion of upland fields that had been bought was over twice as high at 15%; this is probably because the upland was not absorbed into the farm system until relatively recently, meaning that it was available for purchase (or for acquisition by some other means) long after all the riceland had been claimed (table 4.5).

Table 4.3

Baan Noon Tae & Tha Song Korn: Land Holdings

	Baan Tha Song Korn	Baan Noon Tae	Average	Provincial Average(1980)
Av. Size of Landolding	19.0	20.5	19.7	25.5
Av. Area of Riceland	16.7	15.0	16.1	21.7
Av. Area of Upland	2.3	5.5	3.6	3.8

(Area in rai)

- Out of the 81 households interviewed three were non-agricultural. These have been om itted from the calculations.

Source:MOAC,1981,table 89,pp 162-163

Land Ownership

Tenancy is not a problem in the Northeastern region of Thailand, nor in the province of Mahasarakham. Government statistics show that in Mahasarakham 3.4% of the area of farm holdings are rented, and a further 3.4% borrowed for no fee (MOAC,1981,pp 170-174). The questionnaire showed a similarly low rate of tenancy: 96.7% of the land was owner-occupied (94% of households), 0.3% rented and 3.0% borrowed for no charge. Out of the 79 agricultural households interviewed three were full tenants and two partial tenants [1]. Significantly, all the land whether it was rented or borrowed was provided by relatives, and when each case is examined in detail it becomes clear that 'tenancy' should not automatically be correlated with 'exploitation', and that the nature of ownership should be viewed with flexibility. For example; in Northeast Thailand it is commonly the youngest daughter who inherits a family's land and of the 50 rai borrowed 32 rai, although still in the name of the parent, was under the control of the husband of the daughter who was due to inherit it.

In addition to there being five full or partial tenants among those households interviewed there was also one family who could be classified as 'landless'. This was a young couple with two children who lived in a house borrowed from a relative. The husband had no permanent job; he worked as a labourer when possible and was educated to bor sii (four years of primary school education). They wished to either buy or rent land but the scarcity of it meant that they had little hope of being able to do either. Despite this, at the time of the conversation neither husband nor wife wanted to leave the village in search of employment and, suprisingly, when asked what their occupation was replied, 'tham naa'; rice farming.

Also possibly symptomatic of a scarcity of land are the high rentals demanded: of the four households in the

[1] Tenancy here includes those households who borrow land and pay no rent.

questionnaire sample who were involved with renting land either in or out, one secured a rent of two-thirds of production; one, one-half; and the third, 200 baht per rai for five rai of upland [1]. Two of these rates are above those specified in the 1974 Farm Rent Control Law which stipulates that the maximum rental must not exceed one third of the total production (Krikkiat Phipatseritham,Nov 1979,p 36).

In Northeastern Thailand it is often the case that although ownership of land is high, documentation of ownership is low. This tends to limit the number of families who can use their land as collateral, as well as causing administrative problems. There are four forms of ownership certificate: sor kor nung, bai chong, nor sor saam, and chanot thii din of which only nor sor saam and chanot thii din are valid as proof of ownership when the land is to be used as collateral when borrowing money (table 4.4).

Among those interviewed in Noon Tae and Tha Song Korn, 90.1% of their fields were registered as nor sor saam, 6.6% as chanot thii din and only 3.3% as sor kor nung [2] (table 4.5). Therefore, nearly 97% of the land can, if required, be used as collateral to secure a loan.

[1] The fourth farmer had borrowed money from an aunt. He gave her 10 rai of upper paddy to cultivate as payment for the interest on the loan.

[2] None of the land was registered as bai chong possibly because of the length of time the surrounding area had been settled and cultivated: the bai chong certificate indicates that the land has only recently been cleared and is only common in areas of farmland expansion (look to table 4.4).

Table 4.4

Certificates of Land Ownership

1/ SK 1, known as sor kor nung. This is the former certificate of ownership issued before the promulgation of the 1954 land code. This certifiate cannot be transferred, but can be inherited. Holders are unable to use the document as collateral - a nor sor saam must be obtained

2/ NS 2, known as bai chong (pre-emptive certificate). the document authorises temporary occupation of land. If the holder fails to cultivate that land within three years it becomes state land once again. The form cannot be used as collateral

3/ NS 3, known as nor sor saam (certificate of utilisation or exploitational testimonial). This can be issued after a competent official has surveyed the land and found over 75% to have been brought under cultivation. It replaces the bai chong. The form can be used as collateral.

4/ NS 4, known as chanot thii din (title deed). This includes a title deed map, certificate of ownership in lieu of title deed and the pre-occupation certificate stamped 'already put to use'. The form can be used as collateral.

5/ NS 5, known as bai tai suan (certificate of land examination). This states that a land survey has been undertaken for the issuance of a chanot thii din. It includes a plot identification slip, bai nam.

Source: Land Department,1954,p 13; Van der Meer,1981,p 93.

In the light of this, the documentation of land ownership cannot, in itself, be identified as a constraint restricting the borrowing of money by farmers.

Table 4.5

Land Acquisition & Ownership in Noon Tae and Tha Song Korn

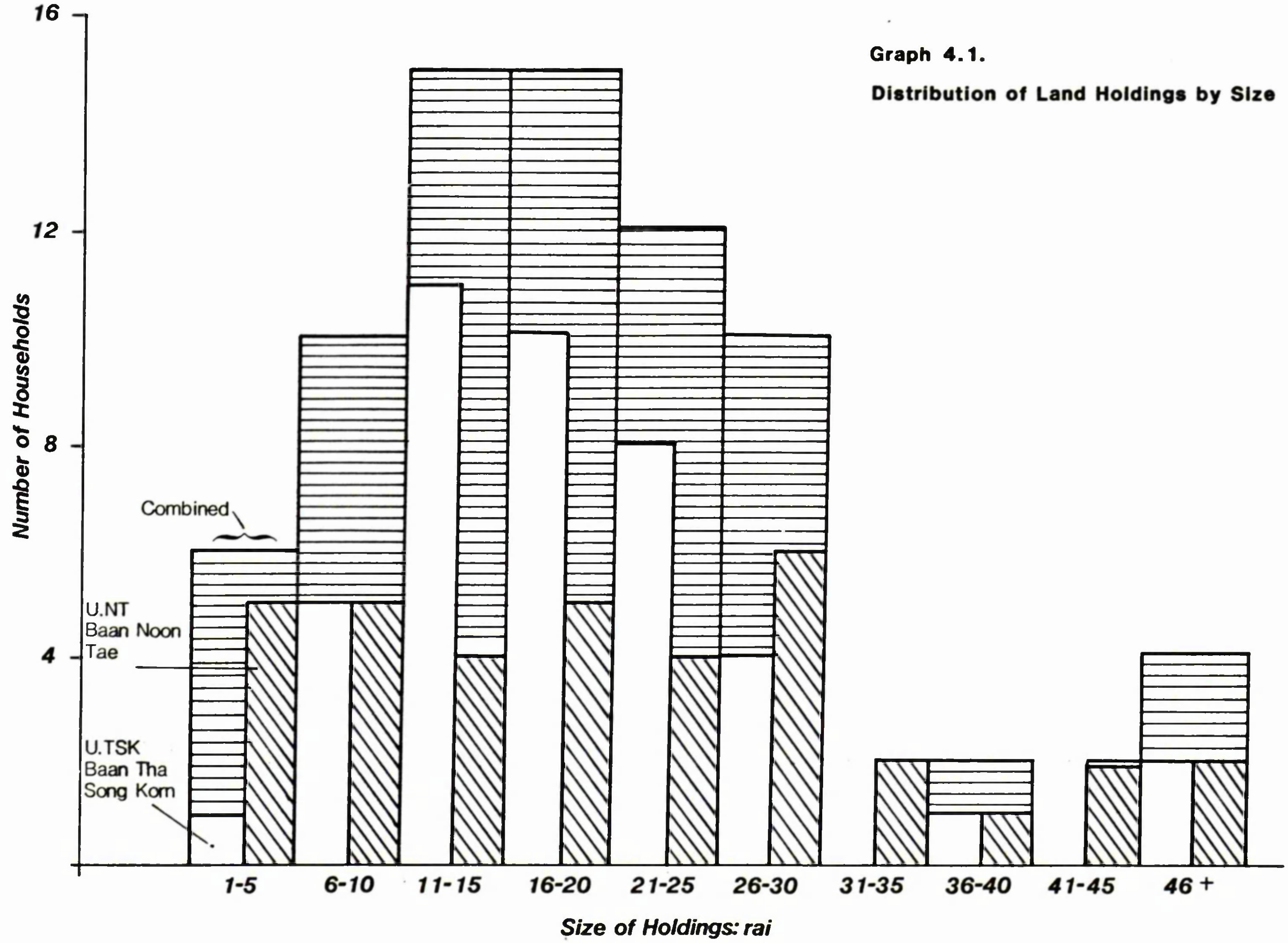
	Riceland	Upland	Total
Plots Inherited	122 (94%)	44 (85%)	166 (91%)
Plots Purchased	8 (6%)	8 (15%)	16 (9%)
Total Plots	130	52	182
Plots with Chanot	7 (5%)	5 (10%)	12 (7%)
Plots with N.S.3	118 (91%)	46 (88%)	164 (90%)
Plots with S.K.1	5 (4%)	1 (2%)	6 (3%)
Total Plots	130	52	182

Although land was scarce in the research area and all the inhabitants perceived that fragmentation of holdings was increasing as population grew, no family had managed to gain control of a dominantly large amount of land (graph 4.1). The largest land owner was a Mr Liang Arway of Baan Tha Song Korn who owned 81 rai, and of the sample only four of the 79 agricultural households, or 5%, owned more than 46 rai.

The importance of tenancy and the distribution of land in determining the degree of economic responsiveness among farmers is well known. It "controls or at least limits the power of choice and action of individuals and families; it is the chief means of rationing economic opportunity; and it determines the impersonal distribution of production and income and the extent to which general economic incentives become meaningful to the farmer" (Oweis; quoted in Chumphot Suvaphorn,1975,p 118).

Graph 4.1.

Distribution of Land Holdings by Size



The fairly equal distribution of land [1] coupled with the low rate of tenancy and the high proportion of land with certificates of ownership in Noon Tae and Tha Song Korn means that at least in this respect there are seemingly no problems restraining the farmer.

Rice

Padiland accounts for over 83% of the land under cultivation in the the villages and rice, as the subsistence crop, is of paramount importance with every other aspect of agriculture being subordinated to its demands. Taking the average consumption of paddy as 246.4 kilograms per capita per year [2] (IBRD,Sept 1978,p 197), then of the 71 households in the sample (88% of total sample) with no substantial income outside agriculture, 76% (54 households) grew enough rice in the 1982/83 season to meet their needs. Of the remaining 17 households who did not, nine stated that they would normally expect to have to buy additional rice while seven remarked that their production was abnormal and in most years they could expect to produce enough to feed themselves and their families (one household gave no reply) (table 4.6).

[1] Graph 4.1 shows that although overall land distribution is fairly equal, when the two villages are examined individually Baan Noon Tae exhibits a somewhat less equitable distribution than Baan Tha Song Korn. However, the difference is not felt to be dramatic enough to upset the contention that land in the villages is not unequally distributed .

[2] This figure is arrived at by taking the average per capita paddy consumption for the years 1967-1977.

Unlike the rest of Thailand, the staple crop of most of the Isan region is glutinous rice, khaaw niaw, and in the study area 84% of the rainfed paddy was planted to it (table 4.7). Those farmers who grew non-glutinous rice (khaaw jaaw) did so for two reasons: either they owned enough riceland to turn a portion of it over to what is essentially a cash crop; or they had decided to take advantage of the higher price commanded by khaaw jaaw, through growing and selling it, and buying back proportionately more khaaw niaw for their own consumption.

Table 4.6

Rice Production and Rice Consumption [*]

	Number of Households	%
Grow enough rice to meet consumption requirements	51	63%
Grow non-glutinous rice to sell, buying back glutinous rice for home consumption	3	4%
Do not grow enough to meet consumption requirements	16	20%
Do not grow enough to meet consumpt'n but have substantial income outside agriculture	8	10%
Non-agricultural households	2	2%
Landless family	1	1%

[*] Consumption requirement taken as 246.4 kilograms of paddy per capita per year (IBRD,Sept 1978,p 197).

Table 4.7 shows the varieties of rice grown and the area planted. Taking only the rainfed paddy, except for one household in Baan Noon Tae who cultivated seven rai of

RD-6, no farmer in the questionnaire sample grew any of the RD rice types in the crop year 1982/83. Instead, almost 48% of the planted riceland was devoted to two 'traditional' [1] varieties of glutinous rice: nang nuan and khaaw dor. A further 510.5 rai or 43% was planted to three 'improved' rice types: khaaw dok mali 105, sanpathong and kum phai. Sanpathong and kum phai are both glutinous and were released by the Thai government in 1962 [2], while khaaw dok mali 105 is non-glutinous and was released in 1959. All three of the rices were bred to incorporate the best qualities of a number of traditional types; but even so they are not HYV's but products of an earlier period of breeding. The final 10% of rainfed paddy was planted to three non-glutinous rices: khaaw jaaw khaaw, khaaw jaaw luang tong and khaaw laaw looy.

The 6 rai of irrigated riceland cultivated by those farmers questioned was planted to RD-7 (non-glutinous, released in 1975) and RD-8 (glutinous, released in 1978).

The beginning of the rice season in the Northeast begins any time from late May through to July or even August depending on the onset of the rains. However, it is important to realise that the various ricelands become available for cultivation at different times: the lower land will become inundated first and the upper padis last. For this reason, farmers tend to locate their nursery beds

[1] Farmers refer to such rices as being phuan baan; literally, 'neighbour' or 'village' rice.

[2] The information on release dates is taken from Grandstaff's 1981 paper.

in such a way that they will receive the first of the rains and so allow seeding at the earliest possible date. When the rice fields are saturated they are ploughed and harrowed with buffalo to puddle the soil and level the land. In only one instance did a farmer utilise machinery to do this job and, in any case, it may well be that mechanical deep ploughing would have a detrimental effect on the land by destroying the plough-pan that has built up in the padis over the years. If this occurred, the sandier soils would become more permeable thereby shortening the period in which they could remain inundated.

Table 4.7

Rice Varieties Cultivated in Noon Tae and Tha Song Korn

Rainfed Riceland	Area (rai)
Nang Nuan [*]	448.5
Kum Phai [*]	173
Sanpathong [*]	251
Khaaw Dor [*]	120
Khaaw Jaaw Khaaw	3
Khaaw Jaaw Luang Tong	77
Khaaw Jaaw Looy	26
Khaaw Dok Mali 105	86.5
RD-6 [*]	7
SUB-TOTAL	1,192 rai
Irrigated Riceland	
RD-7	2
RD-8 [*]	4
TOTAL	1,198 rai

[*] - Glutinous rice types

The seedlings are transplanted from the nursery beds and into the rice fields when they are approximately one month old. Transplanting, even though it is staggered due to the fact that the padis become saturated at different times, is a labour intensive process and often requires more labour than any one family can muster. In the past this demand would have been met by reciprocal labour exchange or long khaek. Today however, due to the presence and prevalence of the cash economy, labour in Noon Tae and Tha Song Korn must usually be hired. The wage for a days transplanting is from 25 to 30 baht with a meal (in some cases more than one meal) being provided [1].

Because of the varying levels of water availability found in the area, more often than not a portion of the higher riceland never becomes saturated enough to be transplanted. In fact, in the crop year 1982/83 almost one quarter of the land classified as being thii dorn or upper paddy, remained unused.

Although the use of chemical fertilisers was widespread with nearly 69% of farmers who cultivated rice using them, the rate of application was low averaging only 7.9 kilograms per rai. This compares with the district agricultural extension office's recommendation of 30 kilograms per rai. Most of those questioned applied their fertilisers in one dose after transplanting. However, there were also some households who added them at

[1] Among the inhabitants of the villages it was felt to be important to provide a meal of some quality. Many households killed chickens to be used in the meal and some families kept fowl to be used solely for this purpose. It also appeared to be customary among some of those interviewed to add marijuana in order to 'make transplanting sanuk' (fun).

'heading' and a small number prior to transplanting. As well as chemical fertilisers, 42% of the farmers also used manure on their riceland. This was collected from the buffalo stalls beneath each house and from paths, fields and wasteland, and placed in the padis to be later ploughed into the soil. The activity was very time-consuming however and invariably the amounts of manure collected were small.

After transplanting, the rice is left to grow and ripen with only a minimum of weeding being carried out. At heading the crop becomes susceptible to attack by birds and other animals, and to combat any loss of production the family, as a whole, will often move out into their fields to sleep and eat, in order to protect their rice. Insect attack also becomes increasingly prevalent as the crop matures and 64% of the households used an insecticide of some variety. These seemed to be applied primarily as a cure rather than as a preventative: they were used after the farmer had perceived that his crop was being attacked, and when a household had not bothered to apply any it was because, 'there were no insects'.

By early November some of the fields were ready to be harvested. As with all the other stages of the rice cycle in the Northeast, the activity is spread over a considerable period of time with the last padis, usually the lowest [1], not being ready until mid-December.

[1] These padis, as well as receiving the first of the rains are also the last to dry out. The farmers take advantage of this by planting khaaw nak (heavy rice) varieties which have the ability to yield more but are late maturing. On the higher ground where water supply extends over a shorter time farmers cultivate khaaw bao (light rice) which is early flowering and hence quick maturing.

Harvesting represents the second of the labour peaks in the season and usually requires that labour be hired or exchanged. However, the inhabitants of the two villages felt that the work of harvesting was not as hard as that of transplanting and the average wage was some five baht per day less because of this. After the rice had been harvested it was stacked and then threshed on a flattened piece of ground in the vicinity of the fields. Families often joined together to make the activity more enjoyable, or sanuk [1]. When this had been completed a pick-up truck was usually hired to transport the production into the villages to be stored in each household's rice barn. The remaining straw was then gathered together and placed on platforms set high in trees or fenced off on the ground (for protection) to be used as fodder during the dry season.

Among the 74 households in the sample who cultivated riceland only 10, at the time of questioning, had sold any of their production (a further six were intending to market some). In two of these cases the rice was sold informally to relatives or friends at a reduced price. Of the remaining households, seven sold their rice to middlemen in the town of Mahasarakham and one to the government. The total quantity of rice that was marketed

[1] People placed immense emphasis on sanuk; the nearest translation is, 'to have fun', although it really means much more than this and is a word with a great depth of expression. Activities would be completed due to the fact that they were sanuk and others avoided because they were not, and whenever possible tedious jobs would be done in groups, not necessarily because it was the best approach, but to make them sanuk.

(formal and informal) amounted to 31,150 kilograms of paddy, some 14% of that produced by the farmers covered by the questionnaire.

Upland Crops

Upland, thii rai, covered 18% of the agricultural land in the villages. It was not evenly distributed between the communities however: Baan Tha Song Korn, the muubaan lying right on the banks of the Lam Chi had less with only 11% of the land of those interviewed being upland. In contrast, Baan Noon Tae with its location slightly inland from the river had more, and nearly 26% of the land holdings were classified thus. The distribution of thii rai within each of the muubaan was fairly equal and no farmer controlled an excessive amount. The greatest area owned was only 20 rai and the average figure among those cultivating upland was nearly 6 rai.

The upland was planted to five crops: cassava, kenaf, jute [1], sugar and water melon. Among these cassava was predominant accounting for 85% of the area. In the past the farmers of Baan Noon Tae and Baan Tha Song Korn planted mostly kenaf and it was not until the relative prices of kenaf and cassava altered in the mid-1970's that they began to change. In fact, 74% of the farmers who grew cassava stated that they had previously cultivated either jute or kenaf.

[1] The 'jute' grown in the Northeast is known as bor krajaaw and unlike the jute of South Asia is an upland drought resistant variety which does not grow well in wet conditions.

Cassava (*Manihot utilissima Pohl* or *Manihot esculenta Crantz*) is a drought resistant tuber crop which, in Thailand, is grown almost exclusively for export. In terms of its growth cycle it is flexible and can be planted and harvested at any point during the year. For this reason, the timing that each individual farmer adopts is moulded around the demands set on him by his other crops and activities (although in the research area farmers tended to harvest their cassava between mid-December and the end of January).

When the previous season's crop has been harvested the vegetative remains are gathered together and burnt. None of the farmers encountered attempted to incorporate the ash into the land, and nor was there any indication that the raw residue was ploughed into the soil as an alternative to this. Following the clearance of the fields the land was ploughed and prepared for planting. There was considerable variation in the manner in which each field was prepared: some were merely ploughed while others were built up into raised beds. Invariably the process was completed in the traditional manner using cattle or buffalo although occasionally farmers would hire tractors to do the job.

Cassava is a crop that can be propagated vegetatively and farmers retained some of the straightest and sturdiest stalks from the previous season to use as cuttings. These stalks are cut into 4-8 inch pieces and planted in rows. The density of planting varied although on average the rows would be three feet apart and the plants in the rows, two feet from each other. After planting, attention was meagre; only one of the farmers interviewed applied any chemical fertilisers and no pesticides or herbicides were used. In fact, the only input of any sort prior to harvesting was weeding which would be done, often superficially, on perhaps two or three occasions. Once again, it is important to stress that the quality of cultivation and the nature of the cultural practices varied greatly between farmers.

After anything from ten to eighteen months the crop is ready to be harvested, by which time it stands some five to twelve feet tall. The harvesting of the crop was done by hand. Hoes were used to loosen the soil around each plant and the tuber was pulled out of the ground with the upper vegetative parts. The roots were then cut from the rest of the plant and transported by truck to the point of marketing.

Of the 38 households that grew cassava 16 or 42% sold their crop in the raw state to middlemen in either Mahasarakham or the district town of Kosum Phisai some 26 kilometres down the road towards Khon Kaen. The price for the root varied between 0.60 and 0.98 baht per kilogram, and the average yield was 1,190 kilograms per rai. Another 19 farmers (50% of those who grew cassava) sold their crop 'green'; khaay suan. It was sold to fellow villagers none of whom made large profits, and the practice seemed to be a response to a situation where the resources of land and labour were unequally distributed. The price paid per rai depended on the condition of the field and ranged from 625 to 2,000 baht per rai.

Following the harvesting of the crop farmers might allow their fields to be 'scavanged' for tubers and parts of tubers left behind. These would normally be chipped by hand, dried, and then sold to middlemen for a price approximately twice that of the raw root.

The only upland crop other than cassava grown in significant quantities in the study area was kenaf. This was planted by five of the farmers interviewed with another two cultivating its close relation, jute. Kenaf and jute are both fibre crops, and in comparison to cassava require greater attention: planting should be more systematic and weeding more rigorous. In addition, the threat of pest attack is higher and the crop maintains its yield less well than cassava on soils of low fertility.

Before the land is ploughed and prepared for seeding the stubble remains from the previous season are fired. As with cassava, firing does not seem to be an attempt to improve the fertility of the land but merely an efficient means of clearance. The crop is seeded in April to May and weeded on two or three occasions (although some farmers, presumably due to labour constraints, allowed their fields to become overgrown). By September some of the fields are ready to be harvested but because this clashes with the demands of rice the crop is often left, sometimes even until December, before it is cut by which time the fibre is over-mature and is beginning to lose quality.

Harvesting is done by hand, the stalks being cut off about three inches above the ground. After this the kenaf is gathered into bundles and taken to be retted. Optimally, retting should occur in running oxygenated water but, due to the lack of surface water resources in the region, this is often very difficult. Even the farmers of Baan Noon Tae and Baan Tha Song Korn, living so close to the Lam Chi were usually unwilling or unable to transport their production to the river, and retting was carried out in ponds and other shallow depressions of surface water. This not only reduces the quality of the product but also deoxygenates the water so killing any fish. The retted kenaf is dried and is then ready to be marketed.

Six of the seven households that cultivated kenaf or jute sold it to middlemen in either Mahasarakham or Kosum Phisai. All of them marketed the crop 'retted and dried', receiving a return of five baht per kilogram. The seventh farmer sold his crop to a paper company in Amphoe Borabu, a neighbouring district to Muang Mahasarakham, and due to the demands of paper-making the fibre was marketed in its raw state receiving a price of 0.70 baht per kilogram.

Fruit and Vegetables

Households in the two mubaan maintained an assortment of fruit trees within their compounds of which mango, papaya, banana and coconut were the most common. The fruit was eaten by the families and occasionally sold in small quantities to other villagers or at the market in Mahasarakham. Similarly, fenced-off vegetable plots were to be found near most houses, the production again being consumed primarily within the family, with only three of the households interviewed marketing any of their produce in the 1982/83 season.

Livestock

In Noon Tae and Tha Song Korn machinery has not yet displaced the buffalo, and to a lesser extent the cow, as the primary source of traction. All of the upland and virtually all of the riceland was prepared using cattle or buffalo and it was essential that every farmer own or at least have access to one (table 4.8). Their breeding and marketing, an old and well-established activity in the Northeast, was not widespread in the two villages and only nine households had sold any animals in the year prior to the questionnaire (1982). Despite this, the value of one buffalo at somewere between five and seven thousand baht and the crucial role that they play in rice cultivation means that they may be the most important asset, apart from land, a farmer possesses.

Pigs were raised by 18 of the households interviewed and in contrast to buffalo they were, without exception, kept to be sold. There was some variation in the manner in which the animals were raised: in Noon Tae the CBIRD project had formed a pig group of 29 members, the details of which will be discussed later, and due to close supervision care was usually good; the animals were inoculated against disease and de-wormed, high protein feed was provided and marketing was organised by the project staff. Farmers outside the CBIRD group tended to raise their pigs in a less uniform fashion and with far fewer inputs. Marketing was done through the Pig Cooperative (a governmental institution) or through private middlemen with prices ranging from 1,500 to 4,000 baht per animal.

Table 4.8

Livestock Owned by Those Interviewed

	Households Owning	Number per Household
Buffalo	71	3.6
Cattle	13	4.2
Pigs	18	4.0
Horses	4	1.7
Chickens/Ducks	58	25.8
Geese	5	4.4
Rabbits	1	2.0

Number of agricultural households requiring the use of buffalo and/or cattle: 77

In addition to pigs, buffalo and cattle among those farmers interviewed five raised geese; one, rabbits; four, horses; and chickens and ducks were kept by 58 of the agricultural households questioned (table 4.8).

Non Agricultural Sources of Income

Sources of income outside agriculture played a significant role in the economies of Baan Noon Tae and Baan Tha Song Korn, and they can be divided into two broad categories: on-farm and off-farm.

The primary source of on-farm non-agricultural income came from the manufacture and sale of crafts. The production and sale of mats was practised by 48 of the households in the sample (64% of agricultural families) and weaving by four [1] (three of whom also sold mats). Both activities were pursued by women and adolescents in their 'spare' time. Usually production was small-scale and on an individual basis although in Noon Tae there was a small informal silk-weaving cooperative and, in addition, a silk-weaving group of ten members set up by CBIRD. Apart from the silk group which marketed its production through CBIRD the products were sold either to merchants or to other villagers who had set themselves up as middlemen on a minor scale. The average income earned by the 49 households involved amounted to 3,250 baht per year.

There were eleven households who had a family member engaged in a full-time occupation off-farm: three worked at the Upland Crop Station approximately one kilometre away; three as road construction labourers; one as a nanny in Mahasarakham; another as a cleaner, also in Mahasarakham; and of the remaining three, one was as a labourer connected to the Royal Irrigation Department, another was a general labourer and the last was the manager of a small family-owned rice mill. The mean income from these occupations amounted to 21,110 baht per year.

[1] This only includes those families who marketed the mats or the cloth that they produced. It does not include the large number who wove cloth,and the smaller number who made mats, purely for their own use.

Perhaps more interestingly three men, all heads of their households, had travelled to the Middle East as migrant labourers. They remitted an average of 102,000 baht per year. In addition, smaller amounts of money averaging 10,140 baht per year were sent by sons and daughters of twelve families who had left the village to work in other parts of Thailand.

Finally, the sample of 81 households included a teacher who earned 74,100 baht per year. The nature of his postion in the village means that he it is probably best to view him in isolation from the other families.

Summary

This chapter has attempted to provide a basis on which the rest of the thesis can stand by describing the economies of Baan Noon Tae and Baan Tha Song Korn; their institutions and framework of authority, the physical characteristics of the surrounding countryside and the services and amenities to which the villagers have access. It has dealt largely with the generalities of the village mielieu in order to build up a picture of the communities and the manner in which the inhabitants lead their lives. The next four chapters will look in greater detail at those aspects with which the study in concerned: rice and upland crop cultivation; credit and cooperatives; and the alternative opportunities to agriculture to which the villagers have resorted.

SECTION I

The Strategy of Cultivation in the Study Villages

Chapter Five

Rice Cultivation in Noon Tae & Tha Song Korn

Agricultural Extension

The previous chapter noted that the inhabitants of Noon Tae and Tha Song Korn, despite a diversification of economic activity into areas outside agriculture, still viewed themselves as farmers, and more specifically as tham naa - rice farmers; and indeed, this is true of the entire region. Reflecting the primacy of paddy cultivation as a livelihood the Thai government has always concentrated the bulk of it s resources on the improvement and development of its production [1]. As far as the farmers of the two research communities were concerned the principal manifestation of this input was the framework of extension through which successive administrations have attempted to aid the households of the plateau in their attempts to increase production. For this reason, prior to any examination of farming in the villages it is felt that it would be useful to first give a brief review of the extension service in amphoe Muang Mahasarakham.

[1] This means those resources directed towards agricultural development. For example; through the construction of irrigation schemes, the breeding of high yielding varieties of rice, the provision of chemical fertilisers, the establishment of a series of research stations, the development of a government marketing network with 'guaranteed' prices (at least until this year) and through the extension of advice and other services.

In Thailand, each amphoe or district is served by an agricultural extension office [1] which represents the lowest level of organisation within the department. It is the personnel from this office with which the inhabitants of any village come into contact and with whom they must participate. It is therefore the most important level in the hierarchy, for it is here that government policies and programmes are implemented.

Thailand, with advice and assistance from the World Bank has adopted the 'Training and Visit' system of extension as developed by D. Benor. The elements of this system, which form the broad framework for the extension service's efforts, are as follows [2]:

The extension service should operate as a coherant unit, with a single line of communications extending from the ministry responsible for agriculture to the field-level extension agent. These agents, who are given the task of diffusing the policies of the extension department to the farmers, should devote all their time to extension and should not have to be involved with administrative duties.

The extension process itself is based on systematic training and visits, with agents concentrating their efforts on a select number of practices, with reference to a few major crops, to be directed at a chosen number of contact farmers. In the initial stages of extension it is

[1] Samnakngaan kaset Amphoe Muang Mahasarakham krom songserm kaankaset

[2] This account has been adapted from Benor & Harrison's, 'Agricultural Extension: The Training and Visit System', May 1977, pp 10-18.

essential to achieve an immediate impact so that the process becomes self-reinforcing, and to ensure that the practices extended can diffuse through the community the contact farmers should be imitable; ie: they should be 'average' farmers. To begin with, practices that do not require additional outlays (eg; land preparation, weeding) in terms of purchased inputs should be concentrated upon and nothing should be recommended that does not increase farmers' incomes. New practices should be used on only a portion of any household's land so that risk is reduced and adoption made more likely. When farm practices have been improved, only then should extension agents turn to the additional use of purchased inputs. But, 'optimum' levels of application should be avoided; it is best to recommend 'minimum' levels. Finally, the links with credit and the supply of inputs should be carefully defined and developed, and the system should incorporate a built-in process of adaptation to changing conditions (the above elements are listed in more detail in Appendix 5.1).

In the introductory chapter it was emphasised that the thesis would principally examine the farmers and their views, perceptions and actions and compare these in the context of the <u>broader</u> government objectives. Because of this purposefully weighted approach, the information gathered regarding the extension service is far less detailed than that devoted to the villagers. Indeed, another study could quite easily be made taking the reverse weighting, and in many ways it would make a fascinating exercise. Nevertheless, as far as this study is concerned the services provided to the farmers by the kaset amphoe are examined only in passing [1], to then be placed against the complexity of the position in which the inhabitants find themselves.

The extension officer responsible for Baan Noon Tae and Baan Tha Song Korn visited the villages 39 times per year and 26 times per year respectively. As the Training and Visit System advises, the officer had a specific schedule of visits which could be easily remembered by the farmers; Tha Song Korn was visited every other Monday of the year while the agent went to Noon Tae every other Thursday and for half a visit on every other Friday (the Friday after the Thursday visit).

In addition, as the system stipulates, a group of farmers had been chosen with whom the officer made specific contact. The kaset amphoe referred to these farmers as 'agricultural leaders' [2] and as of the beginning of 1983 there were 25 such 'leaders' in Tha Song Korn and 14 in Noon Tae. All of them had been educated to bor sii and their average age was 46 years old.

The Agricultural Extension Office sold chemical fertilisers on credit and also distributed 'RD' varieties of rice. It also, occasionally, supplied free pesticide

[1] This also applies, as will be seen later in the thesis, to the Cooperative and the Bank for Agriculture & Agricultural Cooperatives.

[2] 'Thabian Kasetakorn Phuunam'.

and herbicide samples although by all accounts this was an irregular occurrence. Other government agencies involved in providing inputs, and sometimes a modicum of advice, were the cooperative, the Bank for Agriculture and Agricultural Cooperatives (BAAC) and the Farmers Group. The cooperative provided, to its members, fertilisers on credit, one variety of pesticide, loans and also bought paddy at government support prices. The BAAC extended loans while the Farmers Group supplied chemical fertilisers on credit and also gave loans to its members. Finally, with reference to Baan Noon Tae, the CBIRD project provided fertilisers to members of its 'Fertiliser Group'.

This is the basic institutional framework to which farmers had access in their attempts to cultivate rice in the manner in which they saw to be best. Further details of the various agencies will be provided as the thesis progresses.

The kaset amphoe, the principal source of advice and assistance, recommended with respect to rice cultivation, that the farmers of Noon Tae and Tha Song Korn grow RD varieties of rice, or at least one of the 'improved' varieties, and apply 30 kilograms per rai of the chemical fertiliser 16-16-8. It was quite clear that the farmers who were interviewed did not follow this advice: just over 1% of their land was planted to RD rices and the average fertiliser application amounted to 7.9 kilograms per rai. Why there should be this discrepancy between the recommended cultural practices and the actual cultural practices is a theme that will run through this chapter. It will attempt to show, from the position of the farmer, why particular government policies (or their absence) are relevant or irrelevant. But in addition, as it is thought to be important to look at farming as an integrated system which preferably should not be broken-down or, for that matter disassociated from the rest of a farmer's existence, the account will regularly enter into elements both within (eg: labour use) and, in later chapters, outside (eg: off-farm employment) agriculture with which the government has no association.

Rice Variety Selection Strategy

The Northeastern Region has been commonly portrayed as a zone of variability in terms of its physical environment. Rainfall fluctuates greatly and the nature of the soils and topography is uneven. However, although such environmental variations are often grouped together, it is important to appreciate that while climatic variations are largely temporal, edaphic and topographic variations are essentially spatial. This distinction is crucial and is reflected in the strategies that farmers follow in the selection of the varieties of rice they grow.

The variability of rainfall coupled with the limited control most of the farmers have over water supply means that the levels of water in the padis, whether they are lower, middle or upper, is changeable; and as a result the rice varieties that farmers choose to grow need to be resistant to fluctuations in water availability. Significantly, farmers felt that 35% of their planted rice plots were affected by flooding, 29% by drought and a further 20% produced low yields due to the influence of both flood and drought (table 5.1). As far as the RD rices are concerned it was their inability to withstand these extremes of flood and drought which restricted their use on the rainfed riceland to a single inhabitant who cultivated 7 rai of RD-6. The farmers felt that they were not 'strong' enough to be grown successfully in their fields, and that this 'strength' related to a flexibility of response in conditions of varying water supply.

In the past, ignorance on the part of the farmer in association with cultural inertia has often been presented as a major factor contributing to the slow uptake of new cultural practices. In the muubaan of Noon Tae and Tha Song Korn ignorance of the existence of the RD rices was not a problem. However, not all the inhabitants may have fully appreciated the details of the characteristics of the rices and this could have limited uptake. This said, it is worth noting that although the pump irrigation scheme had only been on-stream for a single year, in that first year of operation all of the three households interviewed with access to it planted RD varieties of rice, indicating that at least they knew of HYV's and their special qualities [1].

Table 5.1

Problems Encountered, by Rice Plot

	Thii Lum	Thii Raap	Thii Dorn	Total
Flood	35	6	5	46 (35%)
Drought	13	10	14	37 (28%)
FIood + Drought	18	6	3	27 (20%)
Drought + Salt	0	1	1	2 (1%)
Salt	1	1	0	2 (1%)
Insects	4	2	1	7 (5%)
Unaffected	4	4	4	12 (9%)
Total	75	30	28	133

[1] One of these three farmers had lent his thii prang to a relative. It was this relative, who was present at the interview, who gave the information regarding the rice variety that he cultivated (it was, in fact, RD-11 a non-glutinous high yielding type).

Cultural inertia as a barrier to adoption is harder to identify (as well as being a rather nebulous concept). Some farmers certainly appeared to be unwilling to experiment and gave an impression of entrenchment. For example: one household of eight members that owned 23 rai of thii lum was headed by a grandfather of 65 who, in spite of his age, still held the power of decision-making. In 1982/83 the family planted their riceland with a mixture of kum phai and nang nuan, a strategy which apparently had been followed for 'over forty years' [1]. The head of the household felt that there were no better rices than kum phai and nang nuan and refused to experiment in any way even though his son-in-law (aged 27) thought it was sensible to try other varieties on their land. In this case it is clear that an elderly family head, due to his position as decision-maker, was acting as a barrier to change. It could be argued that change is unnecessary and that the family's present strategy is already the optimum one given the conditions found on their land. But even so, the attitude is entrenched and it is perhaps not suprising that no chemical fertilisers were applied for the same reasons.

Other farmers, although they were willing, felt that they could not afford to experiment; they perceived the risks involved to be too great to warrant change. Many of these said that they would adopt another rice variety if

[1] This statement does not quite add up because kum phai is an improved variety of rice and was not actually released until the 1960's.

it could be demonstrated (thus reducing the risks involved with an 'unseen' adoption) that it was better than those they already cultivated. Indeed, the majority of the farmers showed a remarkable willingness to move from one rice variety to another in an attempt to find the type or combination of types best suited to their land. Mrs Kaw Jumbaaburii's approach is indicative of this: she and her husband, who worked as a labourer in Mahasarakham, owned six rai of land which she classified as <u>thii lum</u>. In 1982/83 she planted two rai of <u>khaaw dor</u> and four rai of <u>kum phai</u>. However, she was dissatisfied with their performance and was intending to plant <u>sanpathong</u> and <u>nang nuan</u> as well as <u>kum phai</u> and <u>khaaw dor</u> in the following season. She explained that her land exhibited considerable variation in conditions and she was hoping, by planting all four varieties together, to discover the rice or rices which would perform best on her land [1].

In Thailand, in addition to ignorance and cultural inertia, the availability of the new seeds has regularly been pin-pointed as a problem restricting the spread of

[1] With respect to the prevalence of cultural inertia as a restriction limiting the uptake of new rice varieties it is worth pointing out that the three farmers who had access to irrigation for the first time in the 1982/83 season all planted RD rices, indicating that when presented with suitable conditions of water supply farmers are willing to switch to the cultivation of HYV's with little hesitation. Continuing on this line, it is also worth remembering that a large number of farmers are currently cultivating the improved varieties (<u>sanpathong</u>, <u>khaaw jaaw luang tong</u>, <u>kum phai</u> and <u>khaaw dok mali 105</u>) which were introduced to, and then clearly accepted by, the villagers (although admittedly, improved varieties are very much more similar to the traditional types than the high yielding varieties, thereby representing that much less of a 'leap').

their use (eg:MOAC,April 1980,pp 30 & 35). This was not a constraint in the research area however. The District Agricultural Extension Office, which was readily accessible and well-known to the villagers, had supplies of all the RD rices and it was apparently only the lack of demand that limited sales. In 1982, the office sold a total of 6,925 kilograms of RD rice seed in the amphoe; enough to plant approximately 0.86% of the planted area in that year (table 5.2). As far as the study villages are concerned the Kaset Amphoe distributed 375 kilograms of seed; enough to cultivate about 75 rai of land, or 4.3% of the riceland of the two communities.

Table 5.2

Distribution of Rice Seed by the Kaset Amphoe (1982)

	Kilograms Sold Amphoe	Kilograms Sold Study Villages
Glutinous:		
RD-6	4,560	270
RD-8	540	35
RD-10	180	-
Non-Glutinous:		
RD-7	300	-
RD-9	480	-
RD-15	840	70
RD-19	15	-
RD-25	10	-
TOTAL	6,925 Kg	375 Kg
Enough seed to plant [1]:	1,385 rai	75 rai
% of total riceland [2]:	0.86%	4.3%

[1] It is assumed that five kilograms of seed will plant one rai of padi.

[2] These percentages are calculated from the following: the planted area of riceland in the amphoe in 1982, 161,508 rai; and the area of riceland in the two study villages, 1,742 rai.

Instead of the RD rices the farmers cultivated an assortment of 'improved' and 'traditional' rices (table 5.3). Of these the most popular were the four 'improved' varieties, sanpathong, kum phai, khaaw jaaw luang tong and khaaw dok mali 105 which accounted for 49% of the planted riceland; and two 'traditional' types, khaaw dor and nang nuan which covered another 47%. Although the 'improved' rices are commonly thought of as 'new' varieties by the villagers, they were released by the Rice Department (now the Rice Division) in the late 1950's and early 1960's, and are in no way comparable to the RD rices in terms of sophistication of breeding. In addition, the characteristics of the original forms are likely to have been altered since their release through each farmers own selection process:

Farmers retain a proportion of each seasons' crop, consisting of the seeds from the most robust plants, to form the seed rice for the following year. In this way, the original rice variety is manipulated so that a sub-variety more in tune with the conditions present on each farmers' particular rice plot(s) is formed [1]. How far sanpathong, kum phai, khaaw jaaw luang tong and khaaw dok mali 105 have been altered through this process is impossible to judge without an intensive investigation into their respective characteristics and those of the

[1] This would be accentuated by the fact that improved varieties of rice (and to an even greater extent, HYV's) are not as genetically stable as traditional forms and they begin to drift, even without any process of selection.

pure line. But, as many of those interviewed had been cultivating the rices for ten years or more, and given that if farmers do change varieties they tend to obtain the seed from fellow farmers [1] rather than from the kaset amphoe (who would, presumably, be distributing the pure line), it seems that the inhabitants of Baan Noon Tae

Table 5.3

Rice Varieties Cultivated By Riceland Type

	Thii Lum	Thii Raap	Thii Dorn	Thii Prang[*]	Total
Traditional Types					
Nang Nuan	277.5	109	64	-	448.5
Khaaw Dor	28	36	56	-	120
Khaaw Jaaw Khaaw	2	-	1	-	3
Khaaw Jaaw Looy	26	-	-	-	26
Intermediate Types					
Kum Phai	161	6	6	-	173
Sanpathong	177	74	-	-	251
Khaaw Dok Mali 105	76.5	10	-	-	86.5
Khaaw Jaaw Luang Tong	46	-	31	-	77
High Yielding Types					
RD-6	-	7	-	-	7
RD-7	-	-	-	2	2
RD-8	-	-	-	4	4
Area planted	794	242	158	6	1,198
Area unplanted	6	-	50	-	56
Area harvested	467	191	91	-	749
Total Riceland	800	242	208	6	1,256

[*] Irrigated riceland is counted twice, once for the main season crop and once for the second, dry season, crop.

[1] This means that the seed base remains unchanged, and no new genetic material would be intruding on the development of the local sub-variety.

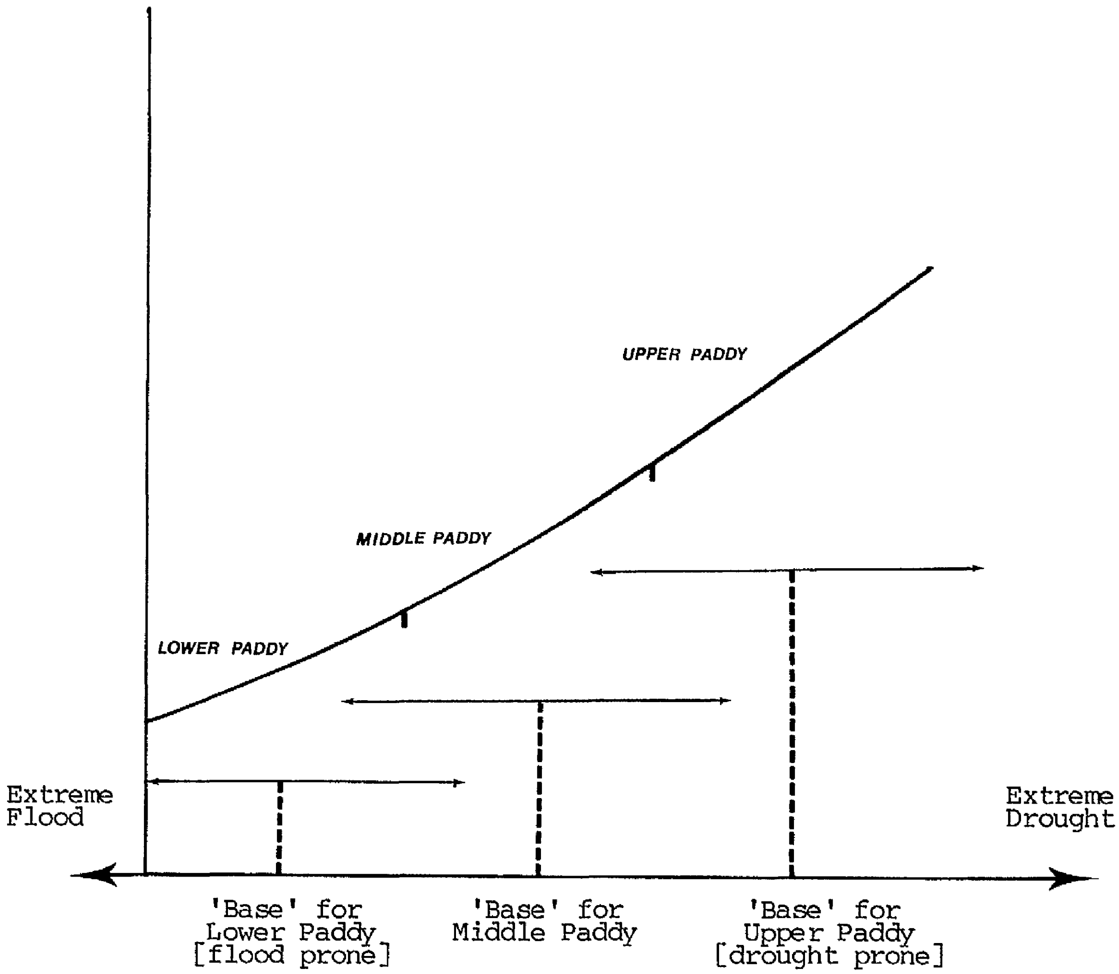
and Baan Tha Song Korn have now bred, through selection, sub-varieties of the original forms.

Thus, because of the nature of the climate in the Northeast and the fact that the fields are truly rainfed giving farmers only minimal control over water supply, the rice types that farmers chose to cultivate virtually all exhibited considerable resistance to fluctuations in the availability of water. They are, in these terms, 'ecologically flexible'. This does not imply that the rices were all similarly flood and drought resistant, but rather that were able to show a breadth of response within the niche in which they were grown.

It is at this point that it becomes necessary to discuss variations in the environment over space, and how this can affect each farmers' choice of which rice he cultivates. For, although rainfall is variable wherever a paddy happens to be located, the position of the paddy in terms of the topography of the surrounding countryside has an important affect in deciding to what extent the land is flood and drought prone. For example: upper padiland, due to its topographical position is always likely to suffer from a lack of water while, in contrast, lower padiland will suffer from an excess. Variations in water supply will occur around these 'base' conditions with farmers selecting rice varieties which conform most closely to each 'base' (fig 5.1). Table 5.3 shows the area of each rice grown among the farmers interviewed, by padiland type. Their varying resistence to flood and to drought is to some extent reflected in each type's

Figure 5.1

"Base" Rice Conditions



distribution of cultivation, although it is only the five most popular rices that are grown over a sufficiently large area for the chance of a meaningful pattern to emerge.

Among the five [1], nang nuan appears to be ecologically flexible enough to be grown on the lower, middle and upper paddy, its distribution representing 34.9%, 45.0% and 40.5% of the three (planted) riceland types respectively. In addition, farmers felt that sanpathong could be cultivated in a reasonably wide range of conditions although it was not thought to have the same level of resistance to periods of drought as nang nuan, and for this reason was not cultivated on the upper padis. This quality of flexibility, especially apparent in the traditional variety nang nuan, was highly valued among the villagers. They viewed it as a form of insurance necessary in a marginal environment such as that of the area. Possibly as a consequence of this, nang nuan and sanpathong were the two most popular rice and were planted on 58.4% of the cultivated land.

The other three rices show greater specificity of response. Kum phai and khaaw dok mali 105 were concentrated on the lower padis with over 90% of the area planted to them being classified as thii lum. Farmers felt that both the rices were flood resistant with kum phai being especially hardy in this respect. Even so, in the 1982/83 season only 44% of the lower riceland planted

[1] The characteristics of the rices cultivated in Noon Tae and Tha Song Korn are tabulated in table 5.4.

Table 5.4

Characteristics of the Rice Varieties Cultivated in Noon Tae and Tha Song Korn

Name	Type	Glutinous/ Non-Glutinous	Photo-sensitive	Days to maturity	resistence to flood/drought	Date of release
Nang nuan	TV	Glutinous	PS	130-150	very flexible	-
Kum phai	IV	Glutinous	PS	150	flood resistant	1962
Sanpathong	IV	Glutinous	PS	150	relativly flexible	1962
Khaaw dor	TV	Glutinous	PS	90-100	drought resistant	-
Khaaw Dok Mali 105	IV	Non-Glutinous	PS	150	flood resistant	1959
Khaaw jaaw luang tong	IV	Non-Glutinous	PS	130-150	?	?
Khaaw jaaw khaaw	TV	Non-Glutinous	PS	?	?	-
Khaaw jaaw looy	TV	Non-Glutinous	PS	150	?	-
RD-6	HYV	Glutinous	PS	120	-	1977
RD-7	HYV	Non-Glutinous	NPS	120-130	-	1975
RD-8	HYV	Glutinous	PS	120	-	1978

TV: Traditional variety.
IV: Improved variety.
HYV: High yielding variety.
PS: Photo-period sensitive.
NPS: Non photo-period sensitive.

to kum phai and khaaw dok mali 105 was actually harvested (table 5.3). This does not mean that the farmers should have been planting other, even more flood-resistant rices, but instead indicates how marginal much of the lower land is. This is supported by the Thai government's land capability map for rice (map 3.3) which classifies much of the riceland surrounding the two villages as being, "suited to the cultivation of rice, but might lose (production) through the affects of flooding" (Dept of Land Development,1977). The two rices are both 'heavy' varieties that take 150 days to reach maturity (table 5.4). This rather long growth period means that they are unsuited to the thii dorn where water availability may extend over only a short time [1].

In contrast to kum phai and khaaw dok mali 105, khaaw dor was planted primarily on the middle and upper ricelands (table 5.3). It is a 'light' rice which matures rapidly in 90-100 days (table 5.4) and, as its name suggests, is adapted to the conditions on the marginal upper paddy. Not only did it mature quickly but farmers also felt that it was the variety most resistant to periods of drought. Once again however it is worth noting

[1] Table 5.4 shows that sanpathong also matures in 150 days. However, its resistence to some degree of drought means that it can be cultivated quite successfully on the middle paddy. It is important to realise that there is a play-off between the various characteristics of a rice plant and the farmers are often trying to cultivate those rices with the best combination of features (high yield, ecological felxibility, resistance to flood/drought, fertiliser requirement etc;).

that even with a rice specialised to deal with the problems of water shortages, 24% of the upper padis remained unplanted and only 63% of the planted area was ever harvested (table 5.3).

Edaphic variations as such are not nearly as constraining a factor on rice production as that of water supply. In Baan Tha Song Korn and Baan Noon Tae there were three ways that the nature of the soil influenced the cultivation of rice; two directly,- fertility and salinity, and one indirectly,- permeability.

The fertility of all the soils of the area is low, and the analysis of a number of samples failed to reveal any meaningful trends in nitrogen, phosphorous, potassium and organic matter content (look to chapter 3). This apparently uniform infertility means that without the application of fairly large amounts of fertilisers (say 25 kg/rai) the RD rices will not fare well (Fukui,1978,pp 265-269). Why farmers refused to apply anything even approaching 25 kg/rai will emerge later, but the fact that they did not is another reason why the adoption of the fertiliser-responsive HYV's is not a sensible strategy.

Connected to soil fertility is salinity, and five farmers said that production on their land had been reduced because the soils were saline. Four of these farmers grew nang nuan and the fifth, sanpathong and they all felt that the rice they grew gave a good response on land affected in this way. Whether this is so, and whether the varieties they were cultivating had been 'selected' to form a sub-variety more resistant to saline conditions is impossible to say without a detailed agronomic investigation.

The permeability of the soils, which largely depends on their clay/silt/sand content, in conjunction with topography, are the two elements that determine the nature of water supply on any piece of land. Soils surveys conducted in the Northeast have tended to show soils becoming more permeable from thii lum up to thii dorn. This means that the problems of flood and drought associated with the lower and upper padis respectively are further accentuated by the tendency for the soils of the thii lum to be impermeable and poorly drained, and those of the thii dorn to be sandy, permeable and to drain rapidly. However, the limited analysis of particle distribution (look to chapter 4) conducted in the study area failed to reveal a trend such as this. It may well be that the analysis is at fault, as the upland soils certainly appeared to have a sandy texture, and the lowland soils a clayey one [1]. Whatever the case, the farmers still perceived the different lands to have different properties of water supply and whether this was the result of soil and topography, or just topography, is not important.

[1] The clay/sand composition of a soil can be estimated by 'feeling' the moistened soil as it is rubbed between the fingers (Faniran & Areola,1978,pp 108-110; Hodgson,1978,pp 53-54).

Summary

The selection of which rice variety(ies) to grow was principally controlled by the nature of the environment. The failure of the farmers to cultivate the RD types distributed by the Royal Thai government did not, in the main, lie in any socio-economic barrier relating to ignorance, cultural inertia, availability or cost but was instead connected to the inability of these rices to meet the environmental demands of cultivation in the area. On the whole farmers were willing to change to other varieties providing they could be shown to be capable of dealing with the physical problems they would encounter. In view of this, it is not suprising that the rices that were grown all showed considerable flexibility. This was especially true of *nang nuan* and, to a lesser extent, of *sanpathong*. The other rices, while exhibiting a certain degree of breadth of response to varying conditions, were specialised in respect either to drought or to flood.

It is also very important to appreciate the local conditions. Farmers would say that the rice they grew was suited to *their* padis, the implication being that the man farming 50 metres away might have very different conditions of soil and water requiring that another rice be planted. These micro-variations which occurred throughout the two villages, and which are so important when farming in a marginal environment where there is little room for manoeuvre and small differences assume great significance, are crucial in understanding why generalised government initiatives are unlikely to succeed.

Fertiliser Use on Rice

The farmers of Baan Noon Tae and Baan Tha Song Korn purchased their fertilisers from a range of sources of which the most popular were the kaset amphoe, CBIRD and merchants in the town of Mahasarakham (table 5.5). Each of the outlets differed slightly in the manner in which they sold their fertilisers, and it is possible to break these differences down and to identify four important variations (table 5.6):

1/ Were the fertilisers purchased from a commercial or from a governmental source?

2/ Was the source accessible to all the villagers or did have limited access?

3/ What was the method of payment: cash or credit?

4/ Was there any delivery service?

Of the 51 farmers interviewed who bought chemical fertilisers in 1982, sixteen or 31% purchased them from middlemen, with the remaining 35 obtaining their supplies from a governmental source of some kind (table 5.5). In the past studies have indicated the merchants are occasionally willing to sell fertilisers and other inputs on credit [1]. This was not the case in the study area

[1] 'Special' relationships evolve between middlemen and their clients (often termed patron/client relationships) so that, for example, a farmer can buy the inputs he requires on credit providing that he sells his produce back to the same merchant (see: Mabry,1979,pp 408-410).
In the town of Mahasarakham there were numerous commercial sources of fertilisers and other agricultural goods and the managers of these enterprises all said that they had no such 'special' relationships with any farmer.

however, and in every instance cash was demanded at the time of the sale.

In contrast, the kaset amphoe, BAAC, CBIRD and the cooperative all distributed fertilisers on the understanding that payment would be made after the harvest. But, access to each of these sources was limited to individuals who could gain 'membership':- the kaset amphoe only sold fertilisers to farmers who were involved in one of the Office's projects. The BAAC stipulated that any household be a member of the BAAC organised Farmers Group (klum kasetakorn), while the cooperative would only sell to their own cooperative members. CBIRD is a slight anomaly in that it is not a national organisation and only operates in one of the two study villages; Baan Noon Tae. Membership was again limited though, in this instance to those farmers who belonged to the 'Fertiliser Group'.

Table 5.5

Fertilisers Purchased, by Source

Households who cultivated rice:	74	
Households who used no fertilisers:	23	
Households who used fertilisers:	51	
Fertilisers purchased from [*]:		
Kaset Amphoe	14	(27%)
CBIRD	10	(20%)
BAAC Farmers Group	3	(6%)
Cooperative	7	(14%)
Merchants/Middlemen	16	(31%)
Unspecified	1	(2%)

[*] Units: household.

In addition to allowing farmers credit facilities the CBIRD 'group' was the only outlet to also deliver the fertilisers to the villages. This was highly valued by the farmers; not so much because of the costs of transportation but because of the effort and time it saved. It was in this respect a convenience rather than a necessity [1].

It is commonly believed that one of the pre-requisites for a successful development programme is an institutional source of agricultural inputs. In Thailand this is grounded in the belief that the private sector alone is unable to fulfil the requirements of the farmers; it is limited and selective and middlemen, so the thesis goes, are by nature exploitative.

Possibly as a product of this the inhabitants of the research villages had potential access to a plethora of governmental, as well as non-governmental, sources. These differed only in the respect that payment could be made after the harvest and, in fact, the price demanded by the merchants for 50 kilograms of the most popular fertiliser type, 16-20-0, was less than that asked by any of the other outlets (some 8% less than the kaset amphoe). The unwillingness of the merchants to extend any credit facilities did not seem to be of great importance. None

[1] Many of the farmers transported their fertilisers by bus. The round trip to both villages cost 4 baht and except for the big users who had to hire a pickup for the journey, was no great problem. However, it is worth remembering that both of the muubaan are close to a main road and Mahasarakham is easily reached. This would not be the case in the more remote areas of the Northeast where transportation might be a constraint.

Table 5.6

Chemical Fertilisers: Details of Sources

Kaset Amphoe

Access:	Sold only to farmers involved in one of the Office's projects.	
Payment:	On credit, after harvesting.	
Delivery:	No delivery service.	
Types & Cost:	16-20-0	250 baht/50 kg.
	15-15-15	300 baht/50 kg.
	16-16-8	280 baht/50 kg.
	21-0-0	225 baht/50 kg.

BAAC - Farmers Group

Access:	Limited to members of 'Farmers Group'.	
Payment:	On credit, after harvesting.	
Delivery:	No delivery service.	
Types & Cost:	16-20-0	235 baht/50 kg.

Cooperative

Access:	Limited to cooperative members.	
Payment:	On credit, after harvesting.	
Delivery:	No delivery service.	
Types & Cost:	16-20-0	250 baht/50 kg.

NB: The cooperative also sold 16-20-0 at a rate of 245 baht/50 kg. to any farmer willing to pay cash.

CBIRD - Fertiliser Group

Access:	Limited to members of the CBIRD 'Fertiliser Group'.	
Payment:	On credit, after harvesting. But, if quantity exceeds 150 kg. then half the cost met immediately.	
Delivery:	Delivery to village included in price.	
Types & Cost:	16-16-8	265 baht/50 kg.

Merchants & Middlemen

Access:	Open access.	
Payment:	Cash.	
Delivery:	No delivery service.	
Types & Cost:	16-20-0	230 baht/50 kg.
	15-15-15	280 baht/50 kg.
	18-12-6	226 baht/50 kg.

NB: These rates were confirmed at four merchants whose prices all corresponded with each another.

of the farmers, even the poorest, complained that it was their inability to gain access to an institutional source which restricted them in their use of fertilisers. The reasons lie elsewhere.

The 51 farmers who applied fertilisers on their rice had been doing so for an average of 5.3 years, with 20 years being the longest that anyone claimed to have used the input. Table 5.7 shows the breakdown of use by introductory source and although the numbers are too small to make any concrete assertions the table does reveal something of the nature of the spread of information regarding their use.

Table 5.7

Diffusion of Information: Fertiliser Use

Introduced by:	Baan Noon Tae	Baan Tha Song Korn	Combined
Kaset Amphoe	11	10	21
Friend/Relative/neighbour	4	11	15
CBIRD	6	-	6
Cooperative	2	2	4
Farmers Group	1	2	3
Self	-	1	1
No answer	-	1	1
Total	24	27	51

Units: household.

Twenty-one farmers said it was the kaset amphoe that introduced them to fertilisers; a significantly greater number than for any of the institutional sourcs. This goes some way to indicate that the kaset amphoe was instrumental in the initial extension process. Table 5.7

is also interesting in that it seems to show that the other villagers have played an important role in the dissemination of fertiliser use: fifteen of the farmers thought that they had first used the input because of information derived from friends, relatives or neighbours. This group seem to represent a second 'wave' of users who first needed to be convinced, through the example of other farmers, of the viability of the input.

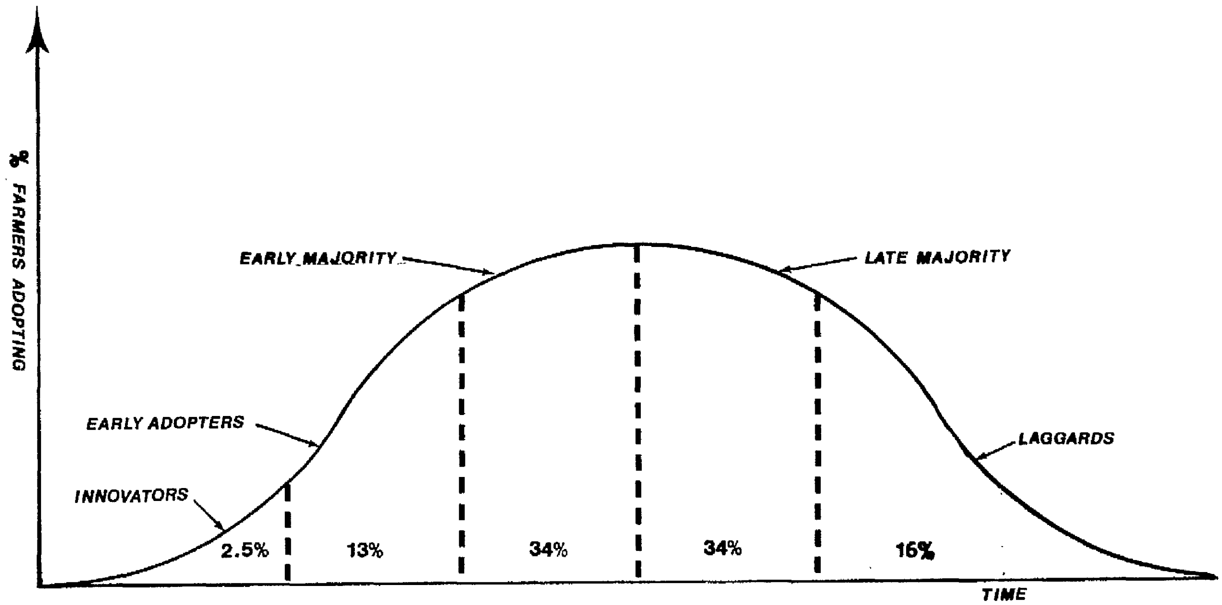
Undoubtably, to begin with the two villages must have contained village leaders who adopted the innovation of fertiliser use first. Using Hagerstrands' model of the diffusion of an innovation (fig 5.2) these farmers would then have been joined by the 'early and late majority' leaving only the 'laggards' cultivating rice without their application (Rogers, 1958; Blaut, 1977; Morrill, 1970). During the 1982/83 season in the villages of Tha Song Korn and Noon Tae, 72% of the farmers who planted their riceland used fertilisers, leaving 28% who could be classified as 'laggards'. In many respects however, this sort of terminology and division is unsatisfactory [1] as it assumes that each farmer makes decisions with the same resources to hand. It fails to account for the varying social, economic and physical conditions in which each farmer finds himself and on account of which his strategy is decided [2]. The application of fertilisers is not

[1] This is not to imply that the model in itself is unsatisfactory; only unsatisfactory in terms of the research.

[2] Look to Blaikie, 1978.

Figure 5.2

The Adoption of Innovations: The Normal Distribution



Source: Rogers, 1958.

necessarily of equal benefit to all farmers,and some individuals had clearly come to the conclusion that, in the light of the constraints in which they were operating (eg: marginal upper padiland), their use was not worth their while.

The rate of application of fertilisers on the rainfed riceland ranged from 1.3 to 37 kilograms per rai, with an average figure of 7.9 kilograms per rai. This compares poorly with the District Agricultural Extension Office's recommended dose of 30 kilograms per rai.

It is often thought that the intensity of use is related to the ability of each farmer to buy the input (MOAC,April 1980,p 27). Poor farmers with a limited amount of surplus cash are seen to be unable to make the outlay with which to purchase fertilisers, or to purchase an adequate quantity. However, with this broad notion of income as a constraining factor are two separate, although admittedly often inter-related, influences: first, the problem of a small total income, and second, that of cash flow.

The idea that the limited and variable cash flow of small farmers is a constraint was the major reason why the various government sources sold their fertilisers on credit. By doing so farmers could intensify cultivation, and pay for their inputs after receiving the returns from their production. But, as far as Tha Song Korn and Noon Tae are concerned this factor did not seem to play a major role; possibly because few of the farmers sold any of their rice, thereby making the delay in payment less of an advantage.

More significant than the problems of cash flow are those relating to a simple inadequacy of income, and it is easy to construct a hypothesis which maintains that income and the intensity of fertiliser use are related. Such a link is commonly alluded to in both the general agricultural development literature and in that devoted to Thailand (eg: US Presidential Mission,April 1982,p 11). However, the data from the households interviewed fails to support this hypothesis, indicating that, at least superficially, the availability of cash did not influence the use of fertilisers: there is no correlation between income and fertiliser use and no appreciable difference between the income of the 23 farmers who failed to apply them in 1982/83 and the mean for the sample (tables 5.8 and 5.9).

Table 5.8

Comparison of those Farmers who Applied no Fertilisers in 1982/83 with the Sample Mean

	Household Size	Total Land (rai)	Riceland (rai)	Total Income 1	Total Income 2
Farmers who Applied no Fertilisers	6.3	22.5	18.5	23,890	24,690
Sample Mean	6.1	20.8	16.1	23,890	22,200

Income in Baht.

Note:'Income 1' is the total annual income as stated by each household head.
'Income 2' is the total annual income as calculated from the responses in each questionnaire.

In fact, the only socio-economic variable which appears to correlate with fertiliser use is the size of the riceland holding. The two show an inverse relationship and have a correlation coefficient of -0.2825, significant to 98.5% (table 5.9).

Table 5.9

Correlation of the Intensity of Fertiliser Use with Various Socio-economic Variables

Socio-Economic Complex	Correlation Coefficient	Significance (%)
Age of Household Head	-0.1615	-
Size of Household	-0.0064	-
Size of Productive Household	-0.1646	-
Total Land Holding	-0.2623	97.6%
Riceland Holding	-0.2825	98.5%
Total Income 1	0.0792	-
Total Income 2	0.0329	-
Agricultural Income	-0.1707	-

Number of cases: 74 (except for Total Income 2, 73 cases)

Statistical techniques: Pearson Product Moment Correlation and two-tailed test of statistical significance.

It is simplest to see this as a function of the man/land ratio: farmers with less land are forced to intensify production to a greater degree to meet their subsistence requirements, and this necessitates that they apply larger quantities of chemical fertilisers. Thus the sub-group of families who farmed less than ten rai of riceland applied an average of 14.1 kilograms per rai, as against 7.9 kilograms per rai for the entire sample. On the surface this is reassuring as it seems to indicate that farmers will spontaneously intensify their production when faced with a deteriorating man/land ratio. Unfortunately the relationship is not as simple as this, and there are many additional, and often disguised, factors at work.

Perhaps the primary of these relates back to the influence of income and involves the cash outlay needed to cultivate varying areas of land: the average riceland holding of the farmers interviewed was 16.1 rai. To add fertilisers at the intensity of 14.1 kilograms per rai, as the sub-group of farmers with less than ten rai of riceland did (who happen to be the lower quartile), would cost 1,180 baht; and for those in the upper quartile [1] who cultivated an average of 32.2 rai it would cost almost 2,360 baht. As income did not differ greatly with size of land holding, the relative risks as a percentage of income would obviously be far higher for the larger than for the smaller landowners. This is borne out in table 5.10 which shows that if the farmers in the upper quartile had applied 14.1 kilograms of chemical fertilisers it would have represented an outlay amounting to almost 10% of their total annual income, as against only 2% for those farmers in the lower quartile. This fact certainly restrained many of the bigger operaters when it came to the use of fertilisers.

[1] Taken to be the 19 largest riceland owners in the sample.

Table 5.10

Costs of Fertiliser Use on Varying Areas of Riceland

	Lower Quartile	Sample Mean	Upper Quartile
Sample size	19	78	19
Riceland Holding	5.9 rai	16.1 rai	32.2 rai
Total Income (baht)	20,570	23,890	24,530
Fertiliser Use	14.1	*if* 14.1	*if* 14.1
Cost (baht)	433	1,180	2,360
Cost as % of Income	2.1%	4.9%	9.6%

Fertiliser use: kilograms per rai

Although income and the size of riceland holding can be seen to exert an influence on fertiliser use it still does not explain the *consistently* low rate of application. The 19 farmers in the lower quartile, who in theory could afford to apply the largest quantities, only used an average of 14.1 kilograms per rai, less than one half of that recommended by the kaset amphoe. To understand why this should be so it is necessary to examine the physical environment of the area and the inhabitants' perception of this environment, as it is here that the core of the answer is to be found.

As was stressed earlier, the climate, soils and topography of the research area combine to present the farmer with an environment in which the potential rice yields are not only low, but also variable. In order to minimise the risks of cultivation they choose rice varieties which are suited to the specific conditions of each plot, while at the same time containing a large degree of ecological flexibility. But, even with this highly developed strategy it is impossible for farmers to ensure stability of production, and it is this that is the element of risk within which each farmer must apply his fertilisers.

The households of the two villages operated an average of 16.1 rai of riceland of which 64% (10.3 rai) was thii lum, 19% (3.1 rai) thii raap and the remaining 17% (2.7 rai) thii dorn. In the past farmers would probably have owned an area of each so that they could meet their subsistence requirements whatever the climatic conditions (MOAC,April 1980,p 6; Ng,April 1974,p 29). Today though, with the fragmentation of land holdings and the worsening man/land ratio many families have only one land type on which to grow their rice. The erosion of the ability of the farmers to risk-minimise in this way has been met by the intrusion of income earning opportunities in other crops, and outside agriculture. Even so, the inhabitants of the two muubaan are still operating in an environment where decisions must be made in the face of uncertainty.

Using the data from the farmers interviewed, table 5.11 is an attempt to illustrate the instability of rice production in the 1982/83 season: 1,250 rai of rainfed riceland was available for cultivation, of which 1,192 rai or 95%, was planted. Of this planted area farmers estimated that only 63% was actually harvested, and almost 10% of the plots produced nothing whatsoever. The average yield on the planted land amounted to 189 kilograms per rai, some 65% of the national figure for the 1981/82 season (MOAC,1981,table 17,p 14), and the standard deviation of yield was 20.398 (the variability in yields is visually demonstrated in graph 5.1). The farmers are therefore being encouraged by the government extension office to apply large quantities of fertilisers on land where less than two-thirds of the cultivated area was harvested, and where yields are consistently low.

Table 5.11

Planted and Harvested Area of Rice, by Padiland type

Land Type	Area	Planted Area	Harvested Area	Area[1] Destroyed	Area unplanted
Thii Lum	800	794	467	92	6
Thii Raap	242	242	191	4	-
Thii Dorn	208	158	91	17	50
Total	1,250	1,194	749	113	56

Area in rai

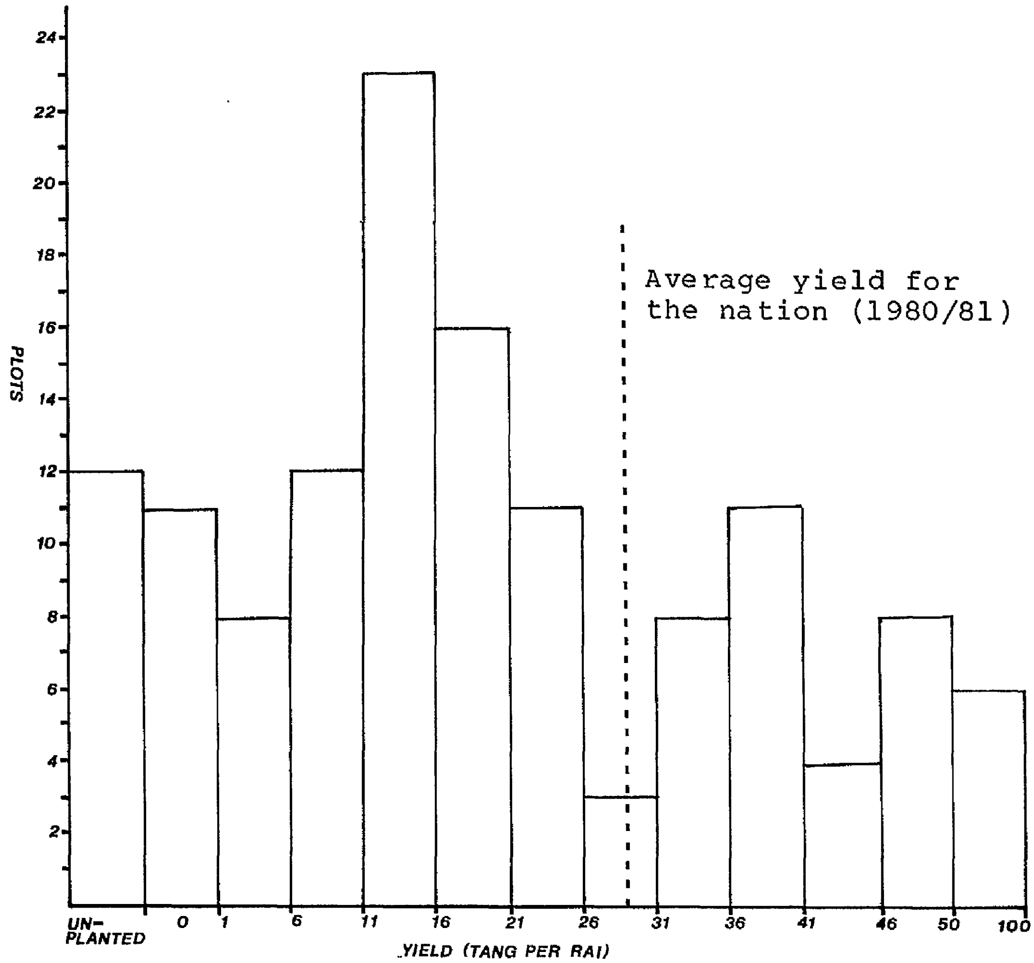
[1] This only includes those plots that were totally unproductive in 1982/83.

95% of riceland available was planted.
63% of the planted area was harvested.
9% of the planted area was destroyed.
4% of the riceland was not even planted.

The statistics present a strong case supporting the contention that the nature of the environment has an influence in restraining fertiliser use. Further evidence could come from the farmers themselves as it might be expected that their views would also reflect this state of affairs: when they were asked why they did not apply more

Graph 5.1

Rice Yield, by Plot



(Tang = 10 kilograms of paddy)

fertilisers the immediate answer from most farmers was that they could not afford to (48 households alluded to limited cash as a constraint). However, on deeper enquiry it invariably transpired that the reasoning was more complex than this, and that they were reluctant to apply greater quantities because they were unable to guarantee that their land would produce enough rice to balance the costs involved. This returns to the point about the role of the cost of application as a proportion of total income, and it appears that in Noon Tae and Tha Song Korn farmers are following a strategy which takes into account this cost, and sets it against the problems presented by fluctuating yields and a marginal environment.

Earlier in the chapter it was emphasised that the envrionmental risks associated with each type of riceland varied, and that this played a large role in determining which rice varieties were cultivated. Fertiliser use is influenced in a similar way.

If 'risk', defined as the size of the yield coupled with the variability of production and the percentage harvested area, is thought to be one of the principal factors affecting farmers in their use of chemical fertilisers then this should be illustrated by the intensity of application on the various padiland types (table 5.12).

Table 5.12 shows that the farmers applied 7.2, 9.6 and 6.5 kilograms per rai of fertilisers on their thii lum, thii raap and thii dorn respectively. Supporting the notion that fertiliser application and production risks are linked, the table also reveals that of the riceland types thii raap has the highest, and more importantly, the greatest stability of yield [1] (taken to be a function of the standard deviation and the harvested area). This corresponds with the idea that of the rainfed land it is the middle padis that are the most regular in terms of water supply. In constrast, the thii lum and thii dorn, both of which exhibit lower and more fluctuating yields, have problems of flood and drought that cause farmers to apply smaller quantities of fertilisers.

Table 5.12

Harvested Area, Yield, Standard Deviation of Yield and Fertiliser Use, by Riceland Type

Land Type	Yield (kg/rai)	Fertiliser Use(kg/rai)	Harvested Area [*]	S. Deviation of Yield
Thii Lum	184	7.2	59%	21.092
Thii Raap	237	9.6	79%	15.754
Thii Dorn	140	6.5	58%	24.030
Thii Prang	-	33.3	-	-

[*] This is the harvested area as a percentage of planted area.

[1] The table is slightly misleading in that yield is obviously dependant, to a degree, on fertiliser use. More informative as a measure of risk must be the percentage harvested area and the standard deviation of yield.

The irrigated riceland, thii naa prang, has an absolutely controlled supply of water and in these terms is a special category of land which presents the farmers with few risks. Indicative of this is the rate of fertiliser use which averaged over 33 kilograms per rai (table 5.12). It could be argued that the high application also reflects the fact that RD rice types are being cultivated, and that these require that large quantities be used. It also important, though, not to view the two decisions separately; they are part of a single strategy which depends on the stability of water supply on the land.

In theory it should be possible to show that there exists a relationship between yield and fertiliser use; specifically that increased yields and increased fertiliser use are positively correlated. Table 5.13 shows that this is indeed so, and overall there is a strong correlation significant at the 99.9% level. If, however, the same correlation is computed for each of the riceland types a rather unexpected set of coefficients are exposed: the thii dorn, the least 'stable' riceland, exhibits the highest correlation while the thii raap, the land with the greatest stability of yield, shows the weakest relationship (table 5.13). Explaining this is difficult, but it is worth remembering that the thii dorn produced the lowest yields and the greatest standard deviation of yield, while the thii raap produced the most paddy with the smallest deviation. In addition, farmers do not apply fertilisers 'unseen', so that if the upper padis do not receive enough rain and the farmers perceive that the crop will be a poor one, then they will apply no fertilisers. In other words, this is by no means a simple correlation in which fertilisers are applied equally. Farmers tend to respond to the type of land and to the condition of each plot, and rather than seeing fertilisers as leading to greater yields, it is best to see them as contributing to greater yields, but only on the 'best' land. This means that there is a certain inevitability in the relationship between the two variables of yield and fertiliser use.

Table 5.13

Correlation of Yield and Fertiliser Use, by Land Type

	Correlation Coefficient	Number of cases	Significance (%)
Thii Lum	0.2350	77	96%
Thii Raap	0.3222	30	92%
Thii Dorn	0.7916	18	99.9%
All Plots	0.3623	125	99.9%

The kaset amphoe's recommendation that farmers apply 30 kilograms per rai of 16-16-8 on <u>all</u> types of riceland is a particularly unrealistic strategy when seen against the heterogenous nature of the environment. The inhabitants of the two villages would never contemplate cultivating their land in such an unsophisticated manner. This is not to imply that the officers of the kaset amphoe were ignorant of the conditions in the fields; they were not. Instead it seems to be a case where recommendations are passed-down to the district level administration from on-top. Thus, the results of agronomic studies conducted out of context are adopted as optimal, taking no notice of the local environment. Why this should occur lies outside the realms of the study, but the tendency for planning in Thailand to be top-down is well documented and often criticised (eg: Riggs,1966,pp 358-361).

From the previous account it might seem that the responses farmers gave for using little or no fertilisers related only to the play-off of cost versus risk. It is true that these two factors dominated, but there were also others involved; indeed, 22 of the households responded in other ways. It is valuable to look at these for two reasons: firstly, they show that (once again) the farmers are not a homogenous group but a complex community where physical, socio-cultural and economic influences vary considerably. And secondly, they demonstrate that the inhabitants are astute and generally well-informed agronomically [1]. The replies of the 22 households can be divided into four groups, relating to:

1/ The prevalence of flood and drought.
2/ The influence of fertilisers on the growth of the rice plant.
3/ Edaphic factors.
4/ Ignorance and cultural inertia.

These responses are tabulated in table 5.14.

[1] I am indebted to Mr Philip Stott for advice regarding the biological and ecological significance of the farmers' comments.

Table 5.14

Reasons Given, Other than Cost, for Applying Little or No Fertilisers

Reason Given	Number of responses
1/ The Soil is still fertile so there is no need	8
2/ Tendency for the land to flood means that the fertilisers are not effective	2
3/ The land is too 'dry' making the use of fertilisers dangerous; their application will depress yields still further	1
4/ Fertilisers stimulate vegetative growth with little increment in grain production; lodging occurs	3
5/ The land is salty; fertiliser use would make it more so	1
6/ Chemical fertilisers cause the soil to become 'salty', 'hard' and less 'pliable'	2
7/ The farmer uses manure because it is better	2
8/ Fertilisers do increase yields but if the application is not continued from then onwards the production will decline to below its original level	3
9/ 'Cultural Inertia'	2
10/ If the rainfall is adequate fertilisers are not applied. But, if it is less than normal then they are; this brings production upto the level of a year when the rainfall is good	1
11/ Fertilisers cause the crop to grow so well that insects are attracted	1

Note: Some farmers gave more than one response. The total number of farmers represented in this table is 22.

1/ The prevalence of flood and drought

Connected to the prevalence of flood and drought are two points raised by a handful of farmers. Flood, as well as reducing the yields of unfertilised rice, was also felt to reduce the effectiveness of chemical fertilisers through 'dilution'. This would make their use an even less profitable proposition. Second, and more seriously, their use on land prone to drought was thought to be unwise because if it was a dry season they would actually harm the crop and depress yields further than if they had never been applied. Both of these points have a basis in the agronomic literature: De Datta, talks of the "flushing action of dew or rain" adversely affecting the recovery of nitrogen from the soil (De Datta,1981,p 375); and it is well-known that drought and fertiliser use can combine to raise the nutrient concentration of the soil to a level where plant-water osmosis is impeded, and moisture stress occurs (personal communication; Mr Philip Stott).

2/ The Influence of Fertilisers on the growth of the rice plant

Traditional varieties of rice, although they respond well to small doses of fertilisers [1] tend to lodge when

[1] It is often said that traditional varieties of rice fail to respond satisfactorily to fertilisers and that if farmers would only grow HYV's then they would see the benefits of the input. Studies conducted in Thailand however have shown that upto a rate of approximately 25 kilograms per rai, traditional rice varieties (represented by sanpathong - an improved variety) actually outperform the RD rices, and it is only with heavy applications of fertilisers that HYV's show their superiority (Mekong Secretariat,Nov 1979).

greater quantities are applied [1] (Fukui,1978,p 266). In the fields of the villages there was at least one instance where lodging had occurred because the farmer had applied too much fertiliser on a traditional rice type; and among the households interviewed three specifically referred to large doses leading to excessive vegetative growth coupled with only a small increment in grain production [2]. For most of the farmers this situation would never arise though, as other constraints hold fertiliser use way below the level at which lodging becomes a problem. There may also be another aspect to this: all the farmers used ready mixed fertilisers containing a fairly high proportion of nitrogen [3]. As nitrogen principally encourages vegetative growth (phosphorous and potassium tend to aid flowering and fruiting), there will be a tendency for large applications to cause lodging,

[1] Lodging reduces the productivity of the rice plant as it, "disrupt[s] the light receiving system and severly reduce[s] photosynthetic capacity" (Fukui,1978,p 266).

[2] Even though lodging may not occur, the benefits of using large quantities on traditional varieties can be negligable. As Fukui notes, leaves on indigenous rice varieties are usually long and drooping and lie horizontally. This means that, "it is easy for the leaf area to pass the optimum level for maximum apparent photosynthesis" (Fukui,1978,p 266).

[3] The most popular fertilisers were N/P/K, 16-20-0 and 16-16-8.

especially when traditional rice types are being cultivated. The farmers recognised this but did not understand it in these terms, and there is possibly a need to educate those villagers that apply large amounts so that they can use their fertilisers in a more sophisticated fashion.

Three other farmers had a rather different version of how fertiliser use affects the rice plant and why they applied little or none: they admitted that their use would increase production; but, they also believed that if the application was not continued at the same rate in every subsequent season then yields would drop below the level at which they had been originally. As farmers were financially insecure and therefore unable to guarantee a greater application, they felt that it would be unwise to begin. This notion, that when one begins to use chemical fertilisers at a particular rate it is impossible to stop, is not without basis. A fertilised rice crop tends to be far more demanding of soil nutrients than an unfertilised one, and it is necessary to replace them in the following years through continued applications.

3/ Edaphic factors

Despite the fact that the soils of the research area are poor, seven farmers stated that they had used no fertilisers because their padis were still fertile.

'Fertility' is a relative term, and although the soils might have been better than most in the area (pockets of more fertile soils do exist) they would have been poor by world standards. Of greater interest were the comments made regarding the effect that fertilisers have on the quality of the soils.

One farmer, with salty land, thought that using fertilisers would make the situation worse. This could be so: saline conditions mean that the water in the fields has a high concentration of salts. The use of chemical fertilisers on such land raises the concentration further still, making the uptake of water by the plant increasingly difficult (due to the unfavourable osmotic balance between the cell-water and the paddy-water). Thus fertiliser use would have a detrimental effect on production.

Two other farmers said that they used small quantities because too much made the "soil salty and hard to work". This astute statement can be understood when it is set against the properties of the soils of the area and, indeed, the two farmers appeared to see the problem in just these terms; for the low organic matter content of much of the land in the Northeastern region means that chemical fertilisers used alone compact the soil and slowly destroy what limited structure there is (reference to deleterious effects of inorganic fertilisers on soil productivity: De Datta,1981,pp 382-383).

4/ Ignorance and Cultural Inertia

In the section on rice varieties it was noted that one elderly farmer gave the impression of being entrenched in his choice of which rice varieties to cultivate. The same man used no fertilisers for similar reasons: he had never used them before, was satisfied with his production, and was unwilling to experiment. There was, in addition, one other farmer who appeared to hold comparable views; although his wife was of the opinion that he was a good-for-nothing drunkard who did little of anything and this was why they were unable to use fertilisers. Even so, these two men were exceptions, for almost 70% of the households who cultivated riceland in 1982/83 applied chemical fertilisers.

Finally, there was a man who seemed to give a reason for which there is no basis: he explained that when the rainfall was adequate he did not use fertilisers but, if it was inadequate, he did. By applying his fertilisers in this manner the farmer claimed that he was stabilising his yields by raising the production of a poor year to that of a good one.

Chemical fertilisers are not the only means by which yields can be increased; other possibilities include the use of manures, mulches and composts. These organic fertilisers are particularly well-suited to the middle and upper padis where the permeability of the soil restricts rice cultivation to those years when rainfall is plentiful. They would build up the colloidal content of the land, increasing its water retention capabilities as well as improving texture, plasticity and the ability of the soil to hold the anions of chemical fertilisers so that they can become available for uptake by the rice plant.

Although none of the sample used composts or mulches, 42% of those who cultivated rice in the 1982/83 season used manure on their land [1]. The quantities applied were invariably small and most did not appreciate the advantages that manure has over chemical fertilisers. Instead they used manure for economic reasons; because it was cheaper. There were exceptions however, and two farmers realised that in addition to raising yields, manure also improved the structure of the soil, making it more pliable and easier to work.

The apparent gap in the knowledge of most of the farmers regarding manure, mulches and composts could be narrowed if the kaset amphoe did more extension work in this area. But, even with such a programme, encouraging farmers to use more would still be difficult; there are distinct problems of supply which would be hard to fill, and many of the farmers complained that a major

[1] Most farmers collected manure from the livestock stalls beneath their houses. This was then transported by pickup to the fields whereupon it was spread over the land. A number of households in the two villages owned trucks and were willing to hire them out; the fee for one journey varied between 100 and 150 baht per load.

restriction was the time needed to collect and then distribute the manure on their land. This and other problems will be discussed in greater detail in the chapter covering upland crop cultivation in Noon Tae and Tha Song Korn, for the benefits of organic fertilisers are even clearer when it comes to cultivation on these lands, than on the ricelands.

Summary

In the muubaan of Tha Song Korn and Noon Tae fertiliser use was primarily controlled by the environment: the overall instability of rainfall tended to restrict farmers to small doses; and on top of this the spatial variations in the environment, principally demonstrated by the three riceland divisions, caused further limitations to be imposed with respect to the specific conditions of each plot. Insufficient income also played a role in constraining farmers in their use of fertilisers. This was especially true of the larger land owners who had to purchase that much more to meet a particular doseage. And, finally, 30% of the households who cultivated riceland in the crop year under study gave other reasons for applying little or no fertilisers. These were extremely diverse, but even so they were invariably accurate in agronomic terms, revealing that on the whole the farmers were astute and well-informed.

De Datta notes that, "variability in the amount and distribution of rainfall is the most important factor limiting yields of rainfed rice..." (De Datta,1981,p 18).

This was admittedly crucial in every farmers' strategy vis a vis fertiliser use. But, it is also important to appreciate that over and above this, the heterogenous nature of the social and physical environment had a warping influence, preventing any attempt at a simplistic theory of cause and effect.

Pesticide and Herbicide Use

As well as using fertilisers, 62% (46 households) of the farmers interviewed who cultivated rice in 1982/83 applied pesticides. These were obtained, in every case, from merchants in the villages or in Mahasarakham, who stocked a wide range of brands and types (table 5.15). The various governmental organisations were extremely limited in terms of their supply; only the cooperative attempted to sell pesticides on a regular basis, and even here there were distinct limitations. Their stocks ran to only one variety [1] which was available solely to cooperative members on a cash basis. Possibly as a result of this, in the 1982/83 season the two groups covering Noon Tae and Tha Song Korn (and two other villages in the tambon) managed to sell none whatsoever. The kaset amphoe, although it did not supply pesticides regularly, occasionally distributed free samples among the farmers. This was not a structured process and depended on when and if supplies were received from the central administrative structure.

[1] Identified as 'Phaaden', which sold at a cost of 20 baht per kilogram.

Table 5.15

Pesticides Used by Farmers in Baan Noon Tae

and Baan Tha Song Korn

Brand	Chemical Composition	Cost/Unit
Folidon (Bayer) 605 50 conc	0-0 dimethyl-0.p nitrophenyl phosphorothroate (Active ingredient: 50%)	15 baht (100 cm3)
Ozo (Thep Watana)	0-0 dimethyl 0-p-nitrophenyl phosphorothroate (Active ingredient: 50%)	12 baht (100 cm3)
Furadaan (Bayer)	-	25 baht (1 kg.)
Azodrin (Shell) sytemic insect-icide	3-hydroxy-N-methyl-CIS-crotonamide dimethyl phosphate (Active ingredient: 56%)	28 baht (100 cm3)
Duratae 3% (Bayer)	2,3,dihydro-2,2-dimethyl-7-benzofuranyl methylcarbamate	20 baht (1 kg.)
Dindrin (Lighthouse)	1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-ENDO-EXO5,8-dimethanonaphthalene (Active ingredient: 50%)	10 baht (25 gr.)
Endex (Shell)	1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-ENDO-ENDO-5,8-dimethanonaphthalene(endrin) (Active ingredient: 20%)	15 baht (100 cm3)

Recommended by the Kaset Amphoe

Brand	Chemical Composition	Cost/Unit
Ozo-Mala 1000E (Cheminova A/S Denmark)	diethyl mercaptosuccinate S-ester with 0.0 dimethyl phosphorodithioate (Active ingredient: 83%)	15 baht (100 cm3)

Although herbicides were available through the same commercial outlets that supplied pesticides none were used by any of the farmers [1]. Virtually all of them explained that there was no need and if weeds did become a problem they could be dealt with by hand. It is well known that in comparison to broadcast rice, with transplanted wet rice competition from weeds is less of a problem (De Datta,1981,pp 476-477). In addition, the cultivation of tall local rices reduces the problem further as these types compete more rigorously with weeds than do the modern semi-dwarf (ie: RD types) varieties (De Datta,1981,pp 477-478).

The introduction of pesticide use to the villages seems to have taken a similar course to that of fertilisers: over half of the farmers identified the kaset amphoe as having introduced them to the input, and another 30% felt that they had first used it because of information gleaned from relatives, friends or neighbours. Thus, it is possible, once again, to hypothesise that the kaset amphoe initiated the extension process and the villagers themselves played a major role in its consequent spread. However, despite the fact the two inputs are similar in this respect it does not follow that the similarities extend further. In fact, the tendency for fertilisers and pesticides to be appraised as if they are a single unit upon which the same influences bear is far from satisfactory. It not only simplifies the farmers'

[1] Herbicides were not distributed by any of the governmental organisations.

strategy, but also fails to account for an important difference between the two; for pesticides tend to be applied <u>after</u> insect attack has become a problem, so that whereas fertilisers are a means to an end (higher yields), insecticides are invariably used as a solution to a problem (insect attack) [1]. Because of this and other differences it is essential to analyse their use independently of fertilisers. It is significant that there exists no relationship between the two inputs, with many of the farmers who applied fertilisers using no pesticides, and vice versa.

The average cash outlay devoted to insecticides among the farmers who used them amounted to 142 baht, only 18% of that allocated to fertiliser use. Possibly as a result of this small cost, pesticide use and income show no relationship [2] (table 5.16). Indeed, of the 26 households who failed to use the input only five (19%) stated that financial factors restrained them. As far as the question, 'would you like to use more; if so, why don't you' (look to appendix 1.1) is concerned, a larger proportion of farmers pointed to cash as a constraint (46%

[1] In other words, within any community there will always be a group of farmers who, because their rice was not affected by insect attack, will have no reason to apply pesticides.

[2] It is felt that it would be unwise to attempt to use the 'intensity of pesticide use' as a variable in the discussion. This is for two reasons:
1/ The farmers have different requirements depending on the presence and the extent of insect attack (which is unsystematic).
2/ It would be hard to equate different pesticide brands and types; they have varying proportions of active ingredients, varying effects on different insects and can be purchased by volume or by weight.

of those that used pesticides). However, the response, 'I have no money', should not be taken at face value. It is a stock phrase employed on many occasions (eg; with respect to fertilisers), and invariably deeper enquiry shows that other factors are also involved. The problem is, of course, a judgemental one in which the answer to an open-ended question must be deciphered. Multiple and contradictory replies are common and in every case a certain amount of intuition is necessary. Given these limitations, the overall feeling was that cash did not play a major role in restraining the use of pesticides. Instead, as many farmers applied them as a 'curative' after insect attack had been identified, the presence or absence of insects dominated with 53% of the farmers identifying this factor as being primary.

Table 5.16

Correlation of Pesticide Use with Various Socio-economic Variables

Socio-economic Complex	Correlation Coefficient	Number of cases	Significance
Total Land	-0.1309	78	-
Riceland	-0.1581	78	-
Fertiliser use/rai	-0.099	74	-
Income 1	-0.1311	78	-
Income 2	-0.1420	78	-
Agricultural Income	-0,0912	78	-

Statistical techniques: Pearson Product Moment Correlation with two-tailed test of statistical significance.

Having identified the principal influence on pesticide use, it still leaves almost half of the farmers (47%) who gave alternative reasons, unaccounted for. These are important as well as interesting, because they illustrate, yet again, the complexity of factors operating within the community. The group can be divided into three loose categories of response:

1/ E conomic
2/ Perceptual/socio-cultural
3/ Environmental

By far the most important is the first; the problem of limited available income (table 5.17). Earlier it was discussed that the reply, 'I have no money' was far from straight-forward and was in many ways deceptive. It is interesting that there is a clear division between those farmers who applied <u>no</u> pesticides and those who were reluctant to apply <u>more</u>. The first group had an average annual income of 7,800 baht and the second of 26,470 baht (table 5.17). It is possible that the questions, 'Why didn't you use any pesticides'; and, 'would you like to use more; if so why didn't you', are very different and that the former elicits a more direct and accurate reply. It certainly seemed that the farmers answering the latter question were more prone to resort to the stock response, 'I have no money', without thinking and table 5.17 indeed shows that in basic financial terms they were not constrained [1]. To sum-up this rather tortuous argument,

[1] They operated an average of 18.2 rai of riceland, only slightly ab ove the mean for the entire sample (16.1 rai). The amount of pesticide needed was therefore only marginally above the norm (assuming some degree of comparability between farmers) and would not have presented a problem in monetary terms.

it appears both qualitatively and quantitively (in terms of income) that whereas cash could have exerted a prevailing influence on the five farmers who applied no pesticides and claimed financial problems limited them, many of those who stated they were loath to apply more for the same reason were probably simplifying their circumstances.

Table 5.17

Reasons Given for Using No, or No More, Pesticides

Why Farmers Applied No Pesticides	Number of cases	Average Income
They had insufficient funds:	5	7,800
There were no insects:	18	)
Other reason:	3	) 21,100
Why Farmers Applied No More Pesticides		
They had insufficient funds:	21	26,470
There were no more insects:	20	)
Other reason:	4	) 27,875
No response:	1	

(Income in baht)

The second category, 'perceptual/socio-cultural', is especially loose accounting for five households with little to connect them. Two of them said that they were reluctant to use more pesticides because they were scared of the consequences of increasing the dosage. The first, a widow of 62, explained that she kept fish in her padis and felt that to use pesticides on the rice would kill them. Interestingly, because she wished to keep fish <u>and</u> to protect her rice from insect attack she applied pesticides on the nursery bed thus, as she saw it, fulfilling both of the goals. The conflicts that exist between pesticide use and fish farming were starkly illustrated in early 1983 when a mysterious virus killed large numbers of fish (worth an estimated 104 million baht) in 29 of Thailand's southern and central changwats. The cause of the virus was widely attributed to an insecticide, although the manufacturers vigorously denied the charge (Bangkok Post Mid-year Review,1983,p 65). The second farmer was worried for a simpler reason: he already used three pesticides in fairly large quantities and thought that applying even more might adversely affect the crop.

In fact, a number of farmers expressed apprehension about the use of insecticides, recognising them as extremely powerful and dangerous chemicals (many of those used in Thailand and other less developed countries would not be passed for use in the developed nations of the West). Indicative of this was an episode that occurred in Baan Noon Tae towards the end of the dry season: five buffalo had somehow managed to consume some insecticide-treated seed rice and subsequently died in great pain. The loss in financial-terms for the families that owned the animals was enormous, as each would have been worth at least 5,000 baht. In addition, the emotional loss would have been great as buffalo are prized and loved.

Ignorance, as with fertiliser use, was not a major factor restricting the use of pesticides with only one farmer saying that he did not use the input becasue he did not know which type to buy or how to apply them. That the man should respond in this manner is, in some respects, suprising as not only was pesticide use widespread through the two villages but also the farmer in question was fairly innovative in other aspects of cultivation (eg; fertiliser use). In a similar vein, a fourth farmer stated that she used no pesticides because she 'didn't care'. This apathy is only understandable if it is seen against the broader background of her existence: she was a widow aged 53 years old who gave the impression of never having really recovered from her husband's death. in addition, she had a brother who owned 'lots' of land and who gave her four rai of production in exchange for the household's labour. This meant that her subsistence was virtually guaranteed giving her no reason to intensify cultivation.

The fifth and final family in this category of 'perceptual/socio-cultural', felt that they could not apply any more pesticide because they had insufficient labour to do so. Although there were six members in the household there was, in effect, only one agriculturally productive member; the Mae Baan. The household head was a teacher at the tambon primary school, the three children were still being educated and the last member, the grandmother, was too old to work at 64 years old. There was of course a further factor; that with an income of over 70,000 baht from the husband's wage alone, there was little necessity to cultivate optimally.

Unlike the influences impinging on fertiliser use and the choice of which rice varieties to cultivate, the environment (excepting insect attack) did not play a significant role with respect to pesticides and only two farmers alluded to the environment as a constraining factor. The first felt that pesticides were ineffective in flooded conditions, to which his land was prone; and the second stated that because he farmed marginal land with low and variable yields the risks involved, even with a small outlay, were too great to justify their use. That only two farmers mentioned the risks of investing in a marginal environment is notable when set against the number who mentioned it regarding fertiliser use. This must pertain to the difference in the size of expenditure needed to apply fertilisers, and that needed to use insecticides.

Summary

The farmers of the muubaan used pesticides principally as a cure after insect attack had been diagnosed. For this reason, the presence or absence of insects exerted the greatest influence in determining whether or not they were to be applied. Insecticides are, in fact, more effective when used as a preventative [1], but given the economic restrictions which continually occupy the background to any decision, it is not suprising that

[1] Hidetsugu Ishikura notes that to apply pesticides at the right time, "pest species should be exactly identified and their occurance should be determined in advance to permit preperations for applying pesticides at the right time" (Hidetsugu Ishikura,1975,p 414).

farmers should wish to wait and see if their fields are actually affected. A large number of farmers also mentioned cash as a problem. But, except for the poorest farmers who would find any expenditure a strain on their resources, this response seemed to be a stock one with little meaning. There was a further group representing 10% of those who could have used pesticides in 1982/83 who gave a selection of other reasons why they were unable to use, or to use more, of them. These 10% illustrate that beneath the generalisations there lies a body of farmers with specific restrictions of their own.

Finally, it is worth mentioning the limited role that the kaset amphoe played in the use of pesticides. The office recommended that farmers use Ozo-Mala at a rate of 30 grammes per rai (table 5.15). But, the office supplied no pesticides, and not one of the farmers in the sample used this type [1]. Instead it was the merchants who played the role of the extension officer; distributing and recommending various types and giving instructions on their use.

Labour Use

So far in this chapter, especially as regards rice types and fertilisers, the farmers' actions have been examined against a background of the kaset amphoe's recommendations. However, it is impossible to continue with this approach with respect to labour use as no 'recommended practice' exists. But, it is still important

[1] Five farmers said that they used 'Ozo'. It is possible that 'Ozo' and 'Ozo-Mala' could have been confused.

to look at the role of labour in the farm system as it has a potential bearing on fertiliser and pesticide use, and also accounts for a large proportion of the total capital invested in the production of rice. In this way it can exert an influence in limiting the uptake of new cultural practices, and restrict the amount of money available to purchase other agricultual inputs.

In Northeastern Thailand, wet rice cultivation is characteristically labour intensive with few of the processes involved having been mechanised to any extent. Families try to complete as many of the tasks as possible without resorting to help from outside the household. However, during the peak peiods of transplanting and harvesting the size of the demand means that many must either hire labour or enter into reciprocal labour exchange agreements. In addition to these two periods, labour is sometimes also required for weeding and for post-harvest processes such as threshing.

In Noon Tae and Tha Song Korn, nearly 70% of those interviewed who produced rice had to obtain labour from outside their own households to meet the demands of their crop (table 5.18). In the past this would have involved long khaek; the exchange of labour between households. Today however, with the intrusion of the cash economy into the area and the overwhelming desire of most people to be paid in cash for anything they do, over 80% of those families who used labour from outside their own households, had to hire it (table 5.18). The wage for a day's work ranged between 25 and 30 baht (generally, 25 baht for harvesting and 30 baht for transplanting) with a meal(s) often being provided.

Table 5.18

Labour Use, by Household

Number of Households that:		% [*]
Hire labour	37	54%
Use long khaek	8	12%
Use both	1	1%
Hire machinery	1	1%
Do none of the above	21	31%
Not applicable	13	
Total Households	81	

[*] Percentage of those households who cultivated rice in 1982/83.

The households hired the equivalent of 113 man days of labour, an average of 7.0 man days per rai. This represents an outlay of between 2,825 and 3,390 baht per household depending on the wage, or approximately 13% of their total income. It is therefore the single largest investment in rice cultivation; nearly three times as much as that invested in fertilisers. But, there is a problem with measurement: farmers exhibited a tendency to over-estimate the quantity of labour they used, and although it is impossible to say to what degree they exaggerated, the figures should be viewed with a certain amount of scepticism [1]. This said, it is still possible to view the data as accurate within itself; ie: to assume

[1] One household which claimed to hire an inordinately large amount of labour (it would have cost 44,550 baht - more than their entire annual income of 40,000 baht) has been omitted from the calculations.

that the degree of over-estimation is comparable between households. Whatever the true figures are, it still seems likely that labour in the greatest monetary input. In view of this it is suprising that so few farmers (only four) complained of financial constraints limiting them in their use of labour; especially when compared with the number who resorted to this excuse with respect to fertilisers and pesticides; inputs which consumed far smaller sums of money. Part of the reason for this might be that whereas fertilisers, and to a lesser extent pesticides, are optional inputs, labour is a necessary input. Farmers have to transplant and harvest their rice (this does not apply to weeding) and there is therefore never the possibility of cutting-back on labour use [2].

There was a very uneven use of labour: one farmer alone hired 17% (in terms of man days), and the five largest employers, 41%. In many ways these households with extremely large requirements are special cases. For example; the family in Baan Noon Tae which hired 17% of the total figure (the equivalent of 1,260 man days) had a clear need for such a labour input: the Mae Baan was acting as the head of the household because her husband had gone to Iraq as a migrant worker. This meant that she was the only productive member in the family (she had three daughters but they were all at school, so that at best they can only be viewed as semi-productive), and

[1] Although it is arguable that labour is flexible, to a degree, and that the members of a household could work harder thereby reducing their additional labour requirement. It would, though, probably be only a minimal reduction.

somehow managed to cultivate 35 rai of thii lum. Given that her husband was remitting 120,000 baht per year, the obvious answer to her labour shortage was to hire villagers to work the land, which she did.

In the two villages labour use exhibits a relationship with three socio-economic variables; the area of riceland [1], income, and the number of agriculturally productive members in a household (table 5.19). The area of riceland is, not suprisingly, strongly correlated with the total amount of labour utilised. However, this is not tremendously illuminating and of greater consequence are the correlations between labour use and income, and labour use and the number of productive members in a household. Income shows a strong positive correlation with total labour use and a weak relationship with the intensity of labour use (ie; per rai). The first is significant at the 99.8% level, and the second at 90%. The size of the productive household meanwhile exhibits a negative relationship with both total labour and the rate per rai; the former is significant to 96% and the latter to 98%. These relationships are 'classic' and almost beguilingly neat. From them it is possible to begin to describe the type of farmer who would hire large amounts of labour; he would cultivate more than the average amount of riceland, would have fewer productive members in his household, and would earn a higher than average income.

[1] The fact that this relationship exists is strong evidence that although farmers may have over-estimated the quantity of labour they hired, they all did so to a similar degree.

Table 5.19

Correlation of Labour Use with Various Socio-economic Variables

Total Labour Use

Socio-economic Complex	Correlation Coefficient	Number of cases	Significance
Productive Household	-0.2480	58	96%
Riceland	0.3379	58	99%
Total Income 1	0.3909	58	99%
Total Income 2	0.3526	57	99%
Labour Use per Rai			
Productive Household	-0.2953	58	98%
Riceland	0.0053	58	-
Total Income 1	0.2172	58	-
Total Income 2	0.1896	57	-

Statistical techniques: Pearson Product Moment Correlation with two-tailed test of statistical significance.

Only nine farmers used long khaek to meet their labour requirements, one of whom also hired some labour (table 5.18). This group of farmers do not appear to be distinctive in any way; the area of riceland they operated and the number of productive members in their households conform closely to the mean, and although income is slightly lower than the average for the sample, it is not significantly so (table 5.20). in these terms, why they were able to fulfil (or decided to fulfil) the labour demands of their rice crop through long khaek is therefore unclear. It is possible that it could correspond to the structure of social relations within the two villages:

Long khaek involves the exchange of labour between two or more families, the implication being that ties between households must exist. These ties are usually between related households who pool their labour at particular times of the year. Because of this, families are not all equally able to enter into reciprocal labour exchange agreements, and the nine farmers in Noon Tae and Tha Song Korn who used long khaek may have done so because they were able to call upon long-standing links with other, related families. One elderly farmer commented that, "in the past everyone was able to use long khaek [and, he implied, the villagers were better for it]; now very few can." The point of this is that it seems to indicate that it has been the breakdown of the linkages between households, rather than diminishing demand which has caused the exchange of labour to become so much less prevelent. Whether or not this is so, it is clear that long khaek as a means of overcoming the uneven labour requirements of wet rice cultivation, at least in this part of the Northeast, is dying out.

Table 5.20

Comparison of those Farmers who Used Long Khaek to Meet their Labour Demands with the Mean for the Sample

	Sub-group who Used Long Khaek	Mean
Age of Family Head (years)	47	47
Productive Household	3.4	3.3
Area of Riceland (rai)	14.1	16.1
Total Land Area (rai)	17.4	19.7
Income 1 (baht)	17,720	23,890

The increased use of man-power is not the only way by which a labour shortage can be overcome. The mechanisation of agriculture can eliminate the demand by drastically reducing the number of man days required to cultivate a unit of land. In Noon Tae and Tha Song Korn, only one farmer said that she had utilised machinery in the production of her rice. She had hired a rotavator (hand-held tractor) from another villager to plough 19 rai of her riceland. This cost 100 baht per rai and to pay for it she obtained a loan of 3,000 baht from the Bank for Agriculture and Agricultural Cooperatives. In this case, the hiring of a tractor seemed to be a simple alternative for a household with limited manpower, to hiring labour: her husband was dead and at 53 years old she was only semi-productive. Thus the work fell to her son and daughter aged 19 and 21 years old respectively.

Because only one household used machinery it is impossible to draw any conclusions about the influences impinging on its use. All that can be said is that the farmers did not perceive there to be a problem regarding access to tractors etc; they simply expressed no desire to hire them.

Of course, in the absence of any degree of mechanisation of the means of production, farmers continued to rely on buffalo, and to a lesser extent cattle, to assist them in the cultivation of rice (and upland crops). Out of the 77 agricultural households who were interviewed, 71 owned buffalo and 13 also kept cattle (no farmer just had cattle. See table 4.8). The average number of head per household amounted to 3.3 and 0.7 respectively. Given that it is clearly essential that farmers have access to some means by which their land can be prepared, it is interesting to see how the six who owned no buffalo at the time of the questionnaire had managed to cultivate their crops:

- Mrs Nooy Narinyaa and Mr Thook Siimaa both hired them from relatives; the former at a rate of 100 baht per day for two days to cultivate two rai of riceland; and the latter as part of a deal which included the renting of five rai of thii lum, costing him two-thirds of the production from that land.

- Two other families were lent buffalo. Mr Samay Nandii borrowed them from his mother-in-law who lived in Baan Doon Do about two kilometres to the east of Baan Noon Tae (look to map 4.2). When he required the animals he would walk over to Doon Do in the morning, and take them to his fields to use for as long as he needed. Mrs Kaw Jammaamurii borrowed buffalo from a relative who lived in the same compound as herself. She explained that the two families commonly helped each other and she gave the impression that they were involved in an extensive system of reciprocal labour and resource exchange.

- The final two farmers has sold their animals at the end of the previous season and were tending to buy replacements before the onset of the 1983/84 season.

Buffalo and cattle were used for a variety of agricultural purposes: they were indispensible in the crucial processes associated with land preperation where they were used to harrow, puddle and plough the padis and upland; and they were also used, to a limited extent, to transport inputs and produce to and from the fields.

At the present time in the two villages there appears to be little chance of a replacement of draught animals by mechanical means of land preparation. Not one farmer expressed a desire for change and the animals were fully and perfectly integrated into the farm system. There has, however, been considerable development as far as using draught animals as a mode of transportation is concerned: farmers tended to hire pickups to take their produce from their fields and onwards, if necessary, to the point of marketing. In fact, the familiar carts of the Isan region were a rare sight in the vicinity of the communities. The rates charged to those hiring pickups varied according to distance; for trips to the fields they ranged between 100 and 200 baht; to Mahasarakham the rate was approximately 200 baht and to Kosum Phisai, 250 baht (although commonly the charge to transport produce was based on the weight of the load - varying between 10 and 15 sataang per kilogram). Buffalo and cattle were also no longer used as a common means of personal transportation, for the inhabitants, being fortunate in having a convenient bus service close at hand, usually chose to travel by road. In addition to these uses, the animals are a source of manure. A number of farmers took advantage of this fact (look to chapter 6) and spread the fertiliser on their land.

Not only were cattle and buffalo the most valuable resource that most farmers owned after their house and land, but there was also a considerable emotional attachment between the farmers and their animals. It could be argued that this would tend to prevent their phasing-out in favour of machinery; although the evidence suggested that they were amply fulfilling their principal job of land preperation.

Not suprisingly, if the number of buffalo owned is correlated with the area of land holdings and riceland holdings, a strong positive correlation significant to 99.7% and 99.9% respectively, emerges. There is no relationship however between the number of cattle owned and the size of landholdings. This is because cattle are not an essential agricultural resource: they are not strong enough to plough padiland successfully and are always owned in addition to buffalo, for it is only buffalo which can meet all the demands of the rice cultivation cycle. One farmer noted that a problem of owning both cattle and buffalo is that a households labour requirement rises considerably: he explained that cattle walk faster than buffalo so that it is impossible to herd the animals together. Because of this, he said, any family with insufficient labour to spare two youths is unable to raise both animals.

Having discussed the various elements of the rice cultivation cycle; varieties planted, fertilisers applied, pesticides used, labour hired and exchanged,and machinery and animals employed; and then set them against the government recommendations; it is now necessary to move onto the final element of the production process, the marketing of the paddy, and to examine it in the same manner.

The Marketing of Paddy

The two muubaan are essentially subsistence rice growing communities and only occasionally do the farmers market any of their production. With respect to the 1982/83 season, seven households sold 100 tang [1] or more, three less than 100 tang and five were intending to sell rice later in the year (table 2.21). Table 2.21 shows that the farmers who sold more than 100 tang owned significantly more land than the average household; 32.7 rai versus 16.1 rai. This enabled them to grow enough rice to market a portion as well as meeting their subsistence requirements. The three farmers who sold less than 100 tang owned an average of 14.3 rai of padiland; slightly less than the mean for the sample. However, their production from that land was considerably greater (table 2.21). It is interesting to look at the planting strategies followed by the two groups (those that sold more than, and less than, 100 tang) as they demonstrate how the difference in the margin of risk can exert an impact on decision making.

The inhabitants of the villages have a staple diet of glutinous or 'sticky' rice. As there is little demand

[1] A tang= 10 kilograms of paddy.

for this type of rice on the international (and to some extent the national) market the prices are considerably lower than those paid for khaaw jaaw - non-glutinous rice. Therefore, if a farmer is intending to sell some of his production it is naturally more sensible to plant the latter type, as it will give him a greater return. But, there is a problem; the farmer still has to meet his glutinous rice needs before he sells any of his crop. He must therefore perform a juggling act; he has to first estimate the amount of land that needs to be planted to khaaw niaw to meet his subsistence requirements (given the variability in yields), and from this calculate the area that can be safely planted to khaaw jaaw. The data from the villages rather neatly exemplifies this dilemma (table 2.22); it illustrates that it is only the larger land owners that have the margins of 'safety' to plant non-glutinous rice (they own an average of 46.5 rai of riceland and produce 1,050 tang of paddy). The smaller landowners, unable to guarantee their own demands for rice will be met, are 'forced' to plant khaaw niaw, a portion of which they might sell if the season happens to be a good one.

The position is, however, not quite as straight-forward as outlined above. Table 2.22 shows that two farmers actually sold all the rice they grew. To understand this it is necessary to look at the two households individually.

The farmer who sold 300 tang of the glutinous rices khaaw dor and sanpathong was the phuuyaybaan of Tha Song

Table 5.21

The Marketing of Rice in Noon Tae & Tha Song Korn

Farmers that sold more than 100 tang	Riceland Holding
1/ 150 tang of Sanpathong [G]	7 rai
150 tang of khaaw dor [G]	
2/ 800 tang of khaaw dok mali 105 [NG]	80 rai
3/ 350 tang of RD-6 [G]	17 rai
4/ 300 tang of khaaw jaaw luang tong [NG]	51 rai
5/ 300 tang of khaaw jaaw looy [NG]	34 rai
6/ 800 tang of khaaw jaaw luang tong [NG]	21 rai
7/ 200 tang of nang nuan [G]	19 rai
AVERAGE:	32.7 rai
Farmers that sold less than 100 tang:	
1/ 18 tang of nang nuan [G]	12 rai
2/ 15 tang of sanpathong [G]	16 rai
3/ 32 tang of sanpathong/nang nuan [G]	15 rai
AVERAGE:	14.3 rai
Farmers intending to sell rice:	
1/ khaaw dok mali 105 [NG]	15 rai
2/ RD-8 [G] [*]	23 rai
3/ kum phai or nang nuan [G]	16 rai
4/ RD-7 [NG] [*]	11 rai
5/ khaaw jaaw luang tong/nang nuan [NG/G]	50 rai
AVERAGE:	23 rai

Total average rice production of those:

that sold > 100 tang:	778 tang
that sold < 100 tang:	417 tang
that will sell rice:	717 tang
Av. for entire sample:	299 tang

[G] = Glutnous rice

[NG] = Non-glutinous rice

[*] = Grown on irrigated riceland

Korn; he owned seven rai of padiland and three rai of upland and was relatively affluent. He explained that the reason why he sold all his production was because he needed to pay off a 'debt'. He was unwilling to state its exact nature but it seemed to be a gambling debt of some sort, and he emphasised that the money was needed immediately. The second farmer owned 21 rai of thii lum which he planted to the non-glutinous khaaw jaaw luang tong. He also operated six rai of upland and like the headman of Tha Song Korn was relatively wealthy. He had decided (as explained in the previous chapter) to take advantage of the higher price commanded by khaaw jaaw, by growing and selling it, buying back proportionately more khaaw niaw. The 1982/83 season was the first year he had followed this strategy, and because khaaw jaaw luang tong had performed rather poorly on his land he was intending to revert back to cultivating the glutinous sanpathong in the following year.

Farmers sold their rice in one of three ways; to the government, to middlemen or informally within the village (table 5.23). Of the ten households who had already marketed their production or were in the process of doing so, seven sold it to middlemen, one to the government and two informally. Unfortunately, because of the small numbers of farmers involved it is not possible to draw any firm conclusions about the prices paid. It does seem as though the village rates are lower than those paid by the middlemen, but this can only be a tentative observation, and it should be noted that there may well be a charitable element involved when farmers sell rice to relatives or friends. However, it is possible to draw some important qualitative points out of the information that farmers gave.

Table 5.22

Comparison of the Farmers who Sold Glutinous Rice with those who Sold Non-Glutinous Rice

	Total Production	Amount Sold	Area of Riceland
Glutinous Rice	300	300	7 rai
	470	350	17 rai
	800	200	19 rai
	300	18	12 rai
	560	15	16 rai
	400	32	15 rai
AVERAGE	472 tang	152 tang	14.3 rai
Non-Glutinous	1,550	800	80 rai
	900	300	51 rai
	950	300	34 rai
	800	800	21 rai
AVERAGE	1,050 tang	550 tang	46.5 rai
SAMPLE AVERAGE	299 tang	–	16.0 rai

Most striking is that the majority of farmers went to commercial enterprises to market their rice. Indeed, only one sold to the government. Why was this?

The farmers of Noon Tae and Tha Song Korn could sell rice to the government in one of two ways; they could either sell it to the agricultural cooperative or to the government purchasing centre. The cooperative bought paddy (nb: unmilled only) at rates above those in the free market place but only from their members. No transport facilities were provided and farmers were expected to take their produce to the district office located just outside the town of Mahasarakham. The purchasing centre bought rice at the government support price [1] and although it was accessible to any household, farmers were again expected to deliver the rice to the depot in Mahasarakham, themselves. The existence of these two bodies was well-known by the villagers, and three of the seven families who sold rice in 1982/83 were also members of the cooperative. Ignorance cannot, therefore, be regarded as a problem.

Table 5.23

Rice: Marketing Channels and Prices Paid

	Baht/kg
1/ Rice Sold to Middlemen	
150 kg (sanpathong)	2.0
3,000 kg (khaaw dor/sanpathong)	2.8
8,000 kg (khaaw dok mali 105)	3.5
3,000 kg (khaaw jaaw looy)	2.7
3,000 kg (khaaw jaaw luang tong)	3.0
3,000 kg (khaaw jaaw luang tong)	2.7
180 kg (nang nuan)	3.1
2/ Rice Sold Informally	
2,000 kg (nang nuan) - to relatives	2.0-2.5
320 kg (sanpathong/nang nuan) - to fellow villagers	2.6
3/ Rice Sold to Government	
3,500 kg (RD-6)	?

[1] A decision was taken in January 1984 to end the government market intervention scheme and the support price has now been abolished (Far Eastern Economic Review,12 April 1984,p 52).

It is commonly thought that because the government buys rice at only a limited number of points through the country and communications are sometimes difficult, farmers sell to middlemen who will often provide transport as part of their service. This might be true of the more remote areas of the country, but it does not apply to the research area; both villages were relatively close to the buying points, communications were excellent and trucks could be easily hired (one of the farmers actually owned a pickup). In a similar way marketing information at the farm-level is often thought to be less than adequate giving middlemen the upper hand in any negotiations. This did not apply to the inhabitants of the study villages who gave the impression of being fairly well-informed. In fact, Noon Tae had a 'library' where newspapers and agricultural pamphlets were kept [1]. These were regularly delivered and gave the community access to up-to-date marketing information. The farmers of both villages knew that they could obtain a better price if they sold to the government and they all believed middlemen to be exploitative. Yet they still sold to the private sector.

The primary reason for this seemingly anomalous state of affairs was the belief that if one sold to either the cooperative or to the government purchasing body, payment took a long time in coming through. Farmers would explain that they needed the money straight away, and that if they

[1] This was built as part of the development programme of the Patanaa Chumchon (Community Development Department).

had gone to the government there would have been a considerable delay between the time of the transaction and the time of the payment. It was for this reason that they went to middlemen who at least gave 'cash on delivery'. Whether or not this was actually so was unclear. The district agricultural cooperative insisted that farmers were given the full amount, in cash, with no delay. However, the important point is that there still existed the widespread perception that the government, in all its guises, was slow in terms of payment and this in itself is a problem that should be overcome. It is revealing that in 1982/83 the district cooperative of amphoe Muang purchased 116,364 kilograms of paddy (for 349,404 baht = 3.0 baht/kg.), an extremely small amount when one considers that Noon Tae and Tha Song Korn alone marketed 31,150 kilograms.

One other farmer complained that he was forced to sell to a middleman because the government was not buying rice at the time when he wished to sell, and that he could not wait for them to begin. The accuracy of this observation, once again, is rather difficult to gauge. No other farmer mentioned the point as a constraint and there seemed to be no supporting evidence that this was so. Nevertheless, we return to the fact that the man believed it to be so and that is all that is needed to prevent a family marketing it s produce through a particular institution.

From the prece ding account of rice marketing in the two communities (albeit extremely limited in scope) it is arguable that it was the shortcomings, or the perceived shortcomings, of the government purchasing bodies rather than the advantages of the middlemen that caused farmers to go to the latter, rather than to the former.

Conclusion

This chapter has attempted to show that the manner in which the farmers of Noon Tae and Tha Song Korn cultivate their rice is influenced, above all else, by the nature of the environment of the area. The failure of high yielding rice varieties to make any sort of impact has been shown to be due to their inability to cope with the variability of water conditions in the padis, coupled with their generalised response to varying soil and land conditions. Similarly, the low intensity of cultivation, exemplified by the level of chemical fertiliser use, was largely a response to the fluctuating yields and the risks of investing scarce financial resources on a crop which had a large chance of failing to justify such an investment. But in addition, above these generalisations are a wealth of further physical, economic and socio-cultural influences which integrate to form the complexity that is the farm system.

Figures 5.3a to 5.3e [1] are an attempt to graphically illustrate some of the influences impinging on the farmers in their choice of which rice varieties to cultivate, what quantity of pesticide and fertiliser to use, how much labour to hire and whether to market any of their production.

[1] These figures are contained in a pocket at the back of the thesis, and appendix 5.2 briefly explains their format.

Chapter Six

Upland Crop Cultivation in Noon Tae and Tha Song Korn

The pattern of upland cropping

Of the 1,534 rai of farmland operated by the households who were interviewed, 278 rai or 18% of the total area was upland, or thii rai [1], and of this 95% was planted to what might be termed 'upland' or 'dry-foot' crops. The land was distributed fairly equally through the villages (although Noon Tae had a higher proportion of upland to riceland; 26% versus 11%) with nearly two-thirds (49) of the agricultural households owning a plot(s), and the average holding amounting to 5.7 rai. In this way upland cropping should be seen as an integral rather than as a subsidiary part of the farm system, and should be placed alongside any analysis of rice cultivation.

Cassava was the principal crop grown in the two villages and in 1982/83 it was planted on 85% of the upland operated by the families who were interviewed. The remaining 15% was used for a variety of purposes; almost 10% was planted to other crops (kenaf, 7%; jute, 2%; sugar cane, 0.4%; and water melon, 0.4%), 2% was left as woodland, 1% was grazed, 1.5% remained unused and a further 1.5% was having a house built upon it (table 6.1).

The dominance of cassava in the villages corresponds with its position in the changwat and indeed, in the

[1] Look to chapter four for a definition of upland or thii rai.

Northeast as a whole (table 6.2). However, just as the crop has not always held this position in the region, nor has it done so in the two villages where a distinct shift in the pattern of upland cropping occurred approximately seven years ago.

Table 6.1

Upland Cropping in Noon Tae and Tha Song Korn

Total Upland	278 rai	
Cassava	237 rai	85.2%
Kenaf	19 rai	6.8%
Jute	5 rai	1.8%
Sugar Cane	1 rai	0.4%
Water Melon	1 rai	0.4%
Woodland	5 rai	1.8%
Grazing	2 rai	0.7%
Unused	4 rai	1.5%
Building Plot	4 rai	1.5%

In 1975 Thailand was the largest exporter of kenaf in the world and the great majority of this was grown in the Northeastern Region (table 6.2). The figures for that year show that 2,486,000 rai of land was planted to kenaf (98% of the area for the whole kingdom) and 1,585,000 rai to cassava. By 1980 the area planted to kenaf had shrunk by 58% to 1,055,000 rai while the area cultivated to cassava had expanded by 286% to 4,535,000 rai. An even more dramatic change occurred in Mahasarakham where the area planted to kenaf contracted by 61% and that devoted to cassava grew by 1,580% (table 6.2). Thus, between 1975 and 1980 there has occurred a remarkable switch from kenaf

Table 6.2

The Area Planted to Kenaf and Cassava: 1975 & 1980

	Kenaf	Cassava
1975		
Whole Kingdom	2,524,000	3,050,000
Northeast	2,486,000	1,585,000
Mahasarakham	166,000	15,970
1980		
Whole Kingdom	1,068,000	7,250,000
Northeast	1,055,000	4,535,000
Mahasarakham	65,055	252,170

Area in rai

Sources: MOAC,1981,pp 24-31 & 60-65; MOAC,1976,p 52

and into cassava [1] (graph 6.1).

The farmers who operated upland in Noon Tae and Tha Song Korn described a similar transformation in the pattern of cropping, with 74% stating that they had switched from kenaf or jute to cassava. This occurred six to eight years ago (1975-1977), and the reasons that were given show a suprising conformity. Almost all the farmers (93%) said that the initial stimulus which encouraged them to change was the fact that the prices of the crops altered to make kenaf and jute less profitable, relatively, than cassava. This is also the usual reason

[1] All through the post-war period the farmers of the Northeast have been extending the area they plant to upland crops. Thus, some of the increase in the area planted to cassava would have been accounted for by land previously uncultivated.Even so,it is still correct to see cassava replacing kenaf over large tracts of the region.

given in the literature [1] to account for the phenomenon (eg: Bangkok Bank Monthly Review,July 1981,Vol 22,No. 7,p 255; The Business Review,April 1983,p 60). But when the actual prices changes are examined (albeit for grade 'A' kenaf and 'high grade' tapioca flour [2]), although there is a small increase in the relative price of tapioca in the period 1973-1976, it is far from dramatic and one is left with the impression that there must be other factors at work to account for such a significant alteration in the pattern of upland cropping [3] (table 6.3; Graph 6.1).

It may be that return per rai is a better and more realistic way of comparing the changes that have affected the two crops at the farm-level. When this is done however, there appears to be even less reason to support the contention that the farmers were responding to a change in the returns [4] from cassava vis à vis kenaf

[1] The "main factor contributing to the drastic decline in jute and kenaf production here during recent years is the switching of farmers from jute and kenaf production to cassava which gives relatively higher net returns due to a booming export market" (Bangkok Bank Monthly Review,July 1981,Vol 22,No. 7,p 255).

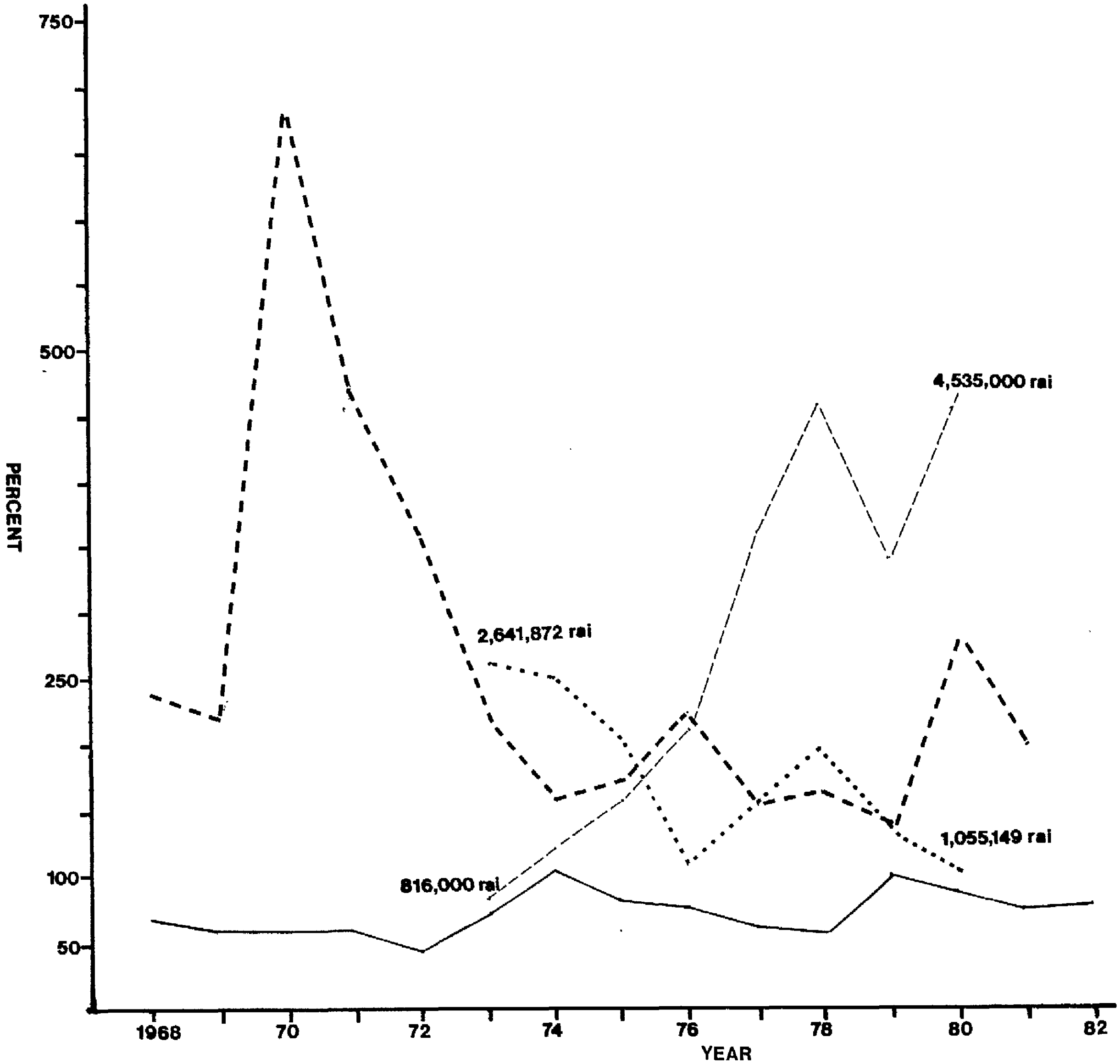
[2] It would not be illogical to assume that the price changes of grade 'A' kenaf and 'high grade' tapioca flour would approximate those for the commodities as a whole.

[3] Usually change is assumed to be linear. ie; a small change in one variable will lead to a small alteration in an associated variable. But it is becoming clear (viz: chaos theory) that small changes on one side of an equation may cause suprisingly large responses on the other. This could, conceivably, be what has occurred in the Northeast.

[4] This is gross return. It does not take account of any variation in the costs of cultivating kenaf and cassava. It is presumed that the two crops' cultivation costs are comparable.

Graph 6.1

Relative Prices, Gross Returns and Area Planted to Cassava and Kenaf, 1968-1982



————	Relative wholesale price of Cassava and kenaf, 1968-82 (the tapioca price as a percentage of the kenaf price).
- - - - - -	Gross returns per rai 1968-82 (cassava return as a percentage of the kenaf return).
....	Area planted to kenaf 1973-1980.
----------	Area planted to cassava 1973-1980.

Sources: MOAC,1977; MOAC,1981, Bangkok Bank Monthly Review.

Table 6.3

The Relative Wholesale Prices of Kenaf and Tapioca

1968-1982 [*]

Year	Tapioca Price as a % of the Kenaf Price
1968	71%
1969	58%
1970	61%
1971	59%
1972	46%
1973	72%
1974	103%
1975	88%
1976	76%
1977	63%
1978	62%
1979	102%
1980	91%
1981	73%
1982	78%
1983 (first quarter)	82%

[*] Prices are for Grade 'A' kenaf and for 'High Grade' tapioca flour at the Bangkok wholesale rate (baht per metric ton).

Source: Bangkok Bank Monthly Review

(table 6.4; Graph 6.1). There are many problems with analysing data in so simple a fashion, but granted this there still remains the feeling that other influences, which cannot be clearly identified, affected the farmers:

There must have been an initial introduction of man sampalang to the region and the subsequent spread of its cultivation. Connected to this, there must have also been a development of a marketing structure capable of handling large quantities of the commodity (middlemen, brokers, exporters, mills and chipping and drying facilities). Not until these facilties had been created would the region have been able to absorb a large expansion of cultivation. Whatever the accuracy of these musings, it does appear that despite past reports cassava did not suddenly become a more profitable crop than kenaf; table 6.4 shows that it has always been so. Rather, the farmers suddenly realised it was the more profitable crop. This would account for the widespread perception that the prices did change.

Despite what could be seen to be a slightly distorted vision of the price changes of the two crops through the 1970's the farmers of the study villages were sensitive to price fluctuations, and their 'businesslike' approach to cash cropping supports the often noted contention that the small-holders of thè plateau are responsive to economic stimuli (Bangkok Bank Monthly Review,April 1981,Vol 22,No. 4,p 146; - "These farmers [of the Northeast] are quick to adapt themselves in response to world market demand").

For some time the Thai government has been trying to encourage farmers to diversify into other crops, seeing the dominance of cassava within the region as unhealthy. These efforts have recently been redoubled as a result of the 1983 agreement reached with the EEC, the main importer of Thai tapioca [1], which will limit the export of the commodity to the community. The government has been attempting to find alternative markets but the possibility

[1] 92% of Thailand's total production is shipped to the EEC (Business Review, March 1983,p 61).

Table 6.4

Average Gross Returns per rai on Cassava and Kenaf

1967/68-1980/81

	Cassava	Kenaf	%
1967/68	918	378	243%
1968/69	813	377	216%
1969/70	1,409	207	681%
1970/71	1,152	243	474%
1971/72	1,177	325	362%
1972/73	912	410	222%
1973/74	714	453	158%
1974/75	633	357	177%
1975/76	895	400	224%
1976/77	1,087	704	154%
1977/78	1,051	603	174%
1978/79	831	590	141%
1979/80	1,617	572	283%
1980/81	1,711	861	199%

Gross Return: Baht per rai. Calculated by multiplying the average yield and the average farm price.

Sources: MOAC,1977,tables 15 & 30,pp 49 & 64; MOAC, 1981, table 22,p 24.

of identifying any large ones is slim. As a USAID document records: "Cassava has very little intrinsic value as an animal feed. It is a cheap source of carbohydrate in animal feed in the EEC because the EEC has priced domestic feed grains out of the market" (Tinnakorn Dararattanasilp,May 1982,p 11), and even within Thailand animal feeds would be cheaper to use than cassava (p 12). Because of the gradual fall in demand associated with the staggered imposition of the quota it is likely that the farmers of the Northeast will be affected by a fall in the price of tapioca. At the present time however, in spite of the efforts directed towards diversification, the amount of land cultivated to man sampalang remains the same (indeed, it continues to rise) and the inhabitants have shown no inclination to follow the government's advice.

These national objectives are followed in the study area where the extension services virtually ignore the existence of cassava, providing no advice, cuttings, fertilisers, pesticides or marketing facilities; and this despite the fact that the crop accounted for over 67% (1981/82 season) of the area planted to field crops in the amphoe (table 6.5). A major question that needs to be investigated is why should the bulk of farmers apparently fly in the face of the Thai government and continue to cultivate cassava? As will become clear, the reason, in short, is that the crop is pre-eminently appropriate given the physical and socio-economic position in which the farmer finds himself. Whether the new initiatives will have a greater im pact is yet to be seen, but it is certain that unlike the move into cassava, the movement out will not be quite as smooth, quick or as simple.

Table 6.5

Field Crops Cultivated in Amphoe Muang Mahasarakham

1981/82 Season

Groundnut	630 rai
Sesame	708 rai
Kenaf	8,730 rai
Water Melon	548 rai
Cassava	25,000 rai
Sugar Cane	103 rai
Others	1,377 rai
Total	37,096 rai

Source: District Agricultural Extension Office, Amphoe Muang Mahasarakham.

Cassava Versus the Fibre Crops: Their Popularity

It is obvious from the pattern of land use - over 90% of the planted upland was cultivated to cassava - that man sampalang was the most popular upland crop among the villagers of Baan Noon Tae and Baan Tha Song Korn. It was also clear from their comments that farmers perceived cassava to be a 'better' crop than kenaf or jute, or indeed better than any other crop which they had experience in growing. In other words, there was more to tapioca's popularity than just its profitability.

The most important of these additional reasons concerned the relative ease of growing cassava versus other crops. It was thought to be so simple to grow that the farmers almost seemed disdainful of it. Commonly they would comment: "You don't even have to be a farmer to grow man sampalang; you can just shove it in the ground and leave it". In contrast to this was the belief that bor was hard to grow; the crop needed weeding and careful attention, and unlike cassava was susceptible to insect attack. Tapioca's ease of cultivation is important in the light of the demands set upon the farmer by his rice crop, because even though the inhabitants saw upland cropping as important it was certainly perceived to be of secondary importance to paddy cultivation and due to this its needs were treated as being subservient to those of rice. Connected to cassava's ease of cultivation were what the farmers saw to be its flexibility and 'strength'.

With the declining fertility of the upland around the villages the necessity of applying chemical fertilisers on the various crops is becoming an important factor which the farmers were increasingly taking into account. They noted that cassava could be grown on extremely poor soils and still give an acceptable yield, while this was not the case for kenaf, jute, sugar cane or groundnut. Cassava's flexibility with respect to its growth cycle was also mentioned on a number of occasions. One farmer who used to grow groundnuts said that he had changed to man sampalang because he could plant and harvest it at any time of the year. This was not so with groundnuts which he could only grow in the dry season thereby restricting the number of choices he had regarding other income earning opportunities.

More striking are the problems of cultivating jute or kenaf. Both of these fibre crops should be harvested by the beginning of November, approximately a month before the peak period for rice. However, although there was no clear conflict (in a strict agronomic sense) between the labour demands of the two crops there was ample evidence of bor standing over-mature (flowering) in the fields around the two villages as late as early December. Evidently, in the run-up to rice harvesting farmers are short of man power for one reason or another [1] and they are faced with the decision of either hiring additional labour or of delaying the harvesting of their jute or kenaf until a suitable gap in the demands of the rice crop appears. As they are reluctant to invest much money in cash cropping farmers invariably follow the latter path and as a result of this the fibre is often low in quality (Sunthorn Rajvongsuek,August 1977,pp 18-19).

Fibre crops also need to be retted. This is best done in running water and the shortage of such resources in the Northeastern region commonly results in a further deterioration in the quality of the final product (bor

[1] Some rice varieties are early maturing and would push into the end of the kenaf season, eg; khaaw dor which is ready for harvesting at the beginning of November. There is also the question of labour availability: a number of families had sons and daughters working outside the villages who returned for the rice harvesting period. Prior to their return there might be a labour shortage within the household preventing bor from being harvested.

that is over-mature is also more difficult to ret; Sunthorn Rajvongsuek,August 1977,pp 18-19). One of the farmers interviewed said that because his land was too far from a suitable supply the time involved in the retting process led him to change and cultivate the 'easier' cassava. Given that labour is the largest financial outlay that farmers have to make, the additional requirement that is needed to ret kenaf and jute is another factor causing them to turn to other, less demanding, crops.

The contrast of the demands of bor and the flexibility of man is best illustrated by cassava's ability to be sold 'green', which 19 households or 50% of those who grew the crop, did. It involved the farmers selling their fields unharvested to other villagers who have to take it upon themselves to harvest and to market the product; and it meant that families in labour surplus and those in deficit could interact to produce a more equitable distribution of labour. This was only possible because man is not constrained by a specific harvesting date and can be left in the ground for a considerable time, waiting until a farmer is ready to harvest it.

Of the 49 families who operated upland, 38 cultivated cassava and seven, one of the two fibre crops. The reasons why the farmers of the two villages chose to grow man sampalang have already been briefly discussed, but it does not shed any light on why seven households had decided, in spite of all the apparent disadvantages, to continue to cultivate bor. Table 6.6 shows that the two sets of families are similar in most respects, with the only real differencs being the number of productive members in the households of each group and the size of their landholdings. The farmers who cultivated bor farmed nearly a third (29%) less land and it might be argued that due to this their agricultural labour requirements were less, enabling them to grow the relatively labour intensive fibre crops. But, if the size of the workforce is also taken into account the difference becomes less dramatic with the ratio of labour and land showing a difference of only 11.5%. Because of the lack of any statistical evidence illuminating why certain farmers chose to grow kenaf or jute, it is necessary to look at the qualitative responses of those in question.

Four of the seven farmers cultivated kenaf or jute as they felt the price was better. This is hard to reconcile with those farmers who were growing cassava because they thought it to be the more profitable crop, but it possibly concerns the problems of deciding the optimum cropping strategy in the face of fluctuating market prices. Interestingly, two of these four households and one other were intending to revert to the cultivation of cassava despite believing fibre crops to be more profitable. This was because they were all dissatisfied with the yields they had obtained. Two blamed this on insect attack and the third on drought and 'poor soil', and crucially, they all thought that these problems would not have arisen with cassava.

Table 6.6

Comparison of those Farmers who Grew Kenaf or Jute and those who Cultivated Cassava

	Cassava	Kenaf/Jute	Sample Average
Age of Household Head	47.5 yrs	47.7	46.8
Household Size	6.3 members	6.2	6.1
Productive H'seh'd Size	3.5 members	2.8	3.3
Total Landholding	24.0 rai	17.0	19.7
Riceland Holding	17.3 rai	13.3	16.1
Upland Holding	6.7 rai	3.7	3.6
Total Income	24,600 baht	23,500	23,900
Agricultural Income	10,700 baht	11,300	7,200

Two further responses related to environmental factors. One farmers said that his land was too 'low' and too 'wet' to cultivate cassava and he was forced to grow kenaf which is more resistant to excess moisture (here again is the implication that the farmers would have grown man if it had been possible). The second rotated bor and man in an attempt to improve the fertility of her land which had been decreasing over a number of years. She thought that cultivating the two crops alternately would stabilise the soil's fertility and because she had no money to purchase chemical fertilisers felt that it was the only option open to her.

These two replies shows that cassava does have some drawbacks, and they will be expanded upon later in the chapter. It needs to be grown on extremely well-drained land and, apparently, is demanding of soil nutrients threby exacerbating the problems of growing crops on land which is already poor. However, the drawbacks are far out-weighed by the benefits, and as far as the farmers of Noon Tae and Tha Song Korn were concerned there was very little doubt as to which upland crop to cultivate. In view of this, the efforts on the part of the government to encourage farmers to diversify their cropping are likely to meet with stiff resistance, and only if there is a dramatic reduction in the relative price of cassava will they move into other crops. Indeed, there was the distinct impression that even if the kenaf prices (or any other) rose to the levels of the late 60's in relation to tapioca the farmers, who now hold the flexibility and strength of cassava in such high regard, would not be encouraged to switch. It should not be forgotten that upland cropping is a part of the farm system, and that the families of the area make their decisions with many other factors in mind. Due to this, the profitability of a crop is only part of the equation, and it is important that it also slots easily between the other demands and constraints which farmers face. It is this which cassava does so well.

To understand the details of cassava's popularity and the problems inherent in its cultivation (as well as those of the fibre crops), it is necessary to examine the manner in which it is grown, and whether this conflicts with the few recommended practices that exist (if they can be termed such).

Advice and Extension

The amount of advice and assistance offered to farmers with respect to upland cropping was extremely limited. The office of the kaset amphoe, the principal source of extension, did not involve itself in the cultivation of cassava, kenaf or jute; it supplied no seeds or cuttings and made almost no recommendations on how to grow the crops. An officer observed that it was unnecessary to apply chemical fertilisers, and as far as cassava was concerned, also unnecessary to use pesticides. The only piece of advice that the Office proferred was that farmers should apply the insecticide Sevin 85% on kenaf and jute if the crops happened to suffer from insect attack [1]. The Office did provide seeds for such 'minor' crops as water melon and thua faak yaaw (yard-long beans), but these were of little importance and in effect the kaset amphoe was uninvolved in the expansion of upland cropping.

In fact, the only government department which concerned itself with the cultivation of such drought resistant crops was the satanii phukrai; the upland crop station. This was located approximately two kilometres from Noon Tae and Tha Song Korn, just north of the Khon Kaen-Mahasarakham road, and was well-known among the villagers. But, a caveat should be inserted here and that is that the station is not part of the true extension

[1] Sevin 85% (Union Carbide). Active Ingredient: 85%. 1 naphthyl methylcarbamate (WP). Sold by merchants at the cost of 15 baht per 80 gram packet.

structure; there are only a handful of such stations in Thailand [1], they are essentially concerned with research rather than extension (IBRD,July 1979,p 9) and very few villages are close enough to have access to one.

Reports have commonly criticised the lack of articulation between research and extension (eg: IBRD,Sept 1978,p 96), and even the present Five Year Devlopment Plan notes that the, "extension of technology [to] rural area [sic] is still limited; and what technology is used is not adaptable to local conditions" (NESDB[1],n.d.,p 99). The failure of the findings from the Upland Crop Station in Mahasarakham to be passed down to the local extension office must represent another instance where the coordination between the two bodies is less than adequate.

The satanii phukrai sold a wide variety of seeds to farmers who wished to purchase them, with the only noteable exception being cassava (table 6.7). The head of the establishment explained that the government was attempting to encourage farmers to cultivate other crops and the station was instructed not to supply cassava cuttings. This is hardly suprising when seen in the light of the EEC quota and corresponds with the many national directives emphasising the importance of diversifying out of tapioca and into other cash crops (An 'Action Plan' to

[1] A 1980 Thai government report recorded that there were ten Upland Crop Experiment Station in the Northeast located principally in the northern and central parts of the region (MOAC,April 1980,p 47).

encourage diversification was implemeneted in 1982; Thailand Business,May 1982,p 34). Fertilisers and pesticides were not distributed; the manager noted that the station was primarily concerned with research, and the supply of agricultural inputs such as these was not part of his brief. However, although it was not actively involved in the dissemination of information and advice, the station was located close enough to the fields of Noon Tae and Tha Song Korn to assume that the base soil conditions are similar to those of the two villages [1]. For this reason, the research findings and consequent recommendations issued from the establishment are particularly applicable to the communities; and they can

Table 6.7

Seeds Available to Farmers from the Upland Crop Station

Crop	Variety	Cost
Kenaf	bor kaew thai	10 baht/kg
	bor kaew cuba	10 baht/kg
Jute	bor krajaaw fakyaaw	20 baht/kg
	bor krajaaw faklom	20 baht/kg
Cotton	-	8 baht/kg
Upland Rice	-	5.50 baht/kg
Maize	khaaw phort khaaw niaw	20 baht/kg
	khaaw phort rai	6.50 baht/kg
Sesame	ngaa Nakhon Sawan	20 baht/kg
	ngaa W53	20 baht per/kg

[1] Although through the years the soils of the Upland Crop Station would probably have been 'upgraded' through the continuous application of chemical fertilisers.

be used to compare what the farmers did with what, in agronomic terms, has been found to be the optimal method of cultivation.

Cassava

Cassava, due to its acid content, is very resistant to insect attack and the satanii phukrai found no need to use pesticides of any sort [1]. Unlike the kaset amphoe however, the station did advise that chemical fertilisers be applied; specifically that 15-15-15 be used at the rate of 50 kilograms per rai. In addition to this it was felt that because of the edaphically demanding nature of cassava [2], monocropping was inadvisable, leading to a rapid deterioration in the quality of the soil. To combat this it was recommended that the crop be either inter-planted or rotated with a nitrogen-fixing legume such as groundnut. By applying fertilisers at the rate of 50 kilograms per rai on the variety Rayong 1 (and also, no doubt, with close supervision and good cultural practices), the station found it could obtain yields of 6 tons per rai of raw root (9 tons if 100 kilograms per rai of chemical fertiliser were used).

Kenaf

Kenaf is more susceptible to insect attack than cassava and the Upland Crop Station recommended that farmers use the pesticide 'Azodrin' at the rate of

[1] The only problems are scale insects and bacterial blight; and even these are, apparently, rare.

[2] This is a contentious point, and many agronomists disagree with the assertion that cassava is particularly demanding of soil nutrients (look to chapter two).

120-160 cm3 per rai [1]. It was also advised that chemical fertilisers be applied; either 15-15-15 at 25-50 kilograms per rai, or 8-8-8 at 50-100 kilograms per rai. If these practices are followed then the station sees no need to rotate or to inter-crop kenaf, believing that it can be planted every year without any fear of depleting the fertility of the soil.

Upland Crop Cultivation in Noon Tae and Tha Song Korn

1/ Crop Varieties

In the previous chapter the rice varieties that farmers chose to grow were discussed in some detail and it was stressed that they had an intimate knowledge of the various strains and their characteristics. This was not the case vis à vis upland crops: 65% of the farmers who were interviewed had no idea what variety of kenaf, cassava or jute they were cultivating, and a further 21% merely stated that they planted phan thamadaa (ordinary type) or phan phuan baan (local/village type). In fact, only six households could give a varietal name to the upland crop they grew; four said that they had planted the cassava varieties Rayong (3) or hua yaaw (1) and two the kenaf khiaw yay (table 6.8).

In many ways the situation is not very suprising. Upland is not divided into separate environmental zones by the farmers as riceland is, and there does not exist

[1] Azodrin (Shell); systemic insecticide sold by merchants in the town of Mahasarakham for 28 baht per 100 cm3.

a large number of varieties designed to fill the various ecological niches. Farmers are therefore presented with a simpler array of choices to plant on land which they perceive in a less sophisticated (though not unsophisticated) fashion. The point about this is that they attach no importance to the type of upland crop they cultivated because they believed it to be of little consequence; and when pressed they would only say, "oh...its an ordinary variety". In addition, concerning cassava, there were no sources of new varieties and farmers had to resort to either re-using cuttings from their own crop or to exchange them with other farmers. In this way the origins of the plant, and its name, are likely to have been forgotten.

Table 6.8

The Identification of Upland Crop Varieties by the Farmers

	Cassava	Kenaf	Jute
Did not know the variety	24	2	2
Termed it *phan thamadaa*	6	-	-
Termed it *phan phuanbaan*	3	-	-
No response	1	-	-
Named variety (as specified)	3 (Rayong) 1 (hua yaaw)	2 (khiaw yay)	-

Units: Households

2/ Fertiliser Use

The use of chemical fertilisers on upland crops was very limited and only two farmers applied them on their land. One grew ten rai of cassava and used 16-16-8 at the rate of 20 kilograms per rai, and the second one rai of sugar cane, applying the same fertiliser at 50 kilograms per rai. It was clear why the farmer who grew sugar cane (he was the only one to cultivate the crop) used the input; the crop cannot perform well without it (Williams & Chew,1979,p 238; Webster & Wilson,1980,pp 297-298). But, it is not clear why Mr Nit Khammanii applied fertilisers; and indeed, applied it at the fairly high rate of 20 kilograms per rai over ten rai [1]. His income was below average for the sample at 15,000 baht per year, as was his area of riceland (12 rai). It is true that he gave the impression of being a fairly progressive man, but even so there was no apparent reason why he should be the only villager to use fertiliser on cassva, jute or kenaf. Possibly he is at the vanguard of a trend towards the increasing use of chemical fertilisers on upland crops.

The soils of the uplands of the Northeastern region are characteristically infertile; they are sandy, low in cation exchange capacity and most nutrients, and contain a very low organic matter content. The continuous cultivation of cash crops on this land since the 1950's, without the use of rotations or fertilisers has led to the widespread degradation of the soil, in some places to

[1] In comparison to the mean application on rice of 7.9 kilograms per rai.

the extent where the land has had to be abandoned. The need to improve cultivation techniques so that further deterioration does not occur has been stressed for some time and it is now one of the Thai government's objectives (US Presidential Mission,April 1982,pp 34-35). The research area is particulalrly suitable as a case study in assessing how (and whether) farmers are responding to the situation and how they are likely to respond in the future, as it is a zone of long settlement where the uplands have been cultivated for a considerable time.

The inhabitants of the villages clearly stated that the fertility of their upland plots have declined over the years, and table 6.9 shows that over 70% of those who grew crops on this land identified poor soil or din juut as a reason for their low and falling yields. Most of the farmers thought that the cause was the fact that they had been continually cultivating cash crops on the land without attempting to replenish the soil. Cassava has an especially bad reputation as a soil nutrient depleter and degrader, although this reputation is not always founded on hard agronomic evidence. Undoubtably, the continuous monocopping of cassava leads to soil deterioration (Hughes,Jan 1980,p 2) but as was stressed in chapter two, this is true of virtually all crops, and at the present time the discussion over the crop's effect on soil fertility remains largely unresolved. Six of the farmers of the research communities said that man was ruining their land but this probably says more about the inadequa cies of their fertilisation methods than about the demands of cassava. The paradox of this is why, when there is the broad appreciation that soil fertility is declining due to over-cropping, did only two farmers apply chemical fertilisers and six, manure (one used both). Once again, the question is far from a simple one, and to gain a detailed understanding of the influences at work it is necessary to look at both its qualitative as well as its quantitative aspects.

Table 6.9

Land Use Problems Facing Farmers Cultivating Upland Crops

	Frequency	%
Dryness	1	2%
Poor Soil	28	60%
Floods/excess moisture	6	13%
Poor soil & drought	3	6%
Poor soil and flood	2	4%
Weed growth	1	2%
No problems	6	13%
Total	47	

Because so few farmers applied chemical fertilisers it is impossible to set up a comparison of those who did with those who did not. However, a somewhat inadequate substitute is to include those who used manure, and then discover if there are any significant differences between the two groups.

Table 6.10 shows that the farmers who used manure and/or chemical fertilisers on their upland crops differed in only one respect: they operated 36% more land than the average. Unfortunately, due to the small numbers involved

(7 & 45) the difference lacks any statistical significance, and it is impossible to go further than to merely point it out. However, it is worth noting that the group did not complain of din juut any more regularly than the total sample and the yields they obtained were not dissimilar. The qualitative responses that farmers gave were equally un-illuminating. Those who used organic fertilisers all recognised that their yields were declining as a consequence of falling fertility associated with over-cropping, but then 70% of the families who grew upland crops recognised this. They all applied small quantities of manure and none appeared to appreciate the particular appropriateness of using organic fertilisers on sandy soils such as those of the area; instead they applied them as a 'cheap' alternative to chemical inputs. Due to the inadequacy of the above in revealing any of the underlying influences affecting fertiliser use on upland crops, it is necessary to examine why 84% of farmers who used neither organic nor inorganic fertilisers chose not to do so.

Firstly, given that 68% of farmers who cultivated rice complained that a shortage of cash restricted them in their use of fertilisers to under 8 kilograms per rai, it is perhaps unsuprising that economic limitations should likewise be alluded to with respect to the use of the input on upland crops. It should also be noted that in addition to this, the uplands are planted to cash rather than subsistence crops and therefore their demands are not given such a high priority by the inhabitants. Farmers were unwilling to risk much of their restricted financial resources on crops which were not directly related to survival, and families felt it was important to cultivate those which demanded the least from them. This fundamental difference between rice and upland crops is hard to over-state, and lies at the basis of the lack of fertiliser use. Needless to say however, it is by no means the whole story and many other factors are superimposed over and above it.

Table 6.10

Comparison of those Farmers who Cultivated Upland Crops and Used Manure and/or Fertilisers with those who did not

	Group 1	Group 2	
Age	48	44	yrs
Size of Productive Household	3.4	3.4	members
Total Landholding	24.3	33.1	rai
Riceland Holding	18.2	27.9	rai
Fertiliser Use on Rice	8.3	8.0	kg/rai
Size of Upland Holding	5.8	5.2	rai
Number of Buffalo & Cattle	4.5	4.3	head
Total Income 1	24,440	27,760	baht
Agricultural Income	11,110	12,960	baht
Sample Size	45	7	households

Group 1 = Those farmers who cultivated upland crops.

Group 2 = Those farmers that cultivated upland crops and used manure and/or fertlisers.

The low organic matter content of the soils of the uplands causes distinct problems when it comes to the application of inorganic fertilisers. The scarcity of colloids means that nutrient anions (nitrogen,potassium and phosphorous) are not held in top soil but are 'free' to be washed through and the situation is exacerbated by the climate of the region as rain tends to fall in heavy erosive storms. Two farmers appeared to allude to the problems of leaching: one said that he had used chemical fertilisers two years previously but a heavy storm soon after application meant that they had no effect on his crop; and the second farmer, although he had never used fertilisers, stated that man grows better without them, mentioning that the irregularity of precipitation meant that they were not always effective. The nature of the soil and climate can also influence fertiliser use in another way, as two of the men who were interviewed appeared to realise: one thought that the absence of rain was problematic; even detrimental to cultivation. The second, Mr Samay Nandii, went into more detail on this point. He believed that his upland was too 'dry' to use inorganic fertilisers and that they would actually damage his crop. The two men were probably referring to the risks of burning when undissolved and undiluted chemical fertilisers lie on the surface of the soil. It should be appreciated that the families of Baan Noon Tae and Baan Tha Song Korn 'broadcast' fertilisers, and did not have access to more sophisticated and less hazardous ways of incorporating the chemicals into their land.

A number of families also thought, as they did with rice, that unless fertilisers were applied every year then yields would drop to a level even lower than the original one. The limited and variable income of most of the population and their consequent inability to guarantee that they would be able to use fertilisers every year, therefore meant that they were loath to begin doing so. The reasoning of this is exactly the same as that which some households gave with respect to the cultivation of rice; but it is different in that the pressures to use fertilisers and to increase production on their subsistence crop are that much greater. Most farmers did not even contemplate applying chemical fertilisers on their cassava or kenaf, and so were never faced with the question of whether or not they were in a position to guarantee their continual use.

Ignorance also played a role and three farmers said that they did not know <u>how</u> to apply fertilisers on their upland crops. However, even if they did not know it is unlikely that they would have begun to use them as their ignorance was a reflection of the fact that they had no wish to apply them, and therefore had no need to find out how it was done. In spite of this, not all the farmers were unwilling to investigate the possibilities of improving the quality of their land, and two had particular initiative.

Mrs Chaysarii Sariimuang, whose strategy was mentioned earlier, rotated <u>bor</u> and <u>man</u> in an attempt to improve the fertility of her land. She realised that the continual cropping of cassava had been degrading her land, but was unable to use chemical fertilisers because she could not afford to purchase them; therefore, as an alternative, she was combatting the situation by rotating cassava with kenaf. Mr Muythin Motkaew exhibited even greater enterprise: two seasons prior to the year of the study he had used chemical fertilisers on his cassava and had obtained an exceptional yield. In the following season, due to a shortage of money, he found that he was unable to apply them and as a result (as he saw it) his harvest was appalling. Because of the fact that he could not ensure their continual use, and in addition because his son had migrated to Bangkok leaving him short of labour with which to apply fertilisers, Mr Muythin was forced to search for an alternative means of arresting the deterioration of his land. He had decided to do this by cultivating cassava only every other season, leaving it fallow so that it could recover in the intervening year.

Earlier in this chapter the use of manure and the low organic matter content of the soils was mentioned and at this point it seems sensible to enter into a wider discussion of the merits of applying organic fertilisers.

Previously it was noted that a greater use of manures, composts and mulches would improve the soils of the upper and middle padis by building-up their colloidal content, thereby increasing their water retention capabilities, improving texture and plasticity as well as preventing leaching by raising the ability of the soils to hold onto nutrient anions. These benefits apply to the uplands even more so than to the ricelands, as the soils are sandier and even more impoversihed in terms of their organic matter content [1].

Until fairly recently the Thai agricultural extension and research services have only paid lip-service to the possibilities of organic means of fertilisation. As a report prepared for the NESDB in October 1981 says: "Extension work on composting is not well achieved" [2] and "information from past reasearches on the utilization of organic fertilizer is not enough to provide sound recommendations for the farmer" (Chairek Suwannarat,Oct 1981,pp 14 & 17-18). The present Five Year Plan, in an attempt to ammend this state of affairs, states as part of its Agricultural Restructuring Progarmme that it will, "encourage farmers to produce organic fertilizers" (NESDB[1],n.d.,p 53). However, at the time of the study there was no indication that the office of the kaset amphoe at Muang Mahasarakham was concerning itself with the directive, or any evidence that the farmers of Noon Tae and Tha Song Korn were adopting the practice. The major question is, of course, would the farmers be likely to follow any advice which advocates the increased use of organic fertilisers; that is assuming the objectives of the National Plan do actually filter down to the district-level.

[1] Hughes (1980,pp 2-3) goes into some detail describing the possibilities of applying organic fertilisers on cassava. He says, significantly, that yields from green manured plots were equal to, or greater than, those from plots fertilised with NPK at a rate of 50-50-25 kilograms per rai.

[2] Composting has been the primary avenue of research and extension into organic fertilisation (Chairek Suwannarat,Oct 1981,pp 8-18).

Of the six farmers who used manure not one applied it because he or she appreciated its particular appropriateness to the edaphic conditions of the uplands, and there were no indications of what stimulated or inhibited its use. However, certain impressions were received and derived from these there appear to be a number of hurdles to be overcome before organic fertiliser use is likely to become widespread.

Firstly, there was a lack of knowledge surrounding the use of manures, mulches and composts (which the kaset amphoe was not rectifying). Secondly, the labour and time needed to collect, produce and spread them when there exists no labour-saving equipment is likely to be a constraint. Thirdly the supply of manure might well become a problem if its use were to gain popularity (the average number of buffalo/cattle owned by the families was only four head). And lastly, there is the important point that upland crops are always in a position of playing second fiddle to rice and the inhabitants would be unlikely to divert much of their time into a crop which does not concern their survival, is subject to a fluctuating market and therefore not necessarily profitable, and which they have chosen for the specific reason that it is so undemanding and easy to grow. However, there must be a point at which declining fertility and yields forces farmers to look at the possibilites of improving their land. Indeed, there were six families [1] who said they would start fertilisation

[1] 16% of those who grew upland crops but did not fertilise them.

'soon' because of just this reason. It is yet to be seen though whether they do mean 'soon', or whether the word is something conjured up for the benefit of a farang researcher.

Although mulches, green manures and composting were used by none of the farmers in the sample, CBIRD had begun to introduce these alternative methods of fertilisation on a small-scale to the inhabitants of Baan Noon Tae. This was being done in three ways: firstly through the Village Biogas Project, secondly by encouraging the cultivation of such crops as lucaena, hamata, spiratro, paragrass and lab lab bean, and lastly by promoting the use of compost piles.

The Village Biogas Project was primarily designed to help alleviate the problem of an energy shortage, but CBIRD also appreciated that the effluent from the process of gas production would be of great benefit to the soils of the area. They calculated that the faeces produced by four pigs in a year would have a value, in NPK terms, of 579 baht (CBIRD document,1982,p 3). In addition to using the by-product from biogas production, CBIRD was also trying to get farmers to make compost piles using straw and buffalo manure. The organisation realised that at present, "manure is not regarded as a recyclable energy source by farmers" and summed-up the current situation as "an almost total non-use of manure as a fertilizer and as a soil conditioner" (CBIRD document,1982,p 1). Finally, CBIRD was hoping to encourage farmers to plant high protein leguminous crops to use primarily as fodder but also, possibly, as green manure.

In 1982/83 when the fieldwork was being conducted these three methods of organic fertilisation were only just beginning to be implemented and had not made much of an impact. However, the realisation that there were possibilities for improving the soils of the area by such methods is in stark contrast to the approach of the Office for Agricultural Extension which appeared to concentrate wholly on the provision and encouragement of chemical fertiliser use. Whether the farmers will be receptive to these laudable efforts is another matter and is yet to be seen. Even so, certain problems were already obvious:

Firstly, the biogas generators are expensive costing between 3,600 and 3,800 baht (15-16% of an average family's income). The money is loaned by CBIRD, interest free, and is repaid in monthly instalments of 100-150 baht. The cost, naturally enough, tended to restrict the generators to the richer households (there were only 4-5 in Baan Noon Tae in March 1983) and it is arguable that being such an obvious visual statement of wealth their presence might increase social tensions within a village where disparities in income are growing. In contrast, compost pile construction is a possibility for almost all of the villagers. There is still a problem, though, of a limited supply of manure and this means that widespread application would be impossible. Lastly, the cultivation of green manure/fodder crops; as far as this is concerned, there was already appearing a problem connected with available land: farmers did not seem to wish to turn any of their upland over to crops from which they could envisage there to be little return. But admittedly, the project had only just begun and those families interviewed who said that they realised that something needed to be done to stem the decreasing fertility of their upland may well adopt the practice of cultivating a green manure crop. If they, as innovators, are seen to be successful by the other villagers, then the practice could spread.

Pesticide and Herbicide Use

Only one of the farmers who were interviewed used pesticides or herbicides on his upland crops, and there appeared to be no history of their use. The single exception applied the insecticide 'Folidon' on his water melon at the rate of 600 cm3 per rai. Judging from the problems that farmers said they had to deal with, this state of affairs is not particularly suprising: not one complained of insect attack, and only a single man of excessive weed growth.

The need to use insecticides on cassava is minimal. The crop is renowned for its resistance to insect attack and neither the kaset amphoe nor the satanii phukrai recommended its use [1]. Bor is not so immune, and the kaset amphoe recommended the use of 'Sevin 85%' to combat insect attack, while the upland crop station recommended

[1] The root contains an average concentration of something less than 0.03% Hydrocyanic acid (the concentration varies with the maturity of the plant), and this makes it unpalatable to most pests (data from: Hughes, jan 1980, p 4).

the use of the systemic insect attack 'Azodrin'. However, the seven households who grew kenaf or jute failed to follow this advice. This was because, as with rice, farmers used the input as a curative rather than as a preventative. (So, presumably, they might have applied a pesticide if their crop had been attacked; although this was not entirely clear from their responses).

The benefits of applying herbicides would probably be greater, especially upon kenaf. There were numerous examples in the fields of the two villages of man and bor plots overgrown with weeds, and at least one case where a kenaf plot had been abandoned. However, the use of herbicides was unfamiliar to the farmers, and none of the extension agencies supplied, recommended or gave advice on how to use the input. Instead, the communities dealt with the problem of weed growth by hand; either through hiring or through using a family's own labour resources. On average the crops were weeded three times a season, each family employing the equivalent of 4.7 man days of labour.

Labour Use

Of the farmers who grew upland crops, 51% hired labour, 2% used long khaek and 2% did both (table 6.11). The small number of families who were involved in reciprocal labour exchange (2) [1] reflects the fact that

[1] Strictly speaking only one farmer used reciprocal labour exchange. The second employed children, who were provided with one meal, to ret his kenaf and although he termed it long khaek there did not seem to be any reciprocal element involved.

upland cropping is a relatively new activity which has no tradition of long khaek. The nature of the crops possibly prevents the development of such a tradition; they are grown for cash and are unlikely to be incorporated into a system of social relations which has evolved to ensure the successful cultivation of a subsistence crop. It is also worth remembering that such practices are dying out on rice, and only 13% of farmers utilised reciprocal labour agreements to cultivate their padiland.

Table 6.11

Type of Labour Used on Upland Crops

Households that Own Upland	49
Households that Cultivate Upland	45
Valid Responses	43
Households that Hire Labour	22
Households that Use Long Khaek	1
Households that do both	1
Households that do neither	19

As would be expected, the amount of labour hired was significantly less than that employed to cultivate rice (table 6.12). Households used an average of 22.5 man days or 4.3 man days per rai. This represents 20% of the total amount hired to grow rice and, in terms of quantity per rai, 63%. Assuming a cost of 25 baht per day per labourer [1] then the mean outlay was approximately 560 baht per household, or 110 baht per rai of upland crops. From

[1] All but two of the households interviewed paid a daily wage of 25 baht.

these figures it is immediately clear that the money injected into cash crops was a fraction of that allocated by farmers to their subsistence crop (remembering that labour is easily the largest cost involved). Including fertilisers, pesticides and labour, upland crops received a monetary input of 590 baht, some 17% of the 3,545 baht allocated to rice. The relative costs and returns, and the associated risks will be returned to and discussed in greater detail later in this chapter.

Table 6.12

Labour Use on Upland Crops

	Total Labour Hired/Family	Amount Hired /rai
Rice	158.5 md	4.3 md
Kenaf/Jute	21.0 md	6.7 md
Cassava (harvested)	26.9 md	5.8 md
Cassava (sold green)	16.8 md	1.8 md
All Cassava	22.8 md	3.9 md
Kenaf+Jute+Cassava	22.5 md	4.3 md

Units: man days (md)

If labour use is correlated with a complex of socio-economic variables there appears a pattern of relationships in which the total man days hired correlates with the area of upland and also, both in total and per rai, with income (table 6.13). However, suprisingly, there is no relationship between the size of household - either total or total productive - and labour use.

Table 6.12 also shows the labour input by type of upland crop (cassava is split into 'harvested' and 'sold green'). The two fibre crops had the highest input per rai at 6.7 man days, but it was not a great deal more than the figure for harvested cassava of 5.8 man days. Superficially,this seems to indicate that kenaf and jute were not much more demanding in labour terms than cassava and, to some extent, contradicts the commonly stated opinion of the farmers that bor needs alot more attention. But, labour hired is not the only relevent variable and if one looks back to table 6.6 it shows that those farmers who grew bor operated a quarter less riceland than those who grew man, and almost a half less upland; and despite the households who cultivated cassava having a larger number of productive family members the man/land ratio for those growing kenaf or jute was some 11.5% greater with respect to total land holding and 30.1% with regards to the upland holding. Assuming that families use their own labour resources to capacity before hiring additional hands, then the combined labour input (ie: hired and family) of bor in comparison to man sampalang would have been considerably greater than that indicated by the figures in table 6.12 [1].

When the two major upland crops are correlated individually with the complex of socio-economic variables

[1] The amount of labour represented by an 11.5% difference in the man/land ratio is much greater than it might appear. As a proportion of the average productive household of those families cultivating cassava it amounts to just over 0.4 of a man or, assuming full year-round employment (admittedly, an unlikely proposition) 147 man days of labour.

in table 6.13, the pattern of relationships changes slightly from that described previously. Cassava continues to show a strong correlation between labour and income, and also a moderate one with the area of upland. But, labour use on kenaf and jute does not exhibit any such links and instead shows an inverse correlation with the size of the productive household. The relationship is only 95% significant but considering the fact that there were only six cases in the calculation this is not terribly suprising (the coefficient is -0.8145). How can the difference between <u>bor</u> and <u>man</u> be explained?

<u>Table 6.13</u>

<u>Correlation of Labour Use with Various Socio-economic Variables</u>

	Household size	Productive H.H'd size	Income	Area of Upland	Number of cases
<u>Kenaf/Jute</u>					
Total man days	-	95.2% (-0.8145)	-	-	6
Man days/rai	-	94.8% (-0.8077)	-	-	6
<u>Cassava</u>					
Total man days	-	-	99.6% (0.4642)	97.3% (0.4244)	37
Man days/rai	-	-	99.4% (0.4424)	-	37
<u>Kenaf+Jute+Cassava</u>					
Total man days	-	-	99.9% (0.4832)	95.7% (0.3132)	43
Man days per rai	-	-	99.7% (0.4476)	-	43

In brackets: correlation coefficients.

Statistical techniques: Pearson Product Moment correlation with two-tailed test of statistical significance.

It may be that the difference is a product of cassava's flexibility and, to a lesser extent, it s 'strength'.: if households are short of labour, rather than hire additional hands they can simply grow the crop less intensely. This is olny possible because man is able to withstand considerable variation in the manner in which it is cultivated. In addition, and more importantly, they can sell the crop 'green' thereby foregoing the necessity to hire labour for harvesting. Farmers who grow bor however are unable to match this strategy: there appeared to be no opportunities to sell fibre crops unharvested [1], and because kenaf and jute are less hardy there is only limited flexibility with respect to cultivation practices. For example; they cannot be left un- or under-weeded without seriously depressing yields. The correlation coefficients, arguably, reflect this state of affairs. Farmers who grow cassava can balance the way in which they cultivate the crop (eg; labour input) against their household size, and hence there is no relationship between labour hired and the number of productive members in a family. Those who grow bor though, are forced by its inflexibility to employ more hands if they are demanded, and thus a negative relationship between labour and the

[1] Unlike cassava, fibre crops need to be harvested at a certain date if the commodity is not to lose quality and therefore, value. This means that any household purchasing the crop 'green' would have far less latitiude with which to organise its labour, and would not being able to leave it unharvested until suitable labour was available. For this reason, buying kenaf and jute 'green' was not a attractive propostion to the farmers of Noon Tae and Tha Song Korn.

size of the productive household appears. This hypothesis is rendered some support by the lack of any link on bor between labour use and income demonstrating that there may be a certain minimum labour input that must be maintained whatever a family's income.

Farmers hired labour for three activities; planting, weeding and harvesting, in the proportions 30%, 23% and 47% respectively. That harvesting accounted for nearly half of all the labour hired when 19 families (out of 45 who grew upland crops) actually sold their crops unharvested demonstrates that this is easily the most labour-demanding stage of cultivation. It also shows how significant selling a crop 'green' can be in reducing a household's labour requirements.

If the farmers who sold their cassava unharvested are examined as a sub-group of the sample, an interesting array of characteristics appear and they reveal something about the influences that encourage farmers to khaay suan (table 6.14). Most striking is the reduced labour input per rai; 1.8 mandays, as against 5.8 mandays for those farmers who harvested their cassava. The reason why 19 of the 37 families who cultivated man chose to sell 'green' should relate, if the hypothesis outlined previously is correct, to size of landholding and/or size of household. Table 6.14 shows that although they had similar size o household, they owned 45% more land (34% more riceland) than those who marketed the crop in the normal way, and therefore it is possible that it was because of their stretched labour resources they decided to khaay suan.

Table 6.14

Comparison of those Farmers who Sold their Cassava 'Green' with those who Harvested the Crop

	Household Size	Productive H.H. Size	Total Landholding
Sold Green	6.1	3.2	28.9 rai
Harvested	6.4	3.6	19.9 rai

	Riceland Holding	Mandays (total)	Mandays (/ rai)
Sold Green	20.3 rai	16.8	1.8
Harvested	15.1 rai	26.9	5.8

The need to hire labour can also be reduced if the various processes of cultivation are mechanised. Only one farmer used machinery to help with the cultivation of his cash crops: he hired a tractor (a 'big' one, not a hand held rotavator) to plough his three rai of upland prior to planting cassava, at the cost of 120 baht per rai. The man who operated the tractor had come from either Khon Kaen or Udon Thani (the farmer could not remember which) and apparently he travelled around the region stopping at each village to see if anyone wished to use his services in order to have their land prepared. That only one farmers should have decided to have his land prepared in this way demonstrates that demand was minimal (no one complained of supply being a problem). However, in Mr Jen Yotsunat's case there was a clear reason why it was a sensible course for him to follow. There were only two productive members in the household (possibly semi-productive; he and his wife were aged 53 and 64 respectively) and they had to cultivate 15 rai of land. He was therefore short of labour. He also felt that ploughing upland mechanically was necessary if cassava was to grow well, explaining that buffalo (of which he owned three) could not plough the land deep enough. There seems to be little basis to this reasoning [1], and if anything, preparing the land in such a manner would, in the long term, lead to a decline in yields as a result of accelerated soil erosion.

Yields, Returns, Costs and Profits

With these methods of cultivation and levels of input, how do the yields that farmers obtained compare with those for the _tambon_, _amphoe_, _changwat_ and nation as a whole? On the surface they seem to correspond fairly closely, especially those for kenaf and jute, indicating that the _muubaan_ of Noon Tae and Tha Song Korn are not abnormal communities (table 6.15). There is, though, some doubt as to the validity of the cassava yields recorded for the _tambon_ by the district agricultural extension office. Each village in the _tambon_ was assigned the identical yield of 1,000 kilograms per rai. Given the methods of measurement they are unlikely to be accurate

[1] Deep ploughing tends to aid rooting, although the benefits to the uplands of the Northeast would probably be minimal as the bulk of the soils are already sandy and disaggregated. However, there is every likelihood that erosion, already a manifest problem (gullying) in the surrounding area, would be accentuated.

and are best ignored [1]. If this is done then those for the study villages begin to appear to be rather lower than the others in table 6.15. It would be tempting to explain it by noting the absence of chemical fertiliser use and the general low level of inputs; and by mentioning the widely perceived decline in yields coupled to a fall in soil fertility. The trouble with this is that the sample was a small one and the comparison figures are from a variety of (dubious) sources recording data pertaining to a variety of crop years.

Finally, it can be seen that there is a gross disparity between the optimal yields recorded by the satanii pukhrai and those of the sample. This corresponds to an equally vast difference between the way in which the upland crop station cultivated its man sampalang and the way the farmer did so. It has been explained why those who were interviewed failed to follow the station's advice and it is debat able whether its recommendations are

[1] One day, while talking to the phuuyaybaan of Baan Tha Song Korn he was in the process of filling in, with the help of two friends, the kaset amphoe's annual report of agricultural statistics. The manner in which this was completed does not give one a great deal of confidence in the accuracy of some of the data: for example, the areas of each crop cultivated in 1982 were clearly guesses, as can be seen from the figures -

- Rice	2,000 rai
- Cassava	2,000 rai
- Kenaf	1,000 rai
- Peanut	50 rai
- Sesame	None
- Mulberry	3 rai

Some of the questions asked of them struck the men as being especially amusing; eg: how many chickens and ducks are there? They did not have the first idea and filled in 1,000 and 500 respectively.

really in accord with the position in which the small-holder finds himself. In fact, the farmers were presented with no sensible alternatives to their own strategy of cultivation and it seemed likely that the development of upland cropping, at least in Noon Tae and Tha Song Korn, would follow the intuitions of the inhabitants rather than any advice extended through the offices of the Thai government.

Table 6.15

Comparison Data for Upland Crop Yields

	Cassava (kg/rai)	Kenaf/Jute (kg/rai)
Sample Data	1,190	153
Noon Tae & Tha Song Korn (1982) [1]	1,000 [*]	142
Tambon Tha Song Korn (1982) [1]	1,000 [*]	130
Amphoe Muang (1982 [2]	1,904	186
Mahasarakham (1981) [3]	1,845	152
Whole Kingdom (1981) [4]	2,281	198
Yields obtained at the Upland Crop Station	6,000-9,000	-

[1] - data from office of the kaset amphoe
[2] - data from office of the kaset changwat
[3] - data from MOAC,1981,pp 26-27 & 62-63
[4] - data from the Upland Crop Station,fMahasarakham
[*] - These figures are of dubious accuracy

Yields: Cassava in kilograms of raw root per rai.
Kenaf/jute in kilograms of dried and retted fibre per rai

When the returns per rai are calculated for bor and man, the figures show that it was man sampalang which gave the highest return in the 1982/83 season of 1,158 baht per rai (table 6.16). In comparison, kenaf and jute yielded 737 baht per rai. If the costs involved are then included in the calculation the difference widens further with cassava, on average, giving a net profit margin 76% larger than that of the two fibre crops. In spite of this already significant disparity there are reasons to believe that a strict comparison of their costs, returns and profitabilities is impossible and that, if anything, the difference is even greater.

For it has already been demonstrated that the households who grew fibre crops operated smaller landholdings than those who grew cassava, especially if it happened to be sold green. In view of this, and in view of the comments farmers made, the labour input per rai is probably much larger than than indicated by the data for 'labour hired' (table 6.12), and it was only because those families had the surplus with which to cultivate bor that they were able to do so. In addition, and perhaps more importantly, is the fact that the farmers of Noon Tae and Tha Song Korn tended to cultivate cassava on the worst land. Many believed that man sampalang, because it could be grown on virtually sterile soils, was the only crop that they could cultivate, and this naturally meant that the yields they obtained were lower, relatively, than those from kenaf or jute.

Table 6.16

Costs, Returns and Profits from Upland Cash Crops

(per rai)

	Labour costs	Transport costs	Other costs	Yield kg/rai	Return baht/rai	Profit baht/rai
Cassava						
Harvested	145	149	-	1,190	1,050	756
'Green'	45	-	7	-	1,240	1,188
Chipped/dried	40	150	-	1,200	1,520	1,330
All Cassava	92	74	-	-	1,158	988
Kenaf/Jute						
Retted/dried	160	19	-	153*	766	587
Raw fibre	50	101	-	807	565	414
All kenaf/jute	144	31	-	-	737	562

All costs in baht

* This is the yield of retted and dried fibre. All other yields are raw root or raw fibre.

This is not quite the whole story as nearly one half of the households who cultivated man sampalang chose to sell their crop unharvested. Table 6.16 shows that, suprisingly, those who decided to do this earned a greater return per rai than those who harvested their crop. The difference becomes even larger when the costs of harvesting and transporting the produce to the point of marketing are included and, given the information to hand, is difficult to explain.

Finally, and more explicably, the table shows that the largest profit and return was obtained by the single farmer who not only harvested his cassava but also chipped and dried it. He received 1,520 baht for each rai that he cultivated, and when his costs had been subtracted, earned a net profit of 1,330 baht per rai.

The Marketing Process

In the communities of Noon Tae and Tha Song Korn 'upland cropping' is synonomous with 'cash cropping' and the entire production of those who were interviewed was marketed. However, in contrast to rice the Thai government plays no direct role in the process, so that farmers are forced to sell their produce to private middlemen. In all, 42 farmers grew and marketed upland crops; 19 of these sold to 'middlemen' living in Noon Tae or Tha Song Korn; 21 to middlemen in Mahasarakham, Kosum Phisai or Borabu (the district town of the amphoe adjoining Muang Mahasarakham); and one farmer to a paper company in Amphoe Borabu (table 6.17).

The nineteen who marketed their cassava crop through fellow villagers represent the nineteen who sold 'green'. These men (as well as the buyers) appeared to be able to judge, fairly accurately, the potential yield of an unharvested field, and the prices paid were negotiated on site and depended on the state of the crop. The highest return per rai amounted to 2,300 baht and the lowest, to 625 baht with the mean being 1,240 baht per rai. It is probably wrong to call the villagers who bought green cassava, 'middlemen', in the true sense of the word. The activity was always small-scale, and was essentially a

Table 6.17

The Marketing of Upland Crops in Baan Noon Tae and Baan Tha Song Korn

		Households	
Households who grew Upland crops		45	
Households who marketed upland crops [1]		42	(two marketed two types of crop)
Those Who Grew Cassava			
Sold Green:		19	All sold to 'middlemen' in Tha Song Korn or Noon Tae.
Harvested:	raw root	- 16	All sold to middlemen in Mahasarakham, Kosum PhisaiPhisai or Borabu.
	chipped & dried	- 1	
Those Who Grew Kenaf or Jute			
Harvested:	retted and dried	- 6	Sold to middlemen in Mahasarakham or Kosum Phisai.
	retted and dried	- 1	Sold to a paper company in Amphoe Borabu.
Household that Sold Water Melon			
Harvested:		1	Sold to a middleman in Mahasarakham.

[1] Three households failed to market any produce: One grew sugar cane and gave her production away because the price was too low to make harvesting worth her while; and two grew cassava but obtained no yield.

process by which households with a labour shortage could interact with those in surplus so that a balance could be achieved. Four of the families interviewed bought fields of cassava to harvest and market and they reflect this situation: they estimated that their profits would be 8,000, 15,000, 16,000 and 20,000 baht (table 6.18), and in three of the four cases the activity was thought of as an income earning opportunity subsidiary to the farming of their own land (the fourth case is difficult to assess as in the 1982/83 season all his riceland - 22 rai - was destroyed by flood or drought). Although the sample is obviously an extremely small one, it is not able that the families had a high man/land ratio giving them a surplus of labour with which to indulge in the practice and to harvest the purchased crop (table 6.18). And, indeed, if harvested riceland and cultivated upland are taken to be a more accurate measure of labour requirements then the difference in the man land ratio between those households who bought 'green' cassava and the sample average grows to 76%; the ratios being 0.44 and 0.25 respectively (table 6.18).

The remaining farmers who grew and sold man sampalang took their produce to middlemen located in one of the three towns within a reasonable distance of the study villages (Mahasarakham, Borabu and Kosum Phisai). In every instance bar one the crop was marketed as raw root, the exception being the man who sold the tuber chipped and dried. The number of middlemen in the vicinity of the communities coupled with the ease of transportation and spread in communications meant that competition between merchants was strenuous, and as a result prices tended towards a competitive norm. The difference in the returns that farmers obtained were a result of price fluctuations through the season rather than exploitation. The highest for raw root was 0.98 baht per kilogram, the lowest 0.60 baht per kilogram and the mean 0.77 baht per kilogram. The individual who sold his crop chipped and dried received 1.90 baht per kilogram.

Table 6.18

Buying of Green Cassava

Household	Productive Household	Income from Buying Cassava	Total Income
1/	5	15,000	70,000
2/	5	16,000	20,000
3/	4	8,000	15,000
4/	2	20,000	24,600
Average	4	14,750	32,400
Sample Mean	3.3	-	23,900

Household (con't)	Riceland (Total)	Harvested Riceland	Man/land ratio [1]	Cultivated Upland	Man/land ratio [2]
1/	12	12	0.42	5	0.29
2/	17	17	0.29	2	0.26
3/	12	0	-	-	-
4/	22	0	-	-	-
Average	15.7	7.2	0.55	1.7	0.44
Sample Mean	16.1	9.7	0.34	3.4	0.25

Man/Land Ratio [1]: ratio of productive households to harvested riceland.
Man/Land Ratio [2]: ratio of productive households to harvested riceland + cultivated upland.

All income in baht; all land in rai.

Six of the seven farmers who grew kenaf or jute sold their crop retted and dried, and they all marketed it through middlemen in Mahasarakham or Kosum Phisai (table 6.17). Except that the fibre was quality-graded the marketing procedure was, as far as the farmers were concerned, the same as that for cassava. Each of them had their crop graded as 'B' and all received a rate of 5 baht per kilogram of fibre. The seventh man sold his production in the raw state to a paper company in Amphoe Borabue, and obtained a return of 70 sataang per kilogram.

In addition to <u>bor</u> and <u>man</u> one farmer grew a rai of water melons and another a rai of sugar cane. The woman who cultivated water melons sold her crop of 500 melons to a middleman in Mahasarakham for 3 baht each. Of greater interest was the family who cultivated the sugar cane, as the problems that they encountered demonstrate the risks that small farmers face when cultivating cash crops.

In 1982 Mrs Liang Away decided to switch from cassava, which she had cultivated in the previous year, and plant sugar cane on her one rai of upland. She had decided to do this because she said that the price for cane at the beginning of the season had been very good. By the end of the season however, the price had dropped to a level at which she felt it was not worth her while to hire the labour to harvest the crop. So she gave the cane away to her friends and neighbours telling them they could have as much as they liked. These villagers, rather than take the cane to a middleman, cut and stripped it and sold it as a snack in Mahasarakham market for approximately 50 sataang a packet. Interestingly, Mrs Liang recognised that she could have followed the same labour intensive process but because she was fairly wealthy [1], as she put it, "could not be bothered".

The point of this is that it reveals the risks that must be taken into account when cultivating crops for sale; and it shows one of the reasons why farmers are usually reluctant to invest much money (Mrs Liang applied 50 kilograms of the chemical fertiliser 16-16-8 at the cost of 300 baht) when they were growing crops which might not justify the investment by failing to yield an adequate cash return.

It has been noted in the past that middlemen are sometimes willing to travel to the farmer to purchase upland crops (as they do with rice; Preecha Kuwinpant,1980,p 159). This has been seen to be a response to the problems that the inhabitants of the more remote villages have in transporting their produce to the point of marketing. In the muubaan of Noon Tae and Tha Song Korn there was no instance of this occurring and the farmers went to the middleman rather than the other way around. There were a number of villagers who owned trucks of one kind and another and they were easy to hire. The rates they charged for transporting produce to Mahasarakham or Kosum Phisai varied between 100 and 150 baht per ton carried, and usually the crops were taken directly from the fields to the middlemen. The ease with

[1] The household owned 81 rai, the largest landholding of all the families who were interviewed.

which farmers could deliver their crops to the middleman was demonstrated by the fact that no one identified transport or communications as a hindrance to the sale of their produce.

In one of the opening chapters to this thesis (Ch 2) it was mentioned that the Thai administration has always stated that a principal reason why farmers remain impoverished is that they are exploited by unscrupulous middlemen. Numerous independent studies have shown that, to the contrary,the agricultural marketing system, especially at the local level is, on the whole, very efficient and is unlikely to be improved upon by government intervention [1]. However, despite these revelations, the present Five Year Plan (1982-86) continues to insinuate that the private marketing system is unfair to farmers: "Middlemen have a monopoly over marketing and agricultural pricing information resulting in lower bargaining power for farmers" (NESDB[1],n.d.,p 46). To investigate, very superficially [2], whether or not they did take 'excessive' profits when marketing agricultural produce a Chinese middleman in Khon Kaen was interviewed.

[1] "So far direct government intervention and agricultural cooperatives are inefficient, private middlemen are more efficient. From field marketing audit the preliminary findings show that middlemen upto provincial level are efficient and they receive comparatively lower rate of profit due to local competition..." (Phaisal Lekutai,Jan 1982,p 164).

[2] It is appreciated that the responses from a single man with no corroborating evidence is a weak basis for any argument. However, it is felt, and there were reasons to believe, that the replies were truthful and accurate.

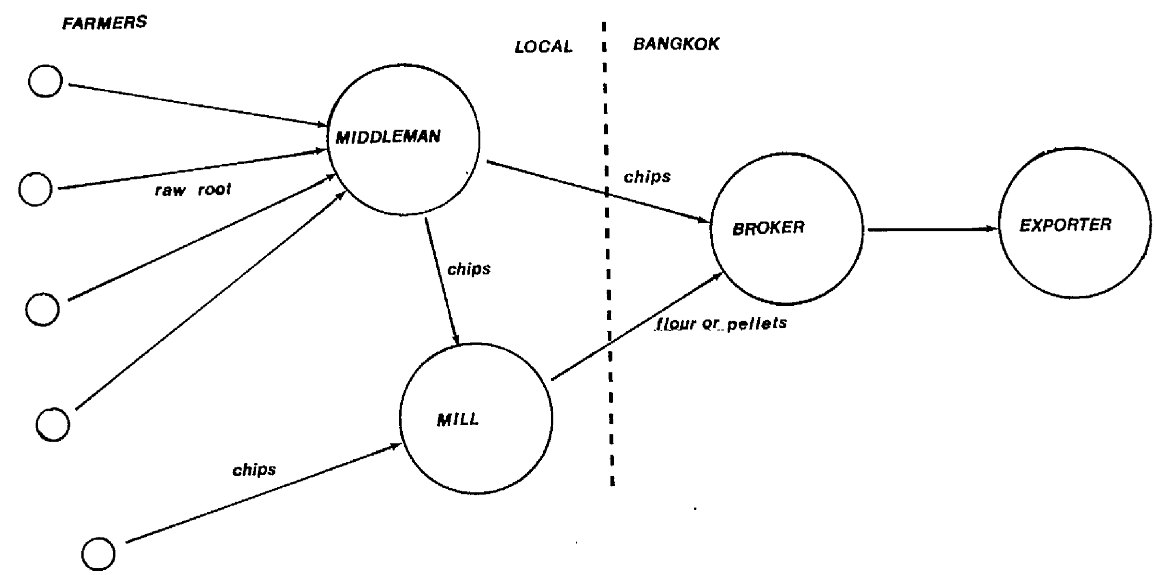
Middlemen or khon klaang are generally involved in the marketing of a number of crops. This account though, will deal exclusively with the case of cassava both for simplicity's sake and because it is the principal cash crop of the region and of Noon Tae and Tha Song Korn.

Usually, raw root is sold by the farmer to the middleman. The middleman will then chip and dry the tuber and either sell it to a broker in Bangkok or send it to a mill to be processed further into pellets or flour (figure 6.1). Farmers who chip and dry the root themselves can sell it either directly to a mill or, alternatively, to a middleman.

According to Mr Nit, middlemen do not tend to work on a percentage profit basis but will take a standard cut (eg 5 sataang) from the rate paid for each kilogram. This will normally remain stable whatever the Bangkok wholesale price, although severe fluctuations can result in the amount being re-evaluated. Table 6.19 shows the profits and costs of marketing dried and chipped cassava as it moves from the farm-gate to the broker in Bangkok. The prices are those of December 1982 and although they would vary through the year the percentage profits and costs would remain roughly stable and would be similar from crop to crop. It is clear that the profits, after all the costs have been taken into account, are not excessive at 1.5% of the price paid at the farm-gate (table 6.19). Mr Nit believed that with the large number of khon klaang operating through the country and the greatly reduced frictions of distance, there was very little chance of

Figure 6.1

Marketing Structure: Cassava



Source: Middleman, Khon Kaen.

monopsonism developing. Today there are few areas of Thailand isolated from marketing information and from modes of transport, and as a result there are very few farmers who must rely on the services of only one middleman.

Table 6.19

Breakdown of Costs and Profits Incurred by a Middleman in the Marketing of Chipped & Dried Cassava

	Costs/ kilogram	%
Price offered over the telephone by a broker in Bangkok	2.30 baht	100%
Transportation costs per kilogram - Khon Kaen to Bangkok	.20 baht	91.3%
Interest on Loan to buy cassava	.04-.05	89.1%
Middleman's cut and costs:		
Labour costs -	.01 baht	
Machinery costs -	.01 baht	
Profit -	.03 baht	
Total -	.05 baht	87.0%
Price at the farm-gate	2.00-2.01 baht	

Earlier it was noted that accounts in the past have sometimes recorded that khon klaang provide other services than marketing (provision of inputs, credit, transport facilities etc;), and that these are extended on the condition that the farmer sells his produce to the middleman in question. The implication of this is that a hold is gained over the farmer, allowing him to be exploited. Mr Nit appreciated that this practice had been prevalent in the past but claimed that today middlemen, because of the increased competition, are forced to separate their sevices into wholly independent entities, treating each transaction individually. This is supported by the absence of any such arrangements in Noon Tae or Tha Song Korn, and also their absence among the merchants of Mahasarakham town.

It would also seem that the number of brokers in Bangkok would tend to eliminate their ability to form a cartel to manipulate the market. This does not necessarily follow with respect to the cassava exporters however. There are only 66 exporting firms and because 92% is shipped out of the country there is the possibility that they could influence the price to their own benefit (US Presidential Mission,USAID,May 1982,pp 1-3). But it is not they who are vilified; it is the small-scale ethnic chinese middleman who receives accusations of exploitation and who is viewed by nearly all Thais, officials and farmers alike, as unscrupulous. It is worth noting, in conclusion, the observations made regarding over-all marketing margins in a recent article on the cassava industry in Thailand: "An analysis of the marketing margins shows that the farmers receive about 50% of the CIF Rotterdam price [80% of cassava going to Europe is handled by the port of Rotterdam]. In the generality of export crops based on small-scale farmers production, this is a very high proportion of the market price" (Bennison,Jan/Feb 1984, p 92).

The Expansion of Upland Cropping onto the Marginal Upper Padis

It has commonly been noted that the farmers of the Northeastern region of Thailand would obtain a greater return if they turned their marginal upper padis, which they are only able to cultivate in the wetter years, over to upland cash crops. As Ng notes: "The North-eastern farmer must come to terms with the reality of the local terrain and soil in order to branch out into growing a larger acreage of non-paddy field crops. Insistence on producing as much rice as possible is the worst strategy that could be chosen" (Ng,1970,p 42). However, almost fifteen years after Ng wrote this there has been little change in the pattern of land use, and the land cultivated to upland crops still does not impinge, in the main, upon the traditional ricelands. The reasons why the farmers of the region have failed to follow this advice are often seen to relate to their strategy of risk minimisation in which they own and operate a variety of padis each representing a different ecological niche; in this way farmers can maintain a stable output of rice whatever the climatic conditions:

> "Although upland terrace land accounts for upto a third of the area in rice production, this land is generally unsuitable for the growing of paddy rice. But farmers reserve these areas for planting to rice if their main crop is damaged by erratic or excessive rainfall" (MOAC,April 1980,p 6).

But, in Baan Noon Tae and Tha Song Korn it has already been noted that most of the farmers (66%), due to the growth in population and the associated breakup of land holdings, own only one type of riceland. They are therefore, in any case, unable to follow this strategy in which they plant, "as much rice and as early in the year as they possibly can" (Ng,May 1974,p 6). What then are the inhabitants doing with their land and why?

Two of the households in the sample had, in the past, turned their upper paddy over to upland crops. There was also evidence that some of the land surrounding the villages currently planted to upland crops had at one time been padiland (remnants of bunds existed). However, bar these cases - which can be seen as exceptions to the rule - thii dorn continued to be cultivated as riceland. The two farmers who had turned their land over to another crop demonstrate rather well some of the reasons why Ng's suggestion has gone unheeded.

Mr Chin Nahaat owned five rai of marginal upper paddy. In 1982 he had to leave it uncultivated because of insufficient rainfall. But, two seasons prior to this he had planted kenaf on the land. He explained that the price of bor was very good in that year and this encouraged him to cultivate the crop. He reverted back to reserving the land for rice when the price of bor declined again. What is interesting about this is that it demonstrates economic awareness as well as flexibility. The question is, however; why did Mr Chin act in this manner when the rest of the village did not; in other words, what made him special?

The answer is largely economic: the family was a small one consisting of Mr Chin and his wife. They owned fifteen rai of riceland (giving them a land/man ratio of 7.5:1, as against the sample average of 3.2:1) and had an income outside agriculture, coming from trading. Their rice production, despite not being able to plant the five rai of thii dorn, was enough to enable them the feed themselves and to sell a portion of their crop. They were therefore under no compunction to meet subsistence requirements by planting their upper paddy to rice and could look to economic rather than purely subsistence considerations. This is not the case for most of the inhabitants; only one of those that actually sold rice (ie: had a surplus of production [regular?] so that they could escape from the demands of subsistence) owned any upper padiland. Indeed, Ng's statement that reserving all potential padiland for rice cultivation, "is the worst strategy that could be chosen" seems to ignore the economics of subsistence.

The second farmer, Mr Muu Phonlaa, had turned his upper riceland over to cassava in the season previous to the one of the study, but in the following year had reverted back to reserving it for the cultivation of rice. Unfortunately, due to the late and insufficient rainfall, he was unable to plant the land to paddy and it was left unused. From this it is clear that the land is exactly the type Ng states is more suited, both physically and economically, to crops other than rice. Mr Muu's experiences are therefore pertinent to understanding the influences at work.

Mr Muu Phonlaa owned 23 rai of riceland of which he classified 10 rai as *thii dorn*. The household contained only three members so that like Mr Chin's it was land rich with a land/man ratio of 7.7:1. In addition to this, four rai was *thii naa prang* - irrigated riceland. This meant that a portion of his land was not influenced by the vagaries of the climate and could be virtually guaranteed to produce a good yield. The family was therefore able to escape from the constraints of subsistence. The principal reason why, despite all these factors which would allow Mr Muu to cultivate upland cash crops, he had decided to stop planting *man sampalang* and switch back to the *possibility* of growing *khaaw dor*, was that the land was too wet to grow cassava sucessfully. His was not an isolated case: another six households said that their cassava crop had suffered because the land that they were cultivating it upon was excessively wet. Their average yield amounted to 115 kilograms per rai, less than 10% of the sample mean. The point of this is that the *upper padis are not only marginal to rice cultivation but also to the cultivation of cassava*. It could be argued that another cash crop would be more suited to the conditions of this intermediate land (eg; sugar cane). But, at the present time cassava is a virtual monocrop; the inhabitants have knowledge of few others and there are no alternatives within their experience which can compete with *man sampalang* in terms of profitability, and ease and flexibility of cultivation. Until there is, and until farmers can be guaranteed either a subsistence income or a subsistence rice crop, the *thii dorn* is unlikely to be cultivated to crops other than rice.

Conclusion

Upland cropping in Noon Tae and Tha Song Korn is now firmly entrenched within the farm system and represents an important element in the economy of the villages. But, in spite of this, it is the demands of rice cultivation which are paramount when farmers are deciding on any strategy of cultivation, and the needs of an upland crop are always subservient to those of rice. This was evident in the widespread opinion that the cultivation of such crops was not 'proper' farming; farming, for the inhabitants of the villages, implied rice cultivation.

In view of this, it was important that any cash crop be flexible, and it was the particular appropriateness of *man sampalang* to the constraints imposed on the farmer by the various elements of the farm system which made the great majority of those interviewed plant this crop rather than any other. Indeed, it is possible that even if kenaf, for example, did become more profitable than cassava farmers would be reluctant to change due to the stricter demands under which they would then have to make decisions.

Some of the influences impinging on the villagers in their choice of which upland crop to grow, whether to use chemical fertilisers and pesticides and how much labour to hire are illustrated in figures 6.1a to 6.1c [1].

[1] These figures are contained in a pocket at the back of the thesis, and a brief explanation of their construction is given in appendix 5.2.

Chapter Seven

Cooperative Membership and the Extension of Credit in Noon Tae and Tha Song Korn

Introduction

The previous two chapters have examined some of the ways in which the government of Thailand is attempting to aid the farmers of Noon Tae and Tha Song Korn in their efforts at intensifying the cultivaton of rice and upland crops. However, there are two important avenues which have not, as yet, been discussed in any detail - those of credit and cooperatives. For, in addition to supplying farmers with inputs and advice through the Office of the Kaset Amphoe, the government also involves itself in their affairs through two other national organisations - the Cooperative Promotion Department (CPD) and the Bank for Agriculture and Agricultural Cooperatives (BAAC). The history and background to these two organisations was discussed on a national scale in chapter 2. This next section will take a much more specific line by continuing on the theme of chapters five and six and examining the role that they are playing in the research communities, and the manner in which they are perceived by the inhabitants of the two villages. In this way it is hoped, once again, to reveal the relevance of the efforts to the varying positions in which the farmers find themselves.

Cooperatives

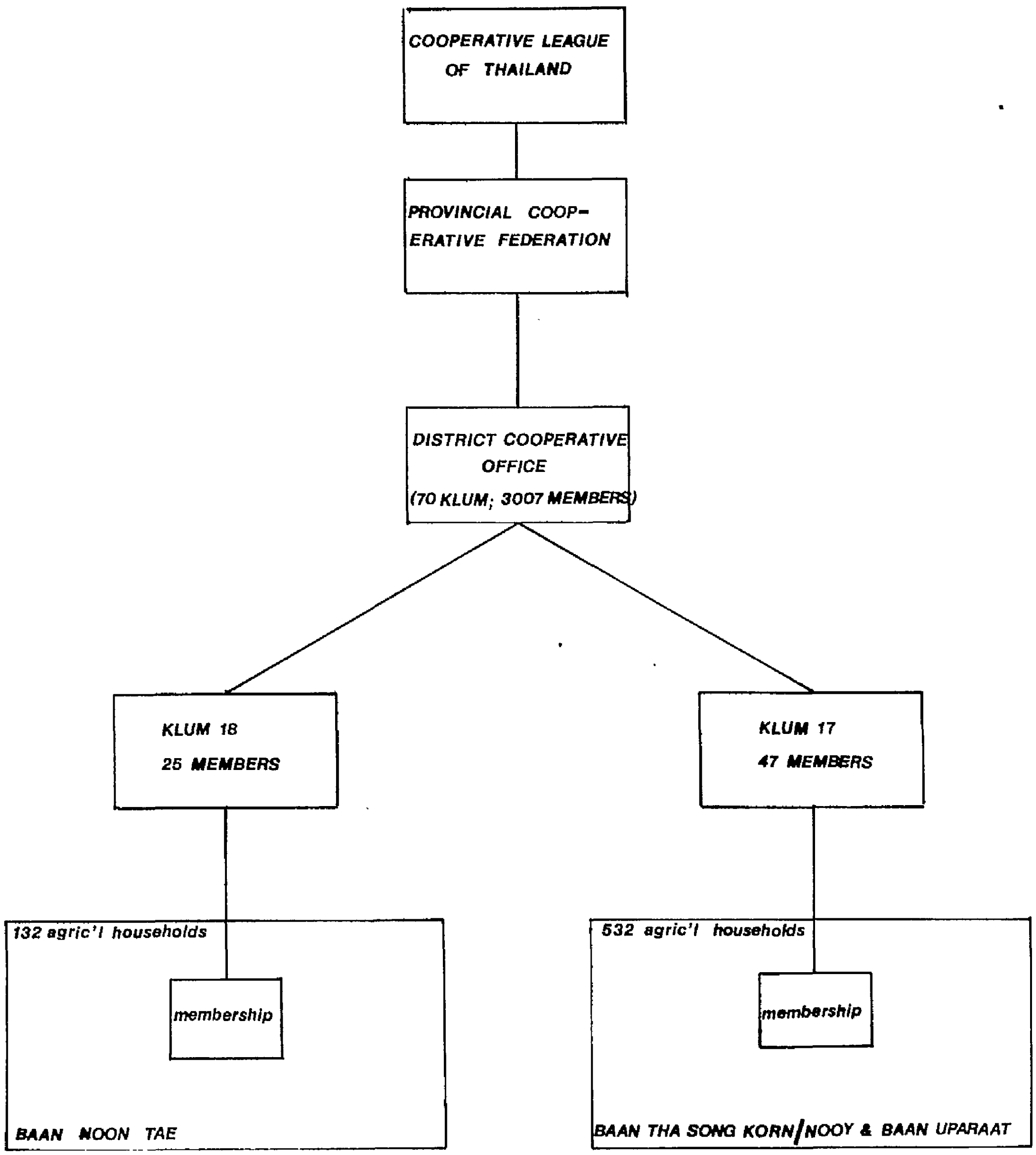
In Thailand, the cooperative structure takes the form illustrated in figure 7.1. The lowest level of administration are the cooperative "groups" or klum which are administered at the district level and which usually represent the farmers of between one and three villages. In Amphoe Muang Mahasarakham there are 70 such klum with a combined membership of 3,007. The farmers of Baan Noon Tae were organised within a single group, number 18, which in April 1983 had 25 members. The inhabitants of Baan Tha Song Korn meanwhile belonged to klum 17, which also included the villages of Baan Uparaat and Baan Tha Song Korn Nooy, and which had the slightly larger membership of 47 (Table 7.1). Both groups were established in 1974.

From these figures it is immediately clear that cooperative affiliation, both in the Amphoe and in the two groups to which the study villages belonged, was far from universal. Only just over 14% of the 20,877 agricultural households in Muang Mahasarakham belonged to a cooperative, while in klum's 17 & 18 membership represented 9% and 19% of the farming households respectively (Table 7.1). The questionnaire revealed a similar pattern and level of affiliation with 22% of the sample from Noon Tae holding cooperative membership and 14% from Tha Song Korn.

The official at the Amphoe Office said that to become a member of the cooperative or sahakon a farmer must own a house and land. She said that there was no lower limit to the size of the landholding, and both nor sor saam and

Figure 7.1

Cooperative Structure: Baan Noon Tae & Baan Tha Song Korn



Source: District Cooperative Office, Amphoe Muang Mahasarakham.

chanot thii din were acceptable as titles of ownership. This means that virtually all of the farming households who were interviewed would have been eligible for membership.

Table 7.1

Cooperative Membership

	Coop Membership	Agric'l households	%
Amphoe Muang	3,007	20,877	14.4
klum 17	47	532	8.8
klum 18	25	132	18.9
from questionnaire:			
Tha Song Korn	6	41	14.0
Noon Tae	8	36	22.0
Combined	14	77	18.0

The cooperative provided a number of services, some of which have already been mentioned: members could buy the chemical fertiliser 16-20-0 at the rate of 245 (cash) to 250 baht (deferred payment) for 50 kilograms; and they could also purchase the pesticide "Phaaden" for 20 baht per kilogram (cash only). However, seeds were not sold and farmers could not hire machinery of any sort. In addition to supplying inputs the cooperative also marketed rice and provided loans. Paddy was bought at government support prices and members could obtain short (one year) and medium-term (three years) loans at a rate of interest of 14% per annum. The size of the loan to which each was eligible was calculated on the basis of the size of their landholding: each rai of land, either riceland or upland, could be used as collateral to guarantee up to 2,000 baht. Table 7.2 shows the extent to which each of these services was utilised by the members of the cooperative groups 17 and 18: each member bought an average of 35 kilograms of 16-20-0 in the crop year 1982/3, marketed a minimal quantity of paddy and purchased no pesticides. Upto April 1983, 44 individuals had loans issued through the coop, 32 of these being medium-term (3 years) and the remainder short-term (1 year). The average loan amounted to 8,700 baht or, if all the members are included in the calculation, 5,300 baht.

Table 7.2

Services Extended to Cooperative Groups 17 & 18: 1982/83 season (per member)

	Group 17	Group 18	Combined
Fertilisers Sold	29 kg	46 kg	35 kg
Pesticides Sold	-	-	-
Marketing of Rice[*]	39 kg	39 kg	39 kg
Loans extended(Baht)	4,900	6,100	5,300

[*] This figure is calculated from the district data as figures for each group were unavailable. It is rather misleading as the great majority of farmers sold no rice and this is only an average derived from the small section of the membership who did.

Although the cooperative office had data pertaining to the extension of credit, the amount of fertiliser and pesticide it sold and to the marketing of rice this data, in itself, reveals nothing of the underlying reasons behind the figures. To discover what they are it is necessary to examine the results, both quantitative and qualitative, derived from the questionnaire.

Of the households interviewed 14, or 18% of the sample, were members of the cooperative (Table 7.1). Table 7.3 shows how they differed from those farmers who were not members: they owned 31% more land, 28% more riceland [1], had a total income 44% larger and an agricultural income over twice as large; borrowed nearly three times as much money and applied 32% more fertilisers on their rice. In other words, at least in Noon Tae and Tha Song Korn, the farmers who belonged to the <u>sahakon</u> were wealthier and owned larger land holdings. The question is; why are they apparently a distinct group within the sample? Is it because, despite what the distict cooperative office professed, eligibility is limited for one reason or another; or is it simply that a particular sort of farmer is attracted to the advantages that membership holds? It is arguable of course that what appears in the table to be a significant set of differences does not, in fact, hold any significance; and indeed, when they are correlated, although there is a

[1] It could be argued that the larger land holdings of the cooperative members are a <u>result</u> of their membership; that in some way it has aided the accumulation of land. The information from the questionnaire however, indicates that in Noon Tae and Tha Song Korn this has not been the case, almost 94% of the plots (122 out of 130) were inherited by the present head of household.

fairly strong positive relationship between membership and the total amount of fertiliser used, credit extended and agricultural income, it is weak for total land, riceland and total income (table 7.3). Debating the merits of this distinctly unilluminating set of coefficients is, perhaps, the wrong approach to the problem and to discover the benefits and nature of cooperative membership it might be better to look more deeply at the responses that farmers gave and to the details of the differences between the two groups [1].

Table 7.3

Comparison of Cooperative Members and Non-members

	Coop Members	Non-members	% Signif'ce
Age of Head(years)	46	47	-
Years of Residence	33	47	-
Size of Household(head)	7.1	5.9	-
Size of Productive Household(head)	3.8	3.1	-
Total Land (rai)	26.0	19.9	85%
Riceland (rai)	20.7	16.2	-
Fertiliser Use(kg/rai)	9.9	7.5	-
Fertilisers Bought(kg)	178	93	96%
Money Borrowed(baht)	9,000	3,200	99.8%
Total Income(baht)	31,600	22,000	85%
Agricult'l Income (baht)	13,200	5,900	98.6%

Statistical techniques: Pearson product moment correlation with two-tailed test of statistical significance.

[1] The overall pattern of the correlation coefficients says little. This does not mean that individual coefficients are uninteresting, and this will be expanded upon later.

Given that the cooperative provides certain services to its members and that their provision is the principal benefit which farmers can derive from affiliation it might be expected for these services to be used by the farmers in question. Their use, and the inability of non-members to gain access to similar services at comparable prices, would indicate that there are distinct advantages attached to membership.

Earlier it was pointed out that fertiliser use both in total and per rai was greater among members than non-members (Table 7.3). However, when these figures are examined more closely one finds that of the 11 who used chemical fertilisers only 5 purchased them from the sahakon, the remainder going to middlemen (2), CBIRD (2), the BAAC(1) or the kaset amphoe (1). It has already been demonstrated in chapter five that farmers have access to a number of similar sources of fertilisers so that, in this respect, there is no particular advantage of belonging to the cooperative. As far as pesticides are concerned, not only did no farmer in the sample buy them from the sahakon but, according to their own statistics, neither did anyone in the four villages associated with klum's 17 and 18. Once again, the farmers need for the input was met by commercial sources which provided pesticides at a competitive price and, incidentally, in a far greater selection. Only two households belonging to the coop marketed any paddy in the 1982/3 season and both sold their produce to middlemen in Mahasarakham. The comments that farmers made (look to chapter 5) illustrate that they do not think highly of government purchasing bodies, and even when they are members of the cooperative are not encouraged to sell to it.

Finally, there is the question of credit. The households covered by the questionnaire had taken out loans from all sources averaging 4,300 baht. If they are then broken down into cooperative members and non-members, the former had loans averaging 9,000 baht and the latter 3,200 baht, and it has already been demonstrated that there is a strong positive correlation, significant to 99.8%, between cooperative membership and the extension of credit. On immediate appraisal this seems to indicate that the farmers who belonged to the sahakon were able, for one reason or another, to borrow larger quantities of money. However, not all these loans were negotiated through the coop. Indeed, of the 14 members, five had loans issued directly through the BAAC and if they are subtracted from the figure of 9,000 baht the amount of credit extended per household declines to 4,100 baht, only a little greater than the average for the entire sample (Table 7.4). It is possible, of course, that belonging to the cooperative is a sign that a farmer is a good risk, thus making it easier for him to borrow money from the BAAC (this would explain the correlation between credit and membership); although the bank itself claimed that this did not necessarily follow; and it is not-able that whereas 93% of cooperative members borrowed money from instit utional creditors, only 42% of the sample as a whole did so (the question of the provision and use of

Table 7.4

Credit Extension to Cooperative Members

Source:	Amount (baht)	Households Involved	Baht per Household
Coop	57,000	8	4,100
BAAC	69,000	5	4,900
combined	126,000	13[*]	9,000

[*] One household borrowed no money.

credit will be entered into in greater detail in the second half of this chapter).

With only 18% of the sample belonging to the sahakon it is possible that the most fertile line of enquiry is that which is directed at those farmers who have not become members. Table 7.5 gives the reasons that the inhabitants gave for remaining unaffiliated (NB; the table does not include those who belonged to the alternative Farmers Association).

Table 7.5

Reasons Given for Failing to Join the Cooperative

	Number of Households	%
No need	17	47%
No need & ignorance	4	11%
Ignorance of coop	3	8%
Not enough land to be eligible[*]	3	8%
Not enough money to be eligible	1	3%
Other reason did not fit requirements	4	11%
In process of becoming a member	4	11%
(No reply:17 households)		
Total	36	99%

[*]Two owned no land.

Particularly striking is the large number who stated that they had no need, and saw no particular advantage, in membership. A typical reply was that given by Mrs Lamaan Japathasen who said that she could get everything she needed just as easily and cheaply elsewhere; while Mrs Munamaa Bunalaa was a little more strident and said that she didn't have the time to sit and listen to people talking at unnecessary meetings (it was almost as though she held a grudge against the coop) [1]. The previous section clearly demonstrated that as far as fertilisers, pesticides and marketing are concerned this is true, and might also be true for a large section of the population with regard to the access to credit. Similar to this group of 17 farmers are the seven who were ignorant of the cooperative, its functions and services, and how to join. They all gave the impression of being ignorant for the simple fact that there was no pressure on them to become informed. Even so it is still rather suprising that farmers in small communities such as those of Noon Tae and Tha Song Korn can be so ill-informed about a major vehicle of government aid, and arguably the <u>sahakon</u> should advertise itself more intensively.

Linked to the problem of ignorance is that of mis-information and the important issue of eligibility. Four households appeared to say that they had been unable to join for reasons which the cooperative office claimed

[1] Two other farmers also said that being a member was a "waste of time".

were irrelevant: one family who owned 8 rai of land (6 of riceland, 2 of upland), stated that they had insuffcient land to be eligible for membership. A second woman, aged 66, said that she was barred from membership because she was too old. A third because one of the conditions was that a farmer must own pigs, of which he had none; and the last because each applicant had to pass a "test" which, among other things, insisted that a farmer earn over 10,000 baht per year. Each of these responses were isolated cases and seemed to be the result of a certain murkiness about how one actually goes about becoming a member. Once again this indicates that the sahakon should do something about making the details of the organisation wider and better known. Undoubtably, part of the problem is the confusion that many farmers have over which government department does what: the man who said that he had to pass a "test" appeared to be muddling the cooperative with the Farmers Association, while the individual who said that he had to rear pigs was probably thinking of the Pig Cooperative - a quite separate entity.

Conclusion

From this account of "cooperatives" in Noon Tae and Tha Song Korn it should be clear that the word is something of a misnomer, and in effect the sahakon only operates as a source of inputs and services rather that as a true cooperative enterprise. This fact has been noted on many previous occasions (Kirsch, 1981, pp 103-114;

Demaine,1976,p 8; Kiyoshi Kamegai,Jan 1982,p 155). The families of the two villages saw nothing particularly beneficial in membership, and it certainly appeared that even those services that were provided could be obtained easily enough elsewhere. But even so, there is still a paradox for which there is no clear solution: why is there a relationship between membership and agricultural income, credit, fertilisers bought and size of land holding? (Table 7.3). This problem has been discussed and talked around in the last few pages but nothing concrete has arisen. In the absence of any obvious explanation it is only possible to take two hazardous stabs at an answer:

Firstly, it maybe that the distribution is derived from a former period when eligibility was stricter and when farmers did not have access to so many alternative sources of inputs, credit and marketing facilities. This would have led to a particular type of farmer joining-up, and would explain the present situation where the wealthier and larger land owners have membership but in many cases do not bother to utilise the facilities to which they are afforded access [1].

And secondly, there seems to be some evidence to suggest that the main benefit of cooperative membership, credit extension, is the cause (or one of the causes) of the relationship. For, it is only the larger landowners

[1] This being because the cooperative no longer has a monopoly on the supply of any service.

who are able to reap the full rewards of the system by which loan-limits are calculated on the basis of the quantity of land owned. This would naturally mean that those households with more than the average amount of land would be encouraged to join.

Farmers Associations

The sahakon was not the only governmental cooperative institution operating in the two study villages; there was also the Farmers Association or klum kasetakorn. This group, as will become clear, played only a minor role in the lives of the population but even so is worth briefly describing, as in the past it has been an important part of the government's extension programme. Its failure to make any sort of impact in the research communities does help to demonstrate why it is now being phased-out.

Farmers Associations were first established in 1973 [1] with the principal purpose of providing agricultural credit facilities at low cost by using group guarantees (Chinnawoot Soonthornsima,Jan 1979,p 36). They have, however, been singularly unsuccessful in meeting their aims (Direk Patmasiriwat,Oct 1981,p 52-3), and the 1979 five-year plan for the development of agricultural cooperatives recommended that they be phased out and their members incorporated into the cooperative structure

[1] Although Rice Farmer Associations, an earlier grouping, were established in Feb 1955 under the supervision of the Department of Agricultural Extension (Direk Patmasiriwat,Oct 1981,p 52).

(NESDB,Feb 1979). This is slowly occurring and indicative is that in the 1982 fiscal year the BAAC supplied only 57 million baht to Farmers Associations for onlending, 0.5% of its total disbursements in that year (BAAC,1983,table 4,p 77).

To members living in the villages of Amphoe Muang Mahasarakham the organisation supplied the chemical fertiliser 16-20-0 at the rate of 235 baht per 50 kilogram sack, sold machinery (though demand was minimal) and extended short and medium-term loans at an interest rate of 14% per annum. It did not though, despite what some government reports state, market produce or provide seeds or pesticides [1].

In Noon Tae and Tha Song Korn only ten farmers in the sample (13% of agricultural households) said that they belonged to the grouping, of whom three stated that they used the organisation to purchase fertilisers and one as a source of credit. It can been seen therefore that not only was membership limited but also that among the members the services that the klum kasetakorn provided were grossly under-used. On the whole, the inhabitants of the two communities had only a limited appreciation of its functions and, in the majority of cases, appeared to be virtually oblivious to its existence. This level of ignorance seemed to be a product of the institutions' unimportance to the villagers. It was almost as if, with the improving living standards of the farmers, it had outgrown its usefulness.

[1] This is probably because of the winding-down process now in progress.

Credit

Although both the cooperative and klum kasetakorn were able to provide loans to their members, neither of them approached the importance of the Bank for Agriculture and Agricultural Cooperatives (BAAC) as a source of agricultural credit in Noon Tae and Tha Song Korn. For this reason it is necessary to look in detail at the BAAC as well as at the alternative sources of credit to which farmers have access and sometimes resort; and to examine the role which each source, as far as the farmers were concerned, filled or failed to fill within the two villages.

The importance of farmers having access to credit at fairly low rates of interest has long been assumed to be an important ingredient in the intensification and modernisation of agricultural production (Lightfoot and Fox,1983,p 2). In Thailand the government became involved in the extension of agricultural credit, albeit on a small scale, as early as the reign of King Rama V, about a century ago (BAAC,Dec 1982,p 8). However, despite this early beginning a document produced by the UN agency, ESCAP, in 1979 found itself concluding:-

> "It is obvious that rural poverty and heavy debt burden are widespread in rural areas of Thailand. Moreover, the flow of savings and credit tends to favour urban people rather than rural people. It is crucial that, in order to solve the problem of mass poverty in rural areas, a new strategy for package operations and reorientation of various financial and rural institutions is applied in the field of rural savings and credit" (Chinnawoot Soonthornsima, Jan 1979,p 41).

Gloomy accounts, such as this (which may well be accurate),of the credit situation in rural Thailand commonly give little detail to the charges that they make, or to the figures that they give. This means that they can go only part of the way to providing a comprehensive critique, for raw data, in itself, is of little use as it fails to provide any background information regarding the conditions in which specific groups of farmers are operating. Equally important are the details of each credit source and the restraints, both real and imaginery, which prevent or cause farmers to borrow money. It is only in the light of such information that the data can become meaningful

The farmers of Baan Noon Tae and Baan Tha Song Korn borrowed money from a number of sources. Principal among these was, not suprisingly, the BAAC, although the cooperative, friends, relatives, middlemen and other government offices also played a part. The distribution of loans, by source, is shown in table 7.6 and it reveals that 79% of the money came from official governmental outlets. This is a little more than the figure arrived at by a survey carried out by the Department of Agricultural Economics which found that 64% of the farmers' debt was borrowed from institutional creditors, and the rest from private or non-institutional creditors (BAAC,Dec 1982,p 9). A visual representation of the flows of credit to the farmers of the two villages is shown in figure 7.2.

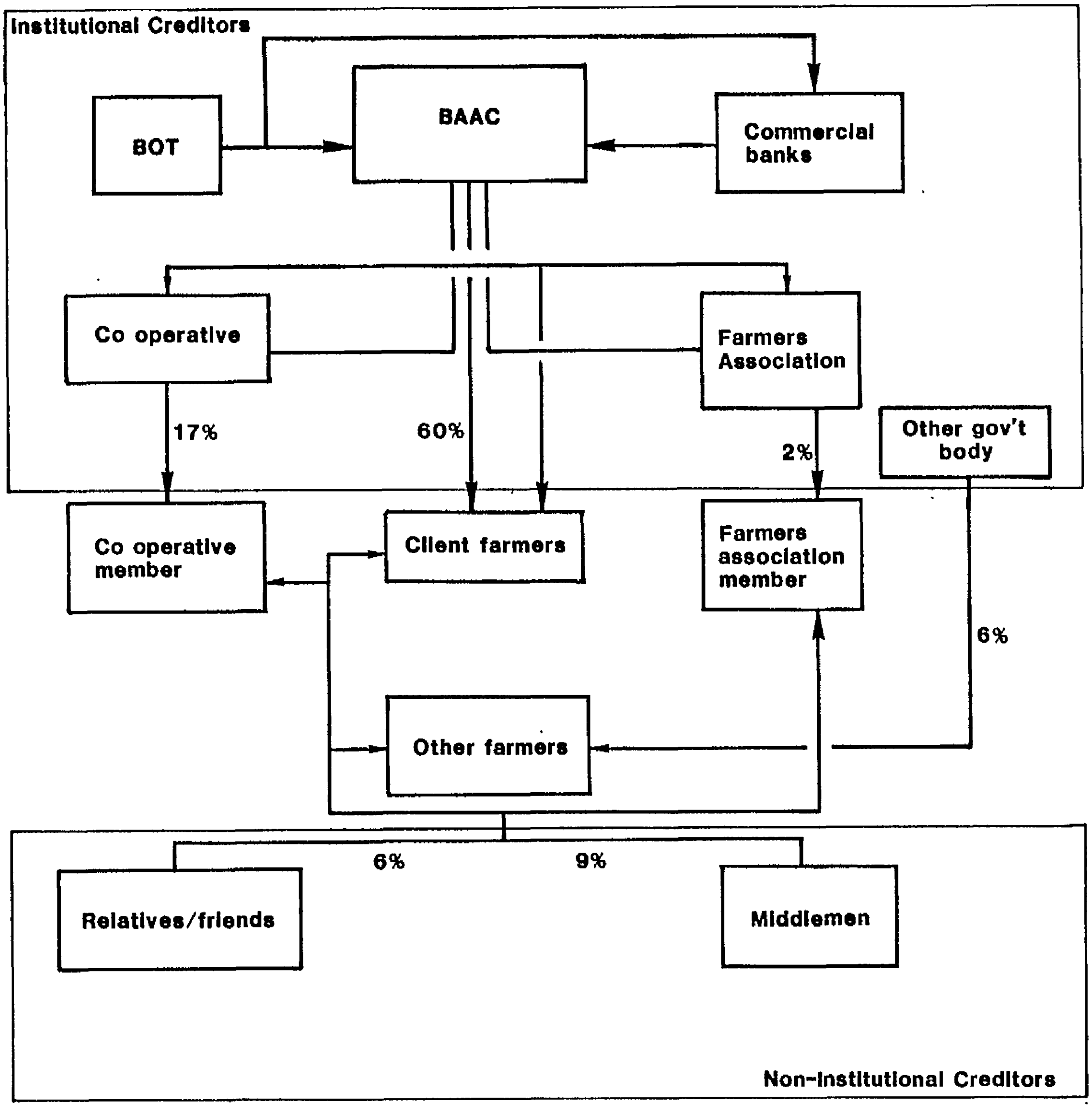


Fig. 7.2. Flows of Agricultural Credit

Source: adapted from :BAAC ,Dec.1982,p10 (percentage flows from questionnaire)

Table 7.6

Credit Use in Noon Tae and Tha Song Korn, by source

	households	%	Baht per Household	% total loans
BAAC	24	60.0%	8,125	60%
Cooperative	8	20.0%	7,125	17%
Farmers Assoc'n	1	2.5%	7,000	2%
Relative	3	7.5%	2,066	2%
Friend	2	5.0%	6,000	4%
Middleman	1	2.5%	30,000	9%
Other Gov't Office	1	2.5%	20,000	6%

(No Loan: 37 households)

The Bank for Agriculture and Agricultural Cooperatives is just that: it extends loans to agricultural concerns, both on its own accord and through the Agricultural Cooperative and Farmers Association.

The loans issued through the cooperative and *klum kasetakorn* are relatively simple in the form that they can take. They are either short (1 year) or medium-term (3 years) and are issued at an interest rate of 14% per annum [1]. However, there is one significant difference between these two credit giving bodies: the *sahakon* gives loans to its members individually using land as collateral to guarantee the transaction (the district office said it would allow farmers to borrow money on their land upto a

[1] This is the interest rate that the cooperative and farmers association charged to its members. The bank lends to the institutions themselves at a rate that is generally lower and depends on the use to which the money is to be put. For onlending to members the figure is 11% per year (BAAC,1983,p 61).

limit of 2,000 baht per rai). The klum kasetakorn though operates on the basis of shared liability in which groups of farmers guarantee each other. They must satisfy their fellow members and the BAAC of their credit worthiness, and to take out a loan must have an account with the bank. Because of this intimate link with the BAAC and because of their generally hazy notion of the group, farmers in Noon Tae and Tha Song Korn were often confused as to the exact nature of the Farmers Association and commonly identified it as a direct part of the bank itself [1]. In 1982 cooperatives accounted for 21.5% of the BAAC's disbursements in the Northeastern Region (BAAC,1983,table 4,p 77) and, in 1980, for 15% of those in the province of Mahasarakham (Lightfoot and Fox,1983,table 5,p 18). The respective figures for Farmers Associations were a minimal 0.5% and 1.0%, reflecting its declining importance within the country [2].

[1] A survey conducted in 1981 reported that "the membership in each village is sometimes identical with the membership of the farmers groups" (JICA,1981,p 108).

[2] The BAAC now imposes stricter controls on loans to Farmers Associations in an effort to stamp out fraudalent activities and the misappropriation of funds. This, combined with the government's policy of slowly dismantling the groups, has meant that disbursements have declined from 295 million bant in 1977 (BAAC,Dec 1982,p 16) to 57 million baht in 1982 (BAAC,1983,table 4,p 77).

More complicated are the loans which the bank issues to its client farmers, and which it supervises itself. They are probably best explained in tabulated form and table 7.7 gives each type that is available and the interest rate charged. Loans such as these account for the majority of the bank's disbursements, and in 1982 amounted to 2,665 million baht in the Northeastern Region, or 78% of the total. Those extended in Mahasarakham in 1980 represented 85% of the total for that province (Lightfoot and Fox,1983,table 5,p 18).

Table 7.7

The BAAC's Loan Structure for Loans to Client Farmers

Type of Loan	Interest
Short Term:1 year	
1/ for main crop production	14%
2/ for other agricultural practices	14% [1]
3/ for postponement of sale	14%
Medium Term:3 years [2]	
1/ for investment in agric'l assets	14%
Long term:5+ years	
1/ for refinancing old debts	13%
2/ for investment in agriculture	14% [3]

[1] 15% for loans exceeding 300,000 baht
[2] This is sometimes extended to 5 years
[3] 15% for loans over 300,000 baht but under 1 million baht; 16% for loans over 1 million baht.

Adapted from: BAAC 1982 Annual Report.

Farmers can secure loans from the bank in one of two ways: either through becoming part of an informal joint liability group of at least five members (operating in approximately the same manner as the Farmers Association groups), or by furnishing the bank with assets as loan collateral (BAAC,1983,p 15). The great majority of farmers in Thailand are too poor to guarantee loans as individuals and so adopt the former approach. As members of joint liability groups they can obtain short or medium-term loans at an interest rate of 14% per annum. Long-term loans, which were only introduced in 1975, usually involve large sums of money and are only available to farmers who can provide a mortgage (Chinnawoot Soonthornsima,Jan 1979,p 14).

The BAAC's statistics showed that in Baan Noon Tae and Tha Song Korn by far the most popular method of borrowing money was through joint liability loans (table 7.8). At the end of the 1982 financial year 134 households had loans of this type outstanding, amounting to 901,100 baht or 6,700 baht per loan. In contrast, loans issued to individual client farmers on the basis of land mortgage ran to only a single man who borrowed 7,400 baht. These figures, both in terms of the number and the size of the loans are similar to those recorded in the questionnaire which revealed that of the 78 agricultural households interviewed 24, or 31%, had loans issued through the BAAC, the average loan coming to 8,125 baht (table 7.8).

Table 7.8

Credit Extended to BAAC Client Farmers in Noon Tae & Tha Song Korn

	BAAC Data		Questionnaire data	
	Number	Value/loan	Number	Value/loan
Joint Liability Loans	134	6,700	24	8,125
Individual Client Farmer Loans	1	7,400		
Total Loans	135 (37% of agric'l households)		24 (31% of agric'l households)	

Table 7.6 showed that just over a half of the agricultural households interviewed had some variety of loan outstanding. The majority of these, 82.5% by number and 79% by value, were granted either directly through the BAAC, or through the cooperative or Farmers Association. The characteristics of the 24 farmers who were BAAC clent farmers, making up 60% of all loans both by number and value are revealed in table 7.9.

Table 7.9

Socio-economic Characteristics of BAAC Client Farmers and Cooperative Members with Loans [*]

	Client Farmers	Coop Members	Mean
Total Land(rai)	19.2	27.6	19.7
Riceland(rai)	14.9	24.1	16.1
Total Income(baht)	25,000	16,000	23,900
Agric'l Income(baht)	11,500	6,900	7,200

[*] The characteristics of those borrowing through the Farmers Association have not been included in this table because only a single farmer did so.

They are shown to be very average in terms of the sample, owning slightly less land and earning a slightly greater income. The cooperative members who took out loans, by contrast, owned significantly more land but had a smaller income (table 7.9). The characteristics of the cooperative members have already been discussed, without really arriving at any firm conclusions about their significance. The fact that the client farmers appear to deviate very little from the mean is interesting, as judging from past reports one would expect them to be the wealthier farmers (eg: Direk Patmasiriwat,1981,pp 40-42; Tongroj Onchan & Meyer,April 1980,p 19). It maybe that because Noon Tae and Tha Song Korn are relatively prosperous villages the problems of gaining access to credit for the poorer households are not immediately apparent.

Table 7.10 shows how the families who earned less than or equal to 10,000 baht per year (the average for the sample was 23,900 baht) acted in terms of borrowing money. As a group there were slightly fewer borrowers and they borrowed less: 45% took out loans, as against 51% for the sample as a whole and, much more dramatically, the size of the average loan at 2,361 baht was just over half the size of that for the sample mean at 4,194 baht. If total income and agricultural income are then correlated with credit a very strong relationship is revealed, significant to 99.8% in the first instance and 99.9% in the second. Table 7.10 also shows the breakdown, by source, of the loans issued to farmers earning less than 10,000 baht/year. It demonstrates that not only did they borrow less than the average, but also that over twice as many of their loans came from informal sources. This indicates that whereas table 7.9 appears to show that farmers gaining access to institutional creditors do not represent a clearly defined group in the two communities there is, in fact, a strong correlation between income and credit, and also a link between income and the source of that credit.

Table 7.10

Credit Use among Farmers Earning less than 10,000 baht/year

	Households with income <10,000 baht		Sample Average	
Average Loan(Baht)	2,361		4,194	
Sample Size(Households)	31		78	
Households in Debt	14		40	
% of Sample in Debt	45%		51%	
Source of Credit (Households):				
BAAC	6)		24)	
Cooperative	3)	64% [1]	8)	82%
Farmers Assoc'n	-)		1)	
Other Gov't Office	-		1	
Relative	3)		3)	
Friend	2)	36% [2]	2)	15%
Middleman	-)		1)	
No Loan	17		38	

[1] Percentage loans from institutional sources
[2] Percentage loans from non-institutional sources

That a farmer obtains credit does not mean that he is satisfied with the quantity he has managed to procure, and of the 39 households who gave an answer 22 or 56% said that they would have liked to have borrowed more. Of these, eight were intending to take out another loan, eleven said they had insufficient collateral and three that they were afraid of being any further in debt. Unfortunately the question, "would you like to borrow more; why don't you", was in many ways unsatisfactory. Farmers often replied "yes" (because of course they wished to have more money), without really contemplating the agricultural necessity for the additional capital. Much more fruitful is an examination of those households, 38 in all (almost half of the sample) who, for one reason or another, had decided not to borrow any money.

Table 7.11a shows the basic characterisitcs of this group and, once again, there is no hint that they are special in any way, as both their average income and the size of their landholding conform closely to the mean. However, what the table masks is an interesting difference between these farmers and those of the rest of the sample (table 7.11b). This difference becomes even more pronounced when the families who were forced to go to informal creditors because they could not meet the requirements of the institutional outlets are removed from the calculation (table 7.11a & b). It demonstrates that whereas nearly two-thirds of the households who went to formal creditors had an income of between 10,000 and 40,000 baht, only a third of those without loans fell into this income bracket. It seems that the poorer households were unable or unwilling to be in debt, while many of the richer ones had no need to be in debt producing (in comparison to those with formal credit) a bimodal distribution of income within the group (graph 7.1).

Table 7.11a

Comparison between those Households who have obtained Credit Facilities and those who have not

	Households without Credit	Households with Credit	Households with Formal Credit
Total Land(rai)	21.1	20.3	21.5
Riceland(rai)	17.2	16.4	17.3
Total Income[*]	24,300	25,000	27,400
Agric'l Income	5,000	9,300	10,000

Table 7.11b

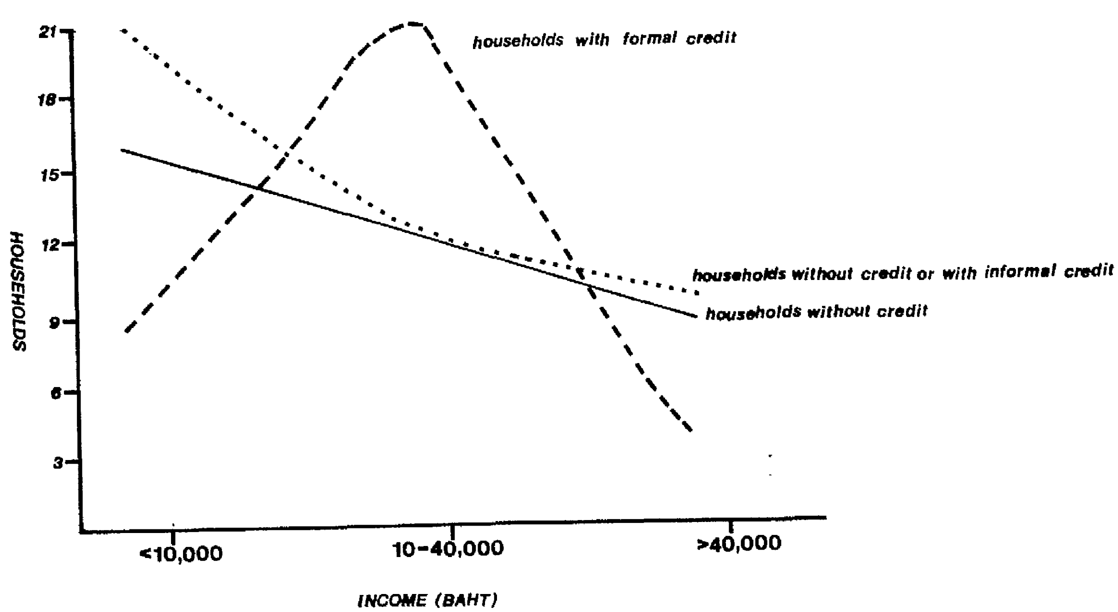
Income Distribution among Households with, and without, Credit Facilities

Number of Households with:			
Income <10,000[*]	16(43%)	14(35%)	9(26%)
Income 10,000-40,000	13(35%)	21(52%)	21(62%)
Income >40,000	8(22%)	5(12%)	4(12%)
Total Households	37	40	34

[*] All incomes are in baht.

Graph 7.1

Income Distribution among Households with Formal Credit and without Credit



This is all very neat, but in essence it only involves the use of statistical data to back up hypothesis regarding credit use in Noon Tae and Tha Song Korn. To further reinforce the hypotheses it is necessary to see how the qualitative responses align themselves with what the raw data appears to be saying. Table 7.12 shows the reasons that the 37 households gave for borrowing no money.

The two crucial groups here are those who said that they had "no need" to borrow money and those who said that they were unable to. The 20 who had no need earned an average cash income of 29,000 baht per year, somewhat over the average; while the nine who either felt they could not afford to borrow money or were unable to gain access to sources of credit earned only 15,400 baht per year, almost 90% less (table 7.12). This supports the contention presented earlier that there are two sections to the group of farmers who did not borrow money; one who were unable or unwilling to, and one who had no need to.

Table 7.12

Reasons given why Farmers Borrowed no Money

	Number of Households	%
No Need	20	54%
Afraid of being in debt	7	19%
Insufficient collateral	2	5%
Doesn't know how to	2	5%
Will borrow in the future	2	5%
No answer	4	11%
Total	37	

That twenty households should have no desire to borrow money, even though they can be shown to have a superior income, is suprising as it is often assumed that the rural areas of Thailand suffer from capital shortages (Direk Patmasiriwat,Oct 1981,p 2). It is also worth noting that these twenty households, as well as earning 20% more than the average income also owned 25% more land. It might be expected therefore that they would require proportionately more money to purchase agricultural inputs. However, in chapter five it was demonstrated that the limits of investment did not relate so much to the amount per rai (ie; the intensity of investment) but to the absolute quantity of investment. This was partly because of the risks associated with the greater outlays, and also because many of the larger landowners were able to meet their subsistence requirements without having to intensify their production. This meant that they could escape from the dilemma of needing to increase their yields in a marginal environment where the risks are great and the opportunities of investment within agriculture, few.

Another seven households, 19% of those who borrowed no money, said that they did not wish to because they were afraid of being in debt. These farmers, as well as many of the others, gave the impression of being conservative financially; they realised that repayment might be difficult and were not willing to enter into an agreement which they felt they might not be able to fulfil . In fact, throughout the two villages the debt burden appeared to be fairly well balanced. Farmers did not borrow beyond their means and although there were some very poor families there were none who could be regarded as insolvent or bankrupt. This probably relates to both the careful control of credit by the BAAC [1] and also to the nature of the Northeasterner who is careful and conservative, never wishing to over-extend himself past the limits of his resources (this mirrors, and is possibly a result of, the farming of the region which, due to the environment, must minimise the risks of crop failure through flexibility).

When the farmers of Noon Tae and Tha Song Korn borrowed money they used it for a variety of purposes (table 7.13). The majority, 23 households or 57.5%, used it to either purchase inputs, land, livestock - in other words they invested it productively within agriculture. But, there were also 14 families who used their loans unproductively - for consumptive purposes; and a small number who used them productively but outside the strict confines of agriculture.

[1] The BAAC has a good reputation of credit supervision and, "as a registered bank controlled by an Act of Parliament, it is required to operate commercially and cover its running costs from interest payments" (BAAC,Dec 1982,p 12).

Table 7.13

The Uses to which Credit was put

	Number of Households	%
Non-Productive	14	35.0%
To buy Inputs	16	40.0%
To buy Land	3	7.5%
To buy Livestock	4	10.0%
To set-up a Trade	1	2.5%
To buy unharvetsed cassava	1	2.5%
To finance Migrant Labouring	1	2.5%
Total	40	

In theory, all the loans issued by the BAAC, the cooperative or the Farmers Association must be used for purposes relating directly to agriculture. However, in response to the questionnaire 13 of the 33 farmers who obtained institutional credit said that they used it in other ways. Eleven of these said that they spent the money non-productively, to buy clothes, food and other essentials; one to set up a trade selling clothes within the village; and another farmer to buy "green" cassava to harvest and sell [1]. That such a large proportion of those with loans from formal sources should claim to use them non-productively is worrying, as it indicates that much of the money extended by the BAAC, obtensibly to be invested within agriculture, is being diverted to other uses where it does nothing to stimulate greater production or to intensify cultivation. This is peculiar as the BAAC (9 of the 13 were BAAC client farmers) closely supervises its loans. It maybe that Noon Tae and Tha Song Korn are

[1] The last two farmers could conceivably have obtained their loans for the purposes for which they used them.

exceptions where the banks control is weak; or it is possible that the responses from the farmers are misleading. Whatever the situation this is certainly an area where deeper study would be useful.

Strangely, if all the 14 farmers who used their credit for consumptive purposes are compared with those who used it productively there is little to separate them. Their household sizes, total land and riceland holdings and income are all comparable, and because of this it is hard to make any statement about why 18% of the agricultural households interviewed should need to borrow money and then use it non-productively. It may be that looking at credit use in this way is not wholly satisfactory. For usually farms are not run as businesses but as part of a system covering every aspect of production and consumption, and because of this, "household and farm expenditure [is] an inextricable knot..." (FAO,1965; quoted in Direk Patmasiriwat,Oct 1981, p 4). If that is so then the money borrowed may be used productively, but in an indirect manner. In other words, the loan could replace money (and be used for consumption) which has already been diverted to production expenditure. The only way to discover if cash is flowing in this manner is to compare the productive outlays each family made with the size of the loans they secured.

The eleven households who obtained credit from institutional sources but claimed to use it non-productively, borrowed an average of 7,545 baht. Their outlays on fertilisers and the hire of labour in

1982/83 (the two inputs which account for the great majority of farm investment) amounted to 3,213 baht, or 43% of the worth of the loan (table 7.14). However, there is a complication, for the loans were spread over an average 2.2 year period so that the value of the loans 'per year' (assuming an equal division of expenditure) was 3,429 baht (table 7.14). This means that the farmers were investing approximately the same amount of money in their farms each year as they were borrowing from the bank or cooperative. Further, if the agricultural investments made by all the other farmers who obtained loans from institutional creditors, but said that they used them productively, are calculated the picture changes little; for their average agricultural investment of 4,234 baht is closely matched by the size 'per year' of their loans at 4,095 baht. All this gives credence to the assertion that

Table 7.14

Comparison of Agricultural Investment and Institutional Credit [*]

	Annual Agric'l Investment	Loan Size	%	Length of Loan	Loan/ 'year'
Farmers who claimed to use their loans productively	4,235	8,190	52%	2.0 yrs	4,095
Farmers who said thay used their loans unproductively	3,213	7,545	43%	2.2 yrs	3,429

[*]: Average, per household.

All income in baht.

farmers in Noon Tae and Tha Song Korn treat both productive and non-productive expenditure as part of a unit, and that any money borrowed merely enters the system to be used, for whatever purpose, as it is required. It also means that looking at the direct uses to which credit is put is unsatisfactory when farming "is not a business but a way of life" (FAO,1965; quoted in Direk Patmasiriwat,Oct 1981,p 4).

Finally, there is the question of informal loan sources. These are important to investigate as they represent the alternative to government initiated lending and show that there does exist a section of the population who, either because they are unwilling or unable to go to institutional sources, visit informal outlets.

The proportion of institutional to non-institutional lending has been a source of considerable discussion. In 1981 Direk Patmasiriwat reviewed a number of past reports and found that they indicated that formal credit as a percentage of total agricultural credit had increased from 5% in 1962/3 to 57% in 1975/6 (Direk Patmasiriwat,Oct 1981,p 13). A survey conducted in the provinces of Khon Kaen and Roiet (both in the Northeastern Region) in 1980 found this trend continuing with 68% of loans, by value, coming from formal sources (Yongyuth Chalamwong & Meyer,Nov 1980,table 7,p 18).

In Noon Tae and Tha Song Korn among the agricultural families questioned six borrowed money informally; five of these went to friends or relations, and one to a middleman (table 7.15). The value of the loans amounted to 48,200 baht, 15% of the total, and the average interest rate was 52% per year (table 8.14). This average hides a great deal of variation however: two of the loans (given by relatives) had zero interest and appeared to be charitable, being based on no notion of financial gain on the part of the creditor. While in contrast, the other four, one from a relative, two from "friends" and one from a middleman, had rates of interest averaging 78% per year; rates that could be viewed as usurious.

Table 7.15

Loans from Informal Creditors (Baht)

Source	Amount	Interest[*]	Use	Income
1/Relative	2,000	0%	Non-productive	10,000
2/Relative	200	0%	Non-productive	6,000
3/Relative	4,000	60%	Non-productive	6,000
4/Friend	2,000	120%	Productive	3,000
5/Friend	10,000	60%	Non-productive	10,000
6/Middleman	30,000	72%	To finance migrant labouring	93,000
Total	48,200			

[*] Interest is percent per year.

The first point that needs to be looked into regarding informal credit is, why didn't these farmers go to the BAAC? As far as the farmers being charged zero interest are concerned the question does not apply as it was obviously worth their while borrowing money informally. For the remaining four it was a different story. All of them would have gone to the BAAC if they had been able to but, for various reasons, they felt they could not meet the bank's lending requirements:

Mrs Keng Nuangwongchaa (case number 3 in table 7.15) borrowed 4,000 baht at an interest rate of 60% per year to pay for her son's schooling. She didn't go to the BAAC, even though she had had a savings account there for eleven years, because at the time she did not realise she was eligible for a loan. By the time of the interview she had realised her mistake and was intending to obtain credit from the bank and pay off the debt to her relative (presumably she would have to claim the money was for agricultural purposes).

Mrs Ow Matannaa (case number 6 in table 7.15) borrowed 30,000 baht from a middleman who lived in Baan Noon Tae. The interest rate on the loan was 6% per month to be paid monthly (72%/year), and the money was used to finance her husband's trip to Saudi Arabia as a migrant labourer [1]. This household owned no land whatsoever (the Mae Baan was lent 5 rai of riceland by her father) and was therefore unable to gain access to any institutional loans.

The remaining two farmers, Mr Naa Narinyaa and Mr Gaw Jammaamurii (cases 4 and 5 in table 7.15) also had insufficient collateral to get a loan from the BAAC. They, like five of the six families in the table (the exception being Mrs Ow Matannaa), were relatively poor with an income of 10,000 baht per year or less. It is this income which is the limiting factor. For, the BAAC's

[1] Agencies in Bangkok and elsewhere in Thailand organise employment in various middle-eastern countries. They charter flights, do all the preparatory work and in exchange are paid a fee.

regulations insist that unless a farmer can guarantee a loan individually he must join an "infomal joint liability group". This might appear to mean that loans are thereby made accessible to all farmers. However, in practice the members of joint liability groups, understandably, only accept fairly credit-worthy people as fellow-members. This means that a man with a limited income would find it hard to join.

Closely linked to this must be the level of interest rates charged by the informal creditors. They may appear to be excessively high and certainly the government of Thailand regularly decries such "exploitation". However, it should be remembered that the middleman, relative or "friend" is taking on a credit risk which no financial institution is willing to take (this applies to cases 4,5, and 6), and it is not therefore particularly suprising that the potential profits, as well as the risks of default, are great.

Conclusion

Credit use was widespread among the households of Noon Tae and Tha Song Korn. The majority was negotiated through formal sources (primarily as BAAC client farmers) and on the whole the input on the part of the government was satisfactory. Indeed, only 19% of the agricultural households had any clear reason to be dissatisfied with their position vis a vis the provision of credit. However, there are two points worth re-stating:

Firstly, there were a suprising number of farmers who used the money they borrowed unproductively. This seemed to relate to two factors. One was the increasing pressure on farmers to make cash outlays on non-agricultural goods and services such as consumer durables, soap, cigarettes, books, schooling, and medicines. And the other was the problem inherent in attempting to invest in agriculture when the environment makes that investment risky.

Secondly, it has been shown that income was an important determinant in preventing farmers from taking out loans and also in deciding the size of those loans and from which source they came. The households who were forced to go to non-institutional creditors to meet their needs, as well as the nine families who were unable or unwilling to borrow money, demonstrate that despite the laudable efforts of the BAAC to meet rural credit requirements there is still a section of farmers at the bottom end of the income scale who remain unfulfilled. This portion of the population would probably benefit from being treated as a special group (possibly loss-making) for which the BAAC could relax its strictly commercial profit orientated methods. As the FAO noted in a document issued in 1965:

> "In the initial stages of agricultural development, credit to farmers must have a predominantly consumptive character....It is only at the later stages of agricultural development that the productive element in agricultural credit gradually increase. As long as agriculture is not a business but a way of life, cost-price is a sheer fiction, and household and farm expenditure an inextricable knot..." (FAO,1965; quoted in Direk Patmasiriwat,Oct 1981,p 4).

SECTION II

Alternative Strategies

Section Two: Alternative Strategies

The previous three chapters have shown that in Noon Tae and Tha Song Korn farmers have, for a number of reasons, been reluctant to invest much money in intensifying agricultural production and have failed to adopt many of the recommendations presented by the government. At the same time, the inhabitants of the villages clearly exhibited a desire to have a greater dispos able income while also needing to feed a growing population from an area of farmland that could expand no further. Given that the cultivation of crops is unlikely to meet these objectives, what alternative strategies, if any, exist?

Many of the households of the two villages earned a significant proportion of their income from sources outside cropping. These can be divided into four categories: secondary agricultural income; on-farm non-agricultural income; off-farm income 1 (intra-changwat); and off-farm income 2 (extra-changwat). Employment opportunities of these types are clearly one way in which farmers can off-set the shortfall between their needs and desires and the production potential of their land [1]. Indeed, such off-farm income has been an important aspect of the Northeastern region's economy for many years.

[1] The 'production potential' of the land is not a fixed and static quantity, but reflects the manner in which it is cultivated.

Another element of such alternative strategies, but which is very much the government's concern, is the provision of development policies and programmes that aim to encourage aspects of the farm economy outside cropping. The Community Based Integrated Rural Development Project (CBIRD) initiated in Baan Noon Tae is just such a programme.

The following two chapters will investigate these two avenues as their importance follows-on from the conclusions of the first section of the thesis: that the opportunities for increasing agricultural production are few. The first looks at the alternative sources of income which farmers are exploiting, and the second at CBIRD.

Chapter Eight

Alternative Sources of Income

Introduction

The market economy of Thailand, for so long concentrated in Bangkok and the Central Plain, probably began to extensively influence Amphoe Muang Mahasarakham in the 1950's when cash crops were first cultivated and sold [1]. Today Baan Noon Tae and Baan Tha Song Korn are fully integrated into the system and most of the traditional forms of exchange (barter, long khaek etc) are mere outliers within the society. The implications of this on farming communities which have been based on the priorities of subsistence are manifold. The inhabitants of the villages are forced to make outlays on services and inputs such as electricity, schooling, medicines and fertilisers which previously never existed, and they are faced with a wealth of consumer products which can only be acquired with cash. In the light of this it is not suprising that when asked if they would like to rent any additional land, of those who gave an affirmâtive reply, 78% said, "yes - upland"; so that they could augment their income (Appendix 8.1); and undoubtedly, rising expectations and ubiquitous advertising are placing great pressure on farmers to have the means to be able to afford

[1] There was a railhead at Baan Phai, some 70 kilomteres from Mahasarakham town, from the 1930's and this must have had some influence on the area. For instance, it is likely that some farmers would have been encouraged to rear livestock and to cultivate extra land for the Bangkok market. Even so, it is still pertinent to see the zone as largely untouched by wider economic forces, at least until after the Second World War.

these goods and sevices. Chapters 5 & 6 showed that there are few opportunities for extensive increases in agricultural production and that the nature of the environment inhibits any high input/output forms of cultivation. Farmers are therefore forced to meet their needs for cash in some other way.

Of the villages' average household income of 21,000 baht [1], some 7,400 baht or 35% of the total was non-agricultural. This may seem to be an indication that agriculture was less important in the lives of the villagers that the previous chapters have implied. This was most certainly not the case. The population viewed themselves as farmers, and every other activity was treated as subsidiary to farming. Rice cultivation met the <u>full</u> subsistence requirements [2] of 60% of the agricultural households, and when other nutritional requirements are added onto this (fish, chickens, pigs, ducks, vegetables etc) it becomes clear that the invisible value of farm products makes agriculture the core of each family's livelihood. This is evident just from the value

[1] Two estimates of income were obtained; one based on the farmers' own approximation (income 1) and the other built-up through the questionnaire (income 2). They were comparable, varying overall by only 8.8%. The second figure will be used in this chapter (unless specified) as it can be broken down into its constituent parts. In chapters 5 & 6 income 2 was quoted as being 22,200 baht. In this chapter, one of the households interviewed has been omitted from all the calculations giving a sample of 77, and an average annual income of 20,990 baht.

[2] This was based on the average per capita paddy consumption in Thailand between the years 1967 and 1977, as calculated by the World Bank (IBRD,Sept 1978,table 73,p 197).

of the rice that was grown: the average agricultural household grew 2,840 kilograms of paddy and had a subsistence requirement of 1,491 kilograms [1]. If this rice (1,491 kg) had to be bought at market it would mean an outlay of something approaching 8,800 baht, or 42% of the average income [2]. This said, it was also clear that the actual cash income of the villages had diversified into a number of non-agricultural areas. These have to be analysed if the village, as an economic system, is to be understood. For the farmers rarely divided their lives into neat packages as academics (and others) are wont to do, and for this reason the village unit, as a totality, must be examined.

The income of the population of Noon Tae and Tha Song Korn can be broken down into five groups, depending on its source:

1/ Primary Agricultural Income (rice and upland crops).

2/ Secondary Agricultural Income (livestock & vegetables).

3/ On-Farm Non-Agricultural Income.

4/ Off-Farm Income: Intra-Changwat.

5/ Off-Farm Income: Extra-Changwat.

[1] Although, in total, ample rice was grown to feed the households who were interviewed, if the excess that families produced is assumed to have been sold then the average crop would have amounted to 1,115 kilograms, or nearly 75% of subsistence requirements. The value of this, if it were to be bought at market, would be about 6,600 baht.

[2] The average wholesale price in 1982 for 100% non-glutinous rice was 5.938 baht per kilogram (Bangkok Bank Monthly Review,July 1983,p 331). Glutinous rice has a slightly lower market value but this is off-set by the inability of individual farmers to obtain wholesale prices.

Table 8.1 shows the breakdown of income among the 77 agricultural households covered by the sample survey. It demonstrates that income derived from agriculture accounts for 35% of the total and that of this only 25% came from the sale of crops. The cultivation and marketing of rice and upland crops has already been dealt with in some detail in chapters 5 and 6. However, the role of livestock in income generation has not been discussed.

Table 8.1

Annual Income of Agricultural Households in Noon Tae and Tha Song Korn; by source (baht)

	Amount (baht)	%	Families Involved
Total Income	20,990		77
Agricult'l Income	7,395	35%	
Rice Income	1,150	5%	13
Upland Crop Income	4,120	20%	41
Secondary Agric'l Income	2,125	10%	21
On-farm Non-Agric'l Income	3,450	16%	53
Off-farm Income:Intra-Changwat	4,590	22%	18
Off-farm Income:Extra-Changwat	5,550	26%	15

Secondary Agricultural Income

Income lying outside that derived from rice and upland crops averaged 2,100 baht per household or 10% of total income (table 8.1). The money came from the raising and marketing of livestock which included, in order of importance; pigs, buffalo & cattle and chickens & ducks; and, to a small degree, from the sale of vegetables (table 8.2). However of these only one, pigs, can be viewed as an important element of income generation among a broad section of the population. For cattle and buffalo were only sold by eight farmers, of whom two can be discounted as they needed to buy replacement animals prior to the onset of the next season (see chapter 5); and although ten farmers marketed chickens or ducks it was on a limited scale with an average return of only 600 baht per household. In contrast, 13 farmers sold pigs in 1982/83 (18 were raising them for sale in the future), giving an average return of 7,500 baht.

Table 8.2

Secondary Agricultural Income: Livestock

	Households raising	Households marketing	Return:1 (baht)	Return:2 (baht)
Buffalo/cattle	70	8	6,560	680
Pigs	18	13	7,510	1,300
Horses	3	-	-	-
Fowl	55	10	600	80
Geese	4	-	-	-
Vegetables	77	3	1,650	65
Total	-	-	-	2,125

Return:1 - Only accounting for those households who marketed the particular livestock.

Return:2 - Taking into account all 77 agricultural households.

Of these 13 farmers, three were members of the CBIRD "Pig Group" and the remainder independant of any grouping. However, although none of the farmers belonged to it, there was also a government organised pig cooperative or sahakon muu, to which farmers could become affiliated.

This was administered at the district level (its office was in Mahasarakham) and at the end of 1982 had a total membership of 1,040 organised into 10 klum, representing 5% of the agricultural households of the Amphoe. In Noon Tae and Tha Song Korn membership was even more limited with only two members in each village, accounting for little more than 1% of the farming households. Up to 1982 the cooperative provided two services to its members; it sold pig feed and purchased the animals. However, in that year the first of these services was discontinued so that in the season under study, 1982/83, farmers could only use the sahakon muu as a marketing organisation [1].

Except for those who belonged to the CBIRD group, farmers raised pigs in a rudimentary and unsystematic fashion: pens were of various shapes and sizes; commercial pig feed did not appear to be used; and inoculation against disease was rare. The marketing of the animals in these ten cases was through middlemen who came to the village, weighed and checked them for malformations [2], and paid for them with cash. Why farmers should sell their animals through private middlemen rather than the pig cooperative related, once again, to the perceived shortcomings of the government body. Farmers complained that they could not sell their

[1] In the 1981/2 crop year the Amphoe office of the sahakon muu had bought 4,588 pigs or 4.4 per member. The price paid ranged between 18 and 21 baht per kilogram live weight, and the pigs weighed an average of 140 kilograms. Therefore the price paid for the "average" animal fluctuated through the year between 2,520 and 2,940 baht.

[2] Middlemen take off some of a pig's value if they find, for example, it has broken and thus deformed a leg.

pigs when they liked, and had to wait until it was "their turn". For this reason they turned to the middlemen who, despite the fact they paid a lower rate per kilogram live weight, gave the farmers greater autonomy over when they sold their animals.

Finally, there is the CBIRD pig group. Three of its members sold pigs to the group in 1982/83, and a further four were expecting to in the following year. The grouping will be discussed in detail and in association with all the other aspects of the project in the next chapter. Suffice it to say that the three farmers were more than satisfied with their dealings with the body.

Given that the income derived from the sale of pigs constituted 7,510 baht per household or almost 30% of the total income of the 13 households involved (25,820 baht)

Table 8.3

Characteristics of those Households who Raised Pigs

	Those who raised pigs		Sample Average
Household Size	6.1	members	6.2
Productive Household Size [*]	3.7	members	3.3
Total Land	22.5	rai	20.8
Riceland	17.7	rai	16.8
Total Income	23,410	baht	20,990
Sample Size	18		77

[*] All through the thesis, and this chapter in particular, 'productive' members of a household are defined as those men or women who are no longer in school and who are fully active within agriculture. In other words, they cannot have alternative work to farming and cannot be physically debilitated or excessively old; they are thus agriculturally fully productive.

it is useful to see if those farmers who raised (or were raising) pigs have any distinguishing characteristics which mark them out from the rest of the sample. Table 8.3 shows that as a group they correspond closely to the sample mean in terms of size of household and landholding, and in terms of income. In other words they do not form, as far as one can see, a distinctive body within the villages.

On-Farm Non-Agricultural Income

Table 8.4 shows the various sources of what might be rather loosely termed "on-farm non-agricultural income". Included in this grouping is income derived from such agriculturally associated activities as fishing, agricultural labouring, the marketing of (bought) cassava and the renting out of land. It is clear that although there is a wide variety of sources only one - crafts - is significant among a large section of the population. However, in spite of this it is worth mentioning the others before turning to crafts as they hint at the potential for further broadening the economic base of the two villages.

Four households in the sample bought, harvested and marketed cassava giving them an average return of 14,750 baht (table 8.4). In chapter 6 it was explained that they conducted their marketing enterprises on a small scale and regarded the activity as subsidiary to that of farming. The families all had an effectively high man/land ratio in the 1982/3 season (double the sample average) [1] giving them the excess manpower to meet the labour demands of harvesting; and in fact selling man sampalang green was really a means by which households in labour surplus or labour deficit could interact to create a more equitable distribution of labour supply and demand.

Table 8.4

On-Farm Non-Agricultural Income

	Households Involved	Return:1 (baht)	Return:2 (baht)
Crafts	49	3,250	2,070
Agric'l labouring	3	3,200	125
Marketing cassava	4	14,750	770
Marketing other goods	2	6,500	170
Renting-out land	4	?	?
Hiring-out transport	1	10,000	130
Running shop/business	2	4,850	125
Fishing	2	2,300	60

Return:1 - Only accounting for those households who were involved in the activity.

Return:2 - Taking into account all 77 agricultural households.

Only three farmers claimed to have earned money from agricultural labouring (table 8.4). This is strange as almost one half of the agricultural households interviewed said that they had hired labour. How can this anomaly be

[1] The "effectively high man/land ratio" takes into account the land that was uncultivated in 1982/3.

explained? It is possible that farmers continued to view labouring and the hire of labour as a form of exchange in which cash outflows and inflows balanced out. In other words, the process was still seen as being in the mould of long khaek in which, overall, there is no return; even though there is an exchange of cash after each days work. The three households who did say that they were involved in agricultural labouring had a total average income of 5,330 baht (25% of the sample mean). They owned, on average, only 12.3 rai of land (59% of the sample mean) and had a productive household of five members (51% greater than the sample mean); ie - they were in labour surplus (relatively). In view of this, agricultural labouring was clearly one of the few ways in which the families could boost their incomes.

Four farmers rented out land to other villagers (all four were relatives). In three of the cases the return is rather difficult to calculate as two demanded a proportion of the production as rent - share cropping - (one, one-half and the second, two-thirds), and the third lent ten rai of thii dorn as the interest payment on a loan. The fourth farmer charged 200 baht per rai for each of five rai of upland.

Fishing was an activity followed by many of the farmers and fish represented an extremely important protein supplement to the diet of the villagers. Only two, though, actually caught and sold fish. Both of them used traps and it gave them an average return of 2,300 baht. The population viewed fishing as "sanuk" -

something that was done after the real agricultural work had been completed. Indeed, often farmers would return from an afternoons enjoyment with very little to show for their endeavours, and the fact that this was so appeared to matter not a bit.

One of the agricultural families owned a truck which was hired out to other villagers for the transportation of produce to Mahasarakham and Kosum Phisai. From this they estimated their annual return was 10,000 baht. In addition to these associated agricultural activities one farmer ran a general store in Baan Noon Tae selling such things as washing powder, cigarettes, soft drinks and kanom from which he earned 2,500 baht per year. A second lady had set up a tailoring shop making clothes to be sold locally from which she made 7,200 baht. And a third farmer "had a trade" selling articles like blankets and linoleum sheets giving him a return of about 10,000 baht.

However, all these sources of income are greatly exceeded in importance by that from the production of reed mats and, to a lesser degree, from the weaving of silk and cotton cloth. Forty-nine farmers, or 64% of agricultural households, had an income from these crafts of whom 45 made and sold mats; one, cloth; and three, both. The average return amounted to 3,250 baht per household. It is important to realise that although only four families sold cloth, production for home use was widespread and most houses had both a loom and a mat-making frame located underneath them where the inhabitants could work while keeping out of the sun. Women and adolescents made the mats and cloth, working primarily during the dry season when agricultural labour demands were minimal. The mats were generally produced from locally available reeds which were dried, dyed and then woven into a warp of twine [1]. The finished product was sold to middlemen who visited the villages several times each year and who, according to an officer at the Communtiy Development Department, exploited the farmers by taking an excessively large profit margin.

Thread for weaving cotton and synthetic cloth was not, apparently, produced within the villages. Farmers would go to Mahasarakham and buy ready-dyed thread (usually made in Japan) which they would then weave and sell, like the mats, to middlemen. Silk however, was still made in Noon Tae and Tha Song Korn, albeit on a minor scale: a number of families kept silk worms from which they would spin thread and consequently make cloth. The worms were kept in a rudimentary fashion (they appeared to be multivoltine [2]) and production was always low - hardly constituting a business. A small group of

[1] Mats were made from two types of reed - "flat" and "round". The former, from which most were produced, was available locally. The second was much scarcer but made a better quality and more expensive product. Occasionally villagers would go out of their way to obtain this superior reed: for example; one day in February a group from Noon Tae got together, hired a lorry and travelled to the neighbouring amphoe of Borabu to collect them.

[2] The Thai sericultue industry is based on the poly- or multi-voltine silk worm. This indigenous breed is resistant to disease and is easy to rear. Attempts to introduce the higher-yielding bi-voltine worm have been unsuccessful in the rural areas of Thailand because it is highly susceptible to disease (especially pebrine) and small-scale producers such as those of Noon Tae and Tha Song Korn cannot reproduce the conditions necessary for its upkeep (Business Review,Feb 1973,pp 25-29).

women in Baan Noon Tae had formed an informal silk cooperative. They pooled the money they obtained from selling the cloth, using it as an "emergency fund" to resort to when income from other sources failed to meet their requirements. A far more sophisticated and better organised group had been established by CBIRD in 1981 and which had a membership of 10 by March 1982. Like the pig group, it will be discussed in detail in chapter nine.

A question that should be investigated, as it was regarding the raising of pigs, is whether there are any characteristics of the households who obtained income from crafts which identify them as a distinctive group within the sample. Table 8.5 shows that they owned less land (both riceland and upland) and had a smaller income. Why should this be so? It could be that given that their household size was comparable to the sample average while their land holdings were smaller, they were in labour surplus. This would have allowed them the time to increase their production of mats and cloth, boosting an income which without that derived from crafts averaged only 13,380 baht, 46% of the income earned by the other agricultural families interviewed. This can only be a tentative stab at a reason, for when craft income is correlated with the size of landholdings and with income the relationship is shown, at best, to be weak.

Table 8.5

Characteristics of those Households with an Income from Craft Production

	Those with Craft Income	Those without Craft Income	Sample Average
Size of Household	6.3	6.0	6.2
Size of Productive Household	3.5	2.9	3.3
Total Land	18.1	25.3	20.8
Riceland	14.9	20.1	16.8
Total Income	16,630	31,210	20,990
Agricultural Income	4,900	10,600	7,400
Sample Size	49	28	77

Off-Farm Income: Intra-Changwat

The average on-farm income of the 77 agricultural households interviewed amounted to 10,750 baht. This is only 51% of their total income of 20,990 baht and it shows how crucial off-farm sources are to the inhabitants of Noon Tae and Tha Song Korn. The souces can be divided into two groups; intra-changwat and extra-changwat. The usefulness of this division is that it distinguishes between those inhabitants who return home to their villages each day ("intra-changwat"), and those who, at best, only return during the peak periods of rice cultivation ("extra-changwat").

Table 8.6 gives the details of the 18 agricultural households who had off-farm intra-changwat income. Although the table is to an extent self explanatory, it is still worth expanding a little on the various sources:

Four "farmers" [1] had labouring jobs at the upland crop station. This was located approximately one kilometre west of Noon Tae and Tha Song Korn just off the Khon Kaen to Mahasarakham road. All four were the heads of their households and of them, three worked there throughout the year, while the fourth only laboured during the dry season. Their mean income was 19,750 baht. Another man, Mr Phonmaa Narinyaa, worked at a government funded pump irrigation centre located near Baan Doon Dor, two kilometres to the east of the two study villages. He was an unskilled labourer and worked throughout the year for an income of 21,600 baht. Five "farmers" had full-time employent in Mahasarakham. Three worked at the government road building and repair centre; a fourth was a labourer (unspecified); while the fifth was a cleaner in a government office. Their average income was 22,080 baht. In addition to these men, another five had off-season work in Mahasarakham or in its vacinity. Mr Phiithik, Mr Samay, Mr Suwan and Mr Yut all worked as carpenters on house construction projects earning 6,000, 10,000, 5,000 and 3,000 baht per year respectively; while Mr Kaw Jammaamurii was employed in a cement factory for which he received approximately 9,000 baht. Once again, all three returned to their homes each evening. Finally, there were

[1] All these households owned land in addition to earning an income outside agriculture. The extent to which farming dominated their lives and the proportion of their income which originated off-farm varied considerably (table 8.6). However, they still regarded themselves as farmers, and it is still pertinent to talk of the families as being farming families.

Table 8.6

Off-Farm Income: Intra-Changwat

Household number	Individual working	Type of work	Income (baht)[*]	Duration
1/[M]	head	carpenter	10,000 (33%)	off-season
2/	son	running a rice mill	30,000 (38%)	all year
3/	head	labourer:pump irrigat'n stn	21,600 (98%)	all year
4/	head	labourer:upland crop station	27,600 (77%)	all year
5/[M]	son-in-law	labourer:gov't road centre	18,000 (42%)	all year
6/[M]	head	carpenter	6,000 (30%)	off-season
7/	head	Teacher	74,100 (100%)	all-year
8/[M]	head	labourer:gov't road centre	36,000 (75%)	all-year
9/	head	labourer:upland crop station	20,400 (100%)	all-year
10/[M]	daughter	nanny:Mahasara'm	4,800 (87%)	all-year
11/	head	labourer:upland crop station	13,600 (69%)	off-season
12/	head	labourer:upland crop station	17,400 (85%)	all-year
13/[M]	head	labourer:cement factory	9,600 (83%)	off-season
14/[M]	head	labourer	14,400 (100%)	all-year
15/[M]	son-in-law	labourer:gov't road centre	18,000 (64%)	all-year
16/[M]	head	cleaner:gov't office	24,000 (100%)	all year
17/	head	carpenter:house construction	5,000 (55%)	off-season
18/[M]	head	carpenter	3,000 (60%)	off-season
	AVERAGE		19,640 (69%)	

[*] In brackets: off-farm intra-changwat income as a percentage of total income.

[M] Employment directly connected to the town of Mahasarakham.

three households with sources of off-farm income as follows; one owned a small rice mill in another village, Baan Thin Laat, which the eldest son operated and from which the family obtained an annual income of about 30,000 baht. Another had a daughter of fifteen years old who was working as a nanny in Mahasarakham. She returned to Baan Tha Song Korn each month (nb; she was the only person in table 9.5 not to return home every day) bringing with her approximately 4,800 baht per year. While the head of the third household, Mr Thong Phuun, was a teacher at the primary school located at the entrance to Baan Noon Tae. His income amounted to 74,100 baht per year.

The average return of the 18 households with an off-farm (intra-changwat) income amonted to 19,640 baht or nearly 70% of their total income. They therefore relied, to a considerable extent, on non-agricultural sources of cash which came from outside the immediate confines of the village. As a group however it is necessary to make some distinctions between its members: firstly between those who only worked during the agricultural off-season and those who worked throughout the year; and secondly, between those whose income was directly related to the influence of the town of Mahasarakham and those whose work was independent of its presence (these two distinctions are labelled in table 8.6).

The first distinction is important because individuals (especially if they are household heads) with full-time empoyment off-farm are, to a great degree, agriculturally unproductive. The second is also crucial, because it is important to recognise that Mahasarakham has an influence on the lives of the inhabitants of Noon Tae and Tha Song Korn and that this could make the two villages atypical.

In all, ten farmers had jobs which were in some way connected to the town of Mahasarakham. To remove these families from any assessment would, it is believed, be misguided as the village is naturally enough a product of its location and to select those agricultural households who fit a particular perception of what such a farming community should be like, would be false. It is also important to realise that in the Northeastern Region, with the development of communications, the expansion of the market economy and the creation of a pervasive government administration, off-farm jobs are no longer a rarity and it would not be unusual to find some farmers in most villages having such employment as road repairing and house building. Even so, it is not denied that the two study villages must have been (and are being) influenced by the fact that they are positioned 10 kilometres from a provincial capital just to the north and to the south of a main road.

Table 8.7 shows that the 18 farmers with an off-farm income owned 32% less land than the sample average. When those households whose head was in *full-time* off-farm employment are analysed the average landholding drops to nearly one half of the mean. This relationship between land holdings and off-farm income is *very tentatively* supported when the two are correlated to reveal a negative coefficient significant to 86% in the first instance and 84% in the second (it should be remembered that the small number of cases with intra-changwat income - 18 & 8 - means that a high degree of significance would be unlikely). As it is improbable that the families would have sold land just because the household head had managed to procure a job outside agriculture [1], one must presume that they had obtained off-farm employment because their small landholdings and neglible agricultural income

Table 8.7

Characteristics of those Households with an Off-Farm Intra-Changwat Income

	Households with Off-Farm Income [1]	Households with Off-Farm Income [2]	Sample Mean
Size of Household	6.0	6.0	6.2
Size of Productive Household [3]	2.5	2.4	3.3
Total Land	14.1	10.5	20.8
Riceland	12.0	8.9	16.8
Total Income	28,270	32,370	20,990
Agricultural Income	4,260	1,190	7,400
Subsistence Produced	1,003 kg	771	1,504
Subsistence Required	1,478 kg	1,478	1,130
% Subsistence Deficit	32%	48%	25%
Sample Size	18	8	77

[1] Includes all those families with an off-farm intra-changwat income.

[2] Only Includes those families whose household head is in full-time employment off-farm.

[3] As noted earlier, this implies agriculturally productive household members, and does not include those with full-time employment off-farm.

[1] Land was only sold on very rare occasions when families were forced,often for economic reasons, to do so.

(table 8.7) had dictated that they do so. Interestingly, when off-farm income is correlated with the area of upland (for the 18 households) the strength of the negative relationship is greater than that with total land holdings, and is significant to 91% (which is still weak). This can be understood when one remembers that it is the upland on which farmers grow their cash crops. Because of this, the quantity of agricultural income which a family has the potential to earn is more dependent on the area of thii rai than on the area of thii naa; and it is those farmers with less upland who are more likely to have to find off-farm enployment to boost their income. It is worth noting that their paddy production met 68% of their subsistence requirements, as against an average for the 77 agricultural households of 75%. They would, therefore, have had to buy rice to meet the shortfall [1] and, not suprisingly, when off-farm income (intra-changwat) is correlated with total income a positive coefficient significant to 98% is revealed.

The closure of the frontier in farmland expansion has meant that many farms are now too small to ensure a minimum subsistence production. This, coupled with the increasing need and desire for a cash income, has forced many farmers to look beyond the limits of rice and upland

[1] The average shortfall between the quantity of rice produced and the subsistence requirement of the 18 households with an off-farm income (intra-changwat) amounted to 475 kg. per family. This, if it had to be bought at market would have cost (1982 wholesale price: 100% unbroken non-glutinous rice) approximately 2,820 baht.

crop cultivation. Some, as has been shown, have turned to raising livestock and the production of crafts; others to various forms of local off-farm employment; and more still to off-farm opportunities outside the boundaries of the province. They (or members of their households) have, in other words, become migrant labourers.

Off-Farm Income: Extra-Changwat

15 households received money from (ex-) members of their families who had left the changwat to gain employment in other parts of the country, or in other countries of the world. In addition, there were a far greater number who had left the village and entirely broken-off contact with their families. The money remitted by these individuals amounted to 26% of the total income of those 77 farmers who were interviewed, and in these terms represented the single largest source within Baan Noon Tae and Tha Song Korn (as categorised in table 8.1). Migrant labouring has been an important element of the economy of the Northeastern Region for many years. As Klausner notes: "Migration from the northeast has been going on for quite a few decades...going back even before the Bangkok-northeast railway was built [1930], northeasterners came to the Central Plain area principally for cash work...The Northeastern villager did not intend to leave his village for good. He was not a pioneer" (Klausner,1972,pp 97-98). The migrant flows to the Central Plain have, if anything, grown in recent years (Klausner,1972,p 105) and although the level of permanent

Table 8.8

Off-Farm Income: Extra Changwat

Household number	Individual working	Type of work	Income (Baht)[*]	contact with village
1/	son	electrician	7,200 (34%)	returns for agric'l season
2/	head	labourer: Iraq	96,000 (93%)	one year contract
3/	son	lumberjack: N. Thailand	40,000 (80%)	returns for holidays
4/	husband (separated)	?	6,000 (56%)	does not return
5/	head	carpenter: Saudi Arabia	90,000 (97%)	two year contract
6/	head	carpenter: Iraq	120,000 (99%)	one year contract
7/	son	petrol pump attendant:Pattaya	18,000 (62%)	holidays
8/	son	petrol pump attendant:Pattaya	12,000 (24%)	holidays
9/	daughter	labourer: Central Plain	3,600 (24%)	returns for agric'l season
10/	cousin	housekeeper: Bangkok	2,000 (20%)	does not return
11/	son	border police	2,000 (7%)	occasionally returns
12/	3 children	?	5,000 (55%)	do not return
13/	son	fisherman:Songkhla	13,000	returns for harvest
	daughter	shop assistant: southern region	10,000 (35%)	does not return
14/	son	tailor: Kanchanaburi	500	returns for agric'l season
	son	guard: Northeast	400 (15%)	returns for festivals
15/	daughter	labourer:textiles Bangkok	2,000 (20%)	returns for festivals
	Average		28,510 baht.	

[*] In brackets: remitted income as a percentage of total income.

rather than circular migration has increased as a proportion of the total, the underlying stimulus remains the search for additional cash income (see: Lightfoot and Fuller,1982).

The details of the work which the migrant labourers from the 15 households were involved in are shown in table 8.8. If the table is compared with that for off-farm intra-changwat income (table 8.7) one difference is immediately obvious: that is that whereas 14 of the 18 (8 all-year) households with employment within the province were household heads, only three of the 15 migrant labourers were. This means that except in those three cases [1] the families were still the traditional farming units containing a male household head as the decision maker. This is important: the sons, daughters and cousins who remitted money were not crucial to the operation of the farm and their loss was a natural process which did not appear to be a response to the limited opportunities on their farms [2] (as it seemed to be with respect to employment within the province). This view is reinforced when a table of their characteristics is compiled (table 8.9).

[1] And also in one case where a woman who was estranged from her husband was acting as the household head.

[2] Although it did not seem to be a response to limited opportunities on individual farms, it may well be a product of limited opportunities in the villages and indeed, in the area as a whole.

Table 8.9

Characteristics of those Households with an Off-Farm Extra-Changwat Income

	Households with Extra-Changwat Income	Sample Mean
Size of Household	6.5	6.2
Size of Productive Household	3.2	3.3
Total Land	20.1	20.8
Riceland	17.1	16.8
Total Income	39,600	20,990
Agricultural Income	6,600	7,400
Subsistence Produced	1,249 kg	1,139 kg
Subsistence Required	1,593 kg	1,504 kg
% Subsistence Deficit	22%	25%
Sample Size	15	77

It shows that except in terms of income the households conform closely to the sample mean, and do not seem to form a distinctive group. Even their total income which is 89% greater than the average is deceptive, as when the three families with their phor baan working in the Middle East are removed from the calculation it drops to 23,075 baht, only a little above the mean.

Once again, certain distinctions can be made between the 15 cases in the table. Firstly there are those households whose family head had left the village; secondly, those labourers who had left permanently (or rarely return); and lastly, those who return to their village to work during the peak agricultural periods (either transplanting, harvesting or both). The three family-heads who travelled to the Middle East were all inhabitants of Baan Noon Tae and went, in two cases, to

Iraq and in the third, to Saudi Arabia. The length of their contract varied between one and two years, and although there must, inevitably, be a degree of hardship caused by separation many of the farmers of Noon Tae and Tha Song Korn expressed a desire to go abroad (or have a member of their family go). This was clearly for financial reasons: two years of labouring in the Middle East would yield a cash return of approximately 204,000 baht. Assuming costs of 30,000 baht [1] this leaves a clear "profit" of over 170,000 baht or the equivalent of 8 years income for the average agricultural family.

Of the remaining 12 households [2] who had a proportion of their income remitted, four returned to engage in agricultural work during the peak periods of rice cultivation. This leaves the majority, ten, who sent money but to all intents and purposes were independent of their respective "households" (at least for the foreseeable future). Eight of them were sons or daughters, one was a cousin, and the tenth a husband who was separated from his wife and sent money to support his son.

It is arguable that there is a play-off, when it comes to off-farm employment, between the additional income earned and the loss of an agriculturally productive member

[1] One farmer estimated that agency fees and travel costs were about 30,000 baht.

[2] Note: two of the households in table 9.8 had cash remitted by two relations.

of the workforce - resulting, perhaps, in the need to hire additional labour to meet any deficit at peak agricultural periods. How pertinent such a play-off is in Noon Tae and Tha Song Korn can be seen if the characteristics of the eleven households whose family heads had obtained full-time off-farm employment (intra- and extra-changwat) are analysed [1]. Table 8.10 shows that these eleven families had a man/land ratio the same as that for the entire sample [2]: 0.16; and hired a similar quantity of labour. It appears therefore, that their smaller land holding not only meant that they were encouraged to look

Table 8.10

Characteristics of those Households who had Lost an Integral Family Member to Off-farm Employment

	Households with Off-farm Income [*]		Sample Mean
Household Size	6.1	members	6.2
Productive Household Size	2.3	members	3.3
Total Land	13.9	rai	20.8
Riceland	11.0	rai	16.8
Man/land Ratio	0.16		0.16
Labour Hired/rai [+]	8.6	man days	8.7
Sample Size	11		77

[*] Includes families who had lost an integral family member to off-farm employment.

[+] As was the case earlier in the thesis, the respondant who claimed to hire what seemed to be an inordinately large quantity of labour has been omitted from the calculation.

[1] It was thought that only those family members integral to the farming unit should be examined. Thus, households with sons and daughters away from 'home' are not included in table 8.10.

[2] The family member employed off-farm is seen as agriculturally unproductive. He is therefore excluded from the calculation of the man/land ratio.

for additional income outside agriculture but also that they had the surplus labour to be able to afford to lose a family member from the processes of production without upsetting the balance of labour supply and demand.

Conclusion

The previous discussion has shown that although it is still correct to talk of Baan Noon Tae and Baan Tha Song Korn as being farming communities, the majority of their cash income came from a variety of sources outside agriculture (table 8.1). The data reveals that when the two sources of off-farm income (extra- & intra -changwat) are individually correlated with the size of landholdings there is a weak inverse relationship. The relationship becomes stronger if the two sources are combined and then correlated with land holdings, and is significant to 93% with respect to riceland holdings and 98% for upland holdings. This can be seen to be a result of the pressures on farmers to augment their income while at the same time being faced with a situation in which the growth of population coupled with the closure of the frontier in farmland expansion is leading to the fragmentation of landholdings; and in which the environment precludes, to any degree, the intensification of cultivation. In the face of these contraints in which it is hard to either intensify or extensify cultivation, farmers - especially those with small areas of riceland or upland - have turned to other income earning opportunities both on and off-farm.

As the agricultural situation is unlikely to change very dramatically in the future (with relation to cropping), there are some good reasons why the Thai government should place greater emphasis on aiding and encouraging the development and expansion of other income earning opportunities in the region [1]. One project which attempts, on-farm, to do just this is the Community Based Integrated Rural Development programme, for which Baan Noon Tae has been chosen as a pilot village.

[1] It is significant that the only aspect of on-farm income outside cropping in which the government did have a role - the pig cooperative - had been rejected by the villagers as a marketing organisation.

Chapter Nine

An Alternative Development Project: 'CBIRD'

Background

The Community Based Integrated Rural Development Project (CBIRD - "Sea bird") was initiated in July 1981 in 60 villages covering three districts (or sub-districts) of the Northeastern Region of Thailand. They are: Amphoe Muang Mahasarakham; the Kae Dam sub-district, also in Mahasarakham province; and Amphoe Ban Phai, Khon Kaen. The project was designed to run for an initial period of two years to June 1983, and has a total target population of 19,250 villagers. The operation has been financed by two organisations: Agro Action [1], which has provided 77% of the total budget of 2,360,239 Deutsch Marks (DM); and by the Population and Community Development Association [2] which has met the remaining 23%. The

[1] Agro Action is apparently a Canadian aid organisation (although it is not at all clear why the budgetting should be in Deutsch Marks rather than Canadian Dollars).

[2] The Population and Community Development Association (PDA) is a Thai Government agency which was set up in mid 1970's. However, in terms of the structure of the Thai bureaucracy it is something of a misfit as it is largely independent of any ministry. Initially under the leadership of the charismatic figure of Mechai Viravaidya, it has concerned itself primarily with the extension of family planning to the rural areas of the country and in these efforts the Association has been remarkably successful. Contreceptive use has spread so that in 1980 there were over 1.1 million <u>new</u> acceptors (NSO[2],n.d.,table 2.7,p 13), and in the province of Mahasarakham, whereas the average population growth rate between 1976 and 1980 averaged 1.6%, by 1981 it had fallen to only 0.8% (PDA document, 1983). The PDA has also concerned itself to a limited degree with some of the broader aspects of social and economic development and part of this effort is the CBIRD project.

objectives of CBIRD are "to improve the livelihood, employment opportunities, living standards and quality of life" (from PDA document) of the 60 target villages through the introduction of new income generating activities and through improving their health and nutritional status. The communities were not all given the same emphasis however: 10 were designated as Model A where the development input was to be intensive; 20 Model B, with a moderate input; and 30 Model C, where the input was light. The relative differences between intensive, moderate and light can be gauged by the initial capital provided per village, which amounted to 50,015 DM in the first case (100%), 19,946 DM in the second (40%) and 5,000 DM in the third (10%) (Table 9.1). This money was designed to be distributed among all of the households in Model A communities, 50% of Model B and 25% of Model C. This means that in terms of investment per target household the three models, A, B & C received 500, 400 and 200 DM respectively (table 9.1).

Table 9.1

CBIRD: Budget Breakdown

	Model A	Model B	Model C
Fund	500,150	398,925	150,000
Villages	10	20	30
Total Households[*]	1,000	2,000	3,000
Target Households	1,000	1,000	750
Investment/village	50,150	19.946	5,000
Investment/household	500	400	200
Investment/person	71	57	29

[*] The document assumes that the average number of households per village is 100, and that the average family size is seven.

All currency is Deutsch Marks.

The range of programmes which the project was extending to its target villages are listed in table 9.2.

Table 9.2

CBIRD - List of Activities

A Animal Raising

1/ Pig *
2/ Commercial Chicken *
3/ Village Chicken *
4/ Fish *
5/ Duck *
6/ Geese *
7/ Rabbit *

B Agriculture

8/ Marketing Funds
9/ Fertiliser
10/ Home Gardening
11/ Seedlings and Trees
12/ Insecticide
13/ Crop Storage

C Home Industry

14/ Silk Weaving *
15/ Cloth Weaving *
16/ Clothes Making *

home industry con't

17/ Water Jar
18/ Ecoomic Stove
19/ Food Preservation
20/ Bamboo, Wood Products
21/ Bamboo, Wood Tools
22/ Pottery
23/ Brick Making

D Environment

24/ Improve Village Ponds
25/ Construct New Ponds
26/ Improve Existing Wells
27/ Construct New Wells
28/ Latrines
29/ Biogas

* = Income generating

Aims and Approach [1]

The CBIRD project was formulated in the belief that in Thailand, as in many other countries, development programmes designed to solve rural problems have failed because:

- they are uncoordinated and unrelated to each other

[1] All the quotes in this section are taken from assorted CBIRD and PDA documents.

- there is a lack of social preparation and communication with the residents of the communities within which they are to be implemented

- there is a lack of community participation

As the project summary states:

> "Projects are likely to succeed when designed in partnership with villagers, focusing on community problems and desired practices. Villagers should be given an active role in implementation of activities in their own communities."

This is the basic development ethos which CBIRD attempts to reflect and to adhere to; and it is within this framework that the aim of improving the livelihood, employment oppotunities, living standards and quality of life is set. It is to be achieved through:

1/ "The introduction of income generating activities aimed at increasing skills and productive capacity in agriculture and livestock."

2/ "Improved health and nutritional status by the provision of better environmental standards and greater availability of nutritious foods."

There are two further points that need to be stressed with regard to CBIRD's approach. Firstly, the project attempts to provide farmers with income earning opportunities while at the same time removing any of the risks involved in undertaking such endevours [1]. For example: all the costs of raising pigs (feed, drugs, sty construction) are met by CBIRD and then subtracted from

[1] Whether this would always be so was not clear. The objective of any project, as CBIRD itself observed with reference to the self-help element of its activities, is that it should become self-perpetuating. In other words, that it should continue to function even when the initiating body's role has ended. If this is to happen with respect to CBIRD then the villagers must take over the risks which are, at the present time, not passed onto them.

the gross return at the time of sale. If, by chance, there should be a net loss this is not passed onto the members but is borne by the project. Secondly, CBIRD carefully breaks activities down into those aspects which can be successfully undertaken by the inhabitants themselves and those which cannot. Those that the project management undertake are usually either of a technical nature, or relate to supply or marketing. For example, again with respect to the pig group: CBIRD vaccinates the animals against cholera and gets its own technicians to construct the gently sloping concrete floor of the sty, as it feels both of these actions are too sophisticated to be successfully completed by the farmers. Likewise, the project supplies the pig feed and the piglets, and organises the marketing of the animals as it believes that economies of scale apply (as well as better access to information) allowing the organisation to obtain better prices. The members are left to do such things as construct the fence and roof of the sty and the concrete feeding trough (a mould is provided) as these jobs are seen as appropriate to the villagers' level of expertise, to the bargaining power which they can exert, and to the materials to which they have access.

Selection of Participants

After a community has been selected as a target village a meeting of all its inhabitants and the personnel of CBIRD is held. During this meeting an outline of the objectives and the general philosophy of the programme is given and each project manager describes the structure and purpose of the activity with which he is associated. The villagers are then asked to sign up if they wish to be considered for participation in a particular activity(ies).

Because of the link between CBIRD and the PDA, and also because the project was designed with the notion that over-population and under-development are two closely related problems, for a household to be considered for participation one of its members must be a family planning user (or if elderly: an ex-user). Those who have signed up are then vetted by CBIRD which asks the phuu yay baan if each villager is a suitable candidate. If potential participants are wealthy, or if the headman says that they are untrustworthy they may be refused membership. Generally however, those who sign up are accepted.

It is worth noting the amount of responsibility given to the headman. It is he who is sought to provide information on the character of each villager and it is he who plays a large role in the decision as to who to accept and who to discard. Such responsibility must be open to abuse. A poor headman may bias his information, recommending that those he holds a grudge against be rejected, and those that he supports, although they may be unsuitable, be accepted. The formation of power cliques and interest groups around particular influential individuals (monks, teachers, headmen and the wealthy) is common in the rural areas of Thailand (see for example: Hanks, 1972; Hanks,1975; Potter,1976, chapter 8,pp

147-223), and although Mr Prichaa Phonlaa, the headman of Baan Noon Tae appeared to be a fair, skilled and industrious man there were sections of the village who disliked him (and whom he disliked?) for one reason or another.

CBIRD and Baan Noon Tae

Baan Noon Tae was selected as a Model A target village and given the maximum investment. The programmes implemented in the community and the number of households involved in each is shown in table 9.3. A description of each activity is necessary to complement the review of the project's overall aims and its operational approach as presented in the previous pages. However, as the thesis is primarily concerned with the problems of intensifying agricltural production and increasing the income of the households in the two villages, it will be those programmes associated with agriculture, with income generation, or with the more efficient use of resources that will be concentrated upon (table 9.3). In addition, to avoid a catalogic and repetitive description of the activities, which in many respects embody similar methods and objectives only the pig, commercial chicken, silk, home gardening, fish and biogas groups will be analysed in detail; the remainder will be mentioned only in passing with further information regarding their operation being placed in appendices.

a) The Pig Group

The Baan Noon Tae pig group has a total of 29 members. Before the first pigs were provided by CBIRD each member had to build a sty to a specific design (appendix 9.6). The total cost of each pen amounted to approximately 300 baht and the construction materials, bar those available locally, were provided by the project. This 300 baht was then deducted from the profits from the first sale. After construction each member was provided with four piglets (drawn by lots) aged between five and seven weeks old (therefore weaned) which were delivered to

Table 9.3

CBIRD: Activities & Membership in Baan Noon Tae

	Membership
* Pig	29
* Commercial Chicken	10
+ Village chicken	15
* Duck	5
+ Geese	10
* Rabbit	10
* Fish	?
+ Fertiliser	72 (?)
+ Home Gardening	47
* Silk Weaving	10
x Economic Stoves	20-30
+ Improving Village Ponds	1 pond
+ New Village Ponds	1 pond
New village Wells	1 well
Latrines	43
x Biogas	4-5

+ = Agricultural, but principally non income generating
* = Income Generating
x = Efficient use of resources

the farmers. When the animals were nine weeks old they were de-wormed (an operation performed by the villagers who were given a powder to administer by incorporating it into the feed) and at ten weeks vaccinated against cholera (this was performed by a CBIRD official). Following the delivery of the pigs each participant received four bags of "grower feed" which, when exhausted, was replaced by a regular supply of a protein supplement consisting of fish meal, rice bran & broken rice and added vitamins & minerals. To augment this feed members were expected to feed their animals with vegetables, grass and food waste [1]. As already mentioned, all the initial costs of the feed, drugs and the actual piglets was met by CBIRD which subtracted them from the return that each farmer made.

The pigs were marketed when they had attained a weight of approximately 110 kilograms [2]. Although the marketing was organised by CBIRD the actual sale was conducted through a middleman who came to the village. He

[1] CBIRD was hoping that farmers could be encouraged to turn a small area of unused land (250 square metres) over to the cultivation of fodder crops such as hamata, lab lab bean, spirato, paragrass and lucaena. The plot would be low-input both in terms of labour and in terms of fertilisers and pesticides, and the production was to be used as additional feed for pigs, ducks, geese, chickens and rabbits. However, CBIRD had been unsuccesul, at least in the initial stages of extension, in promoting these fodder plots principally, it appeared, because of the belief among the farmers that they were time consuming and that the labour input would not be matched by the benefits that would accrue.

[2] The pigs raised are of European descent and their optimal marketing weight is 100 kilograms (in terms of their feed conversion rate). However, Thai middlemen prefer to buy pigs at the slightly higher weight of 110 kilograms.

paid 23.50 baht per kilogram liveweight for the pigs if they weighed between 97 and 130 kilograms [1]. This is because the meat of pigs over 130 kilograms has a high fat content and is therefore inferior; while the transport costs of those below 97 kilograms becomes excessively high per unit weight of pig as all pigs, no matter what size, occupy a basket of similar dimensions in which they are transported to the wholesale market in Bangkok. After the animals had been sold each farmer had to disinfect and thoroughly clean his pen which was then checked by a CBIRD officer prior to the delivery of the next batch of piglets. If any of the pens did not pass this cleanliness test then none of the members would receive their replacement animals. This was designed to ensure that rules of hygiene were strictly adhered to by giving farmers a sense of group responsibility.

Costs and Returns

The first sale of pigs by the pig group of Baan Noon Tae occurred on January 20 and 21 1983. The second batch of piglets were delivered on February 1 1983. All the costs and returns relate to this first sale.

The average weight of the animals sold by each farmer was 112.7 kilograms, with a high of 124.6 kilograms and a low of 101.25 kilograms. The middleman paid an

[1] If the animals were outside this range the middleman deducted 1 baht for each kilogram over or under the limit. He also deducted money for deformities in the animals. eg; 5 kilograms off the weight of an animal with an injured leg which had subsequently healed.

average of 23.3 baht per kilogram live weight (the price was not consistent: it varied over the two days; one farmer had money deducted because one of his pigs had an injured leg; five because an animal was underweight; and two because they were overweight). The cost per kilogram of raising the animals averaged out at 20.09 baht giving a net profit of 3.21 baht per kilogram live weight, or a total net profit for four pigs of 1,447 baht [1]. The members did not, however, always get the return they were due. The CBIRD official in charge tended to give slightly more (per kilogram) to those with the lightest animals and slightly less to those with the heaviest [2] thereby narrowing the disparities between the two extremes [3].

The pigs are raised over a four month period which means that in a year, with the delay between the sale of one batch and the delivery of another, farmers can raise approximately two and one half sets of four pigs (ten animals). Assuming that the first net profit was not abnormal then the average income per member through the year would be 3,617 baht, boosting the average income of the farmers who were interviewed by 17%. On the face of

[1] The cost of pen construction at 300 baht per member is not included.

[2] Especially those he thought had been "unlucky" - eg; a pig belonging to one farmer had died because it had been fed large amounts of the high protein grass leucaena, which had expanded in the animal's stomach and killed it.

[3] The difference between what should have been the highest and lowest return was 2,300 baht (251 baht as against 2,551 baht).

it, this represents a substantial and important addition to the average household's cash income.

Observations on the CBIRD Pig Group

The membership of the CBIRD pig group were, without exception, satisfied with its performance and the eight who were interviewed did not profer any criticisms, even on prompting. The reason for this state of affairs is simple: upto mid 1983 the project had been well organised and run; and, more importantly, that section of the membership who had sold their animals had received a sizeable profit. However, there are several areas where problems could arise.

Firstly there is the problem of inconsistencies in upkeep: commercial large-scale concerns have far greater control over conditions of growth than small farmers such as those of Baan Noon Tae. In the first sale nearly 20% of the animals lost some of their value because they were either over or under-weight. When competing against large pig farmers who are operating on small and highly tuned margins of costs and returns such inconsistencies can be the difference between profit and loss. Part of the problem of trying to monitor upkeep more closely must lie with the farmers, who are unfamiliar with such a "strict" regimen to the raising of livestock. For example; before the first piglets were delivered, the CBIRD official in charge of the pig group gave each member a record card so that both CBIRD, and the farmers themselves, could keep track of feed inputs, drugs used and calculate (in the end) the feed conversion rate. But not one of the members bothered to fill in his record card. There are, however, some advantages which the pig group has over larger enterprises and with which the project hopes to off-set the losses incurred through the lack of control in upkeep:

(1) The farmers labour is free causing labour costs to be nil.

(2) A fair proportion of the feed (grass, food scraps, waste vegetables etc) is likewise without cost.

The second and more serious problem is that of profitability and the necessity of ensuring a continuous return that is large enough to make the activity worthwhile in the face of fluctuating market prices and stiff competition from other producers.

The middleman paid 23.50 baht per kilogram live weight. The total costs amounted to 20.09 baht per kilogram live weight giving a healthy profit margin of 14.5%. However, at the time of the sale (20/21 January 1983) the price of pork in Bangkok was estimated by the CBIRD official to be some 3 baht per kilogram higher that the average price through the year. This was for two reasons: one, because of the cyclical nature of pork prices which means that January is a seasonal high; and two, because of the impact of the fish epidemic which had struck many provinces in the Central and Southern Regions and had caused an increase in the demand for pork and hence to a rise in its price. If the average annual price is really somewhere around 20.50 baht at the farm gate then the profit margin is a slim 2% giving a return of only 185 baht. Unless upkeep is made more efficient and costs are cut it could be that although the farmers will never actually make a loss, the profits will be too small to maintain their interest in the programme.

b) The Commercial Chicken Group

This group in Noon Tae had a membership of ten. The chicken pens, like the pig stys, were built to CBIRD specifications and they were designed to contain 200 adult birds. The project provided the chicken wire, roof covering, water drinkers and lighting but expected the group members to complete all the construction processes, with a CBIRD technician checking the work when it was finished. After completion the pens were sprayed to help protect against disease. The total cost of construction and out-fitting varied between 1,600 and 1,900 baht, and because this was so much greater than that of the pig stys the costs were gradually deducted from the profits, rather than from the profits of the first sale.

Each member was given 200 day-old chicks which were raised, to begin with, in circular woven pens and kept warm with lights until they were old enough to be transferred to the larger run. CBIRD provided ready-mixed commercial chicken feed which was graded according to the age of the birds. Again, the feed costs were met by the project and then subtracted from the profits. The chickens were marketed after approximately 45-60 days when they had reached a weight of between 1.6 and 1.8 kilograms. They were collected from the farmers and sold by CBIRD in one of two ways:

(1) either directly to a middleman.

(2) or CBIRD itself killed and plucked them, selling them in the town of Mahasarakham (it was the older birds which tended to get marketed in this manner).

Costs and Returns

Unfortunately, detailed costs and returns were not available for the commercial chicken group (this fact will be returned to later). All that could be determined was that profits were being made and these were being distributed back to the members, less the costs incurred by CBIRD.

Observations on the CBIRD Commercial Chicken Group

The members of the group, like those of the pig group, appeared to be satisfied with its progress. However, any detailed criticisms would have been unlikely as the project was still in its infancy. Even so, two problems had already emerged:

Firstly, that of marketing. The local demand for chicken was both limited and it fluctuated through the year. This made it hard to ensure a stable outlet for the groups production, and meant that CBIRD often had to sell to middlemen, something which the project had hoped to avoid, believing that middlemen are one of the major reasons why profits are small. They were attempting to avoid this problem by arranging to market a proportion of the production through a PDA division called "Fair Price" which supplied the refugee camps along the Kampuchean border with food. But, demand from the division was becoming less as the camps shrunk in size and it looked as though this outlet would only account for a small number of birds. So the problem remains, and will become more serious as the project becomes fully operational and fowl begin to be produced continually and in large numbers.

The second problem was one of disease. Chickens are extremely susceptible to infectious diseases, especially when large numbers are raised in small pens [1]. This is accentuated because of the difficulty of controlling disease in a village environment where farmers are unfamiliar with large-scale production techniques and where other, village chickens, roam free. Although there had been no serious outbreaks in Baan Noon Tae upto mid 1983 the officer running the commercial chicken group feared that it was only a matter of time before one of the more common diseases hit the community [2].

The Village Chicken, the Goose and the Home Gardening Groups

These three groups were all low input/output projects. The village chicken group had fifteen members in Baan Noon Tae, the goose group, ten, and the home

[1] In addition, the chickens provided were of foreign stock less resistant to disease than the native types.

[2] It has been estimated that 50-70% of village chickens are lost each year due to infectious diseases. The most common are Newcastle's disease, infectious brochitis, fowl cholera and fowl pox (Charan Chantalakhana,Oct 1981,p 26).

gardening group, forty-seven. CBIRD provided no feed for the two livestock groups and did not supervise the construction of pens or give a great deal of technical advice and assistance, leaving farmers very much to themselves. In this respect they differed from the pig and commercial chicken groups where the project played a major and continuing role (details in appendices 9.1 & 9.2).

c) <u>The Home Gardening Group</u>

The home gardening group was the simplest of all the CBIRD activities that will be described in this chapter. It was an effort to give each of the 47 members access to a variety of seeds, fertilisers and pesticides at a rate lower than that available from the merchants in Mahasarakham [1]. They were to be used, with a modicum of advice, to form productive and diversified home garden plots. Because of the small quantity of each input purchased the cash outlay was correspondingly small and therefore the project did not defer payment but demanded cash on delivery [2]. As the name of the group suggests it was designed to provide vegetables for home consumption

[1] An example of the sort of package CBIRD provided and the costs involved is as follows:

2 kilograms of the fertliser 16-16-8:	12 baht
100 grammes of "yard long bean" seeds:	12 baht
100 cm3 of the pesticide "lenate":	18 baht
Total Cost:	42 baht

The above package was estimated to be sufficient to cultivate one <u>ngaan</u> (0.25 of a rai).

[2] There was a degree of dispute over this: one of the officers thought that it was possible for members to pay for their purchases after harvest, although it seemed that due to the small amounts involved farmers preferred to pay on the spot.

rather than for sale, and although the members could market the produce if they wished CBIRD was not involved in the process.

The number of households in the village who were involved with this group - 47 - indicates that it appealed to the farmers and met some sort of a demand. It seemed from their responses that what attracted them the most was their ability to buy small quantities of a wide variety of vegetable seeds at competitive prices. It is striking that so simple a project could elicit such a wide and enthusiastic response and shows that often small farmers can be motivated to adopt a development initiative which, on the face of it, appears to offer very little.

The Duck and The Rabbit Groups

These two groups represent, in terms of CBIRD supervision and involvement, a point somewhere between the pig & commercial chicken groups and the goose & village chicken groups (details in appendices 9.3 & 9.4). In Baan Noon Tae the Duck group had five members and the rabbit group, ten.

d) The Fish Group

It would be more accurate to call this the "Fish Pond Project" as rather than being a group of villagers who were involved in an activity for their own benefit it was intended as a community project that would benefit all the inhabitants of Baan Noon Tae.

In the compound of the *wat* of Baan Noon Tae there was a pond of about 1,000 square metres in area. CBIRD asked the abbot if it could be used to establish a fish pond and he gave his consent. The pond was ideally suited to such a community activity because: firstly, it was already perceived by the villagers to be communally owned [1]; and secondly it was felt that they would be unlikely to "poach" fish as it was located within the wat precincts.

After getting permission to use the pond it was pumped dry (petrol costs: 100 baht) and all the fish removed to ensure that there were no predator fish. After six weeks it had filled again (31 July - 17 September) and was ready to be stocked. CBIRD stocked it with 500 common carp, 500 talapia, 700 tawes, 300 rohu and 20 grass carp. All these fish were supplied free as fingerlings by the local government fishery station. The common carp, talapia and tawes represent the standard poly-culture. They feed at different depths and therefore do not compete. The rohu and grass carp were added because of the high price they fetch at market (grass carp were selling for 40-50 baht per kilogram). From this account it can be seen that the cost of establishing the pond was minimal.

CBIRD then organised a group of villagers to manage the pond. They were expected to feed the fish with grass cuttings, buffalo dung and a feed which was provided (and

[1] This is important. In Baan Tha Song Korn a dispute over the ownership of a fish pond was creating friction within the village and had, to some extent, polarised the community into two sets of supporters. There was no possibility of such an occurrance with this pond CBIRD had chosen.

consisted of broken rice and rice bran) every day, either early in the morning or at night. When the fish had grown to a marketable size it was intended that "fish catching days" would be announced. The villagers who had been placed in charge of the pond would catch a number and they would then be sold within the community at rates considerably below market price. The profits from the sale would be divided as follows: 10% to the maintenence group as a fee for their work; 60% to a village fund; and 30% to CBIRD to recoup some of their costs. After the pond had attained an equilibrium it was hoped it would yield 200 kilograms of fish a year and that this would fetch about 3,000 baht.

As with most plans, the results did not quite match up to their expectations. The two major problems concerned the nature of the pond itself (its physical properties) and the difficulty of stimulating "community spirit".

The pond was only 1,000 metre square in size and although long-established [1] lost water at a fairly high rate through leakage. This meant that it had reached a critical level by the beginning of December so that fish could only be raised over a six-month period, from July to December. As a result, the highest weight of any fish caught during the final catching session was a talapia of 200 grammes, and in total only 25 kilograms of fish were sold at 15 baht per kilogram (the market rate was 24 baht) yielding a return of 375 baht. In fact, 600 of the

[1] Normally, "old" ponds have built up an impermeable layer of silt on their bottoms preventing leakage.

smallest fish were so small that they were taken by CBIRD and introduced into one of the projects own ponds to mature.

The disappointing yield from the pond not only related to its size however; there was every indication that it was also maintained poorly. The officer in charge of the Baan Noon Tae pond noted that a great many community fish pond projects in the Northeast had failed, or had been less successful than hoped, because of a lack of cooperation. In this case it was also true. The group of villagers assigned to look after it had acted in an undisciplined and unsystematic manner: they had failed to clear the pond of debris regularly and had fed the fish inconsistently. Indicative of this lackadaisical approach is that on the day of the visit by CBIRD for the final catching session only two of the members turned up, and the CBIRD manager as well as a fortuitous visiting research student had to be called upon to help. Why it should be so hard to stimulate cooperation when a project is designed to be materially beneficial to those involved (the management group receive 10% of the profits from the sale) is difficult to say although the following two factors probably played a part: firstly; farming in the Northeastern region is very much an individual household enterprise and commentators have commonly noted the independent nature of the Isan farmer when compared with those of the North and the Central Plain and the difficulty of eliciting any sort of community response. Secondly, the <u>phuu yay baan</u> of Baan Noon Tae had failed to give his support to the project (for some unidentifiable reason), and CBIRD believed that because of the headman's influence within the commnuity this was hampering the full involvement of the villagers.

In an attempt to overcome the problem of pond management it was proposed that the responsibiltiy of feeding the fish and clearing out the pond be assigned to the monks. They could either do it themselves or organise a roster of children to carry out the work. The advantage of turning to the abbot for help is that he is possibly the most influential man in the village and by gaining his support the problem of the headman's cool reception to the project could be overcome. In addition, the abbot was very development conscious and there was every likelihood that not only would he be willing to run the village pond project, but would also be very good at it.

As well as this pond in the wat compound, there was another in the grounds of the primary school located at the entrance to Baan Noon Tae (this is the "new pond" in table 9.3). The pond had been excavated in mid 1982 by a government programme known as kor sor chor[1]. However, it was too shallow and needed to be re-dug before it could be stocked with fish. This was going to be done later in 1983 by kor sor chor whereupon CBIRD were to take it over and enlist the help of the pupils and teachers of the school to maintain it.

[1] "Programme to develop off-season jobs in the countryside" under the control of the Ministry of the Interior.

e) The Silk Group

The silk group of Baan Noon Tae had a membership of ten women. Silk weaving is a traditional activity of the Northeast and all the members already possessed the looms, and the skills to produce cloth [1]. CBIRD therefore saw its principal role as one of supply and of marketing in which the project would supply the silk thread (cost: 280 baht per piece of cloth) and then sell the production.

The women were given two types of silk thread: Thai multivoltine for the weft and Japanese bivoltine for the warp [2]. The women were then expected to complete all the subsequent operations providing CBIRD with the finished product to market [3].

[1] In fact, CBIRD did have a supply of second hand looms. They were taken from the refugee camps near the Kampuchean border which were gradually contracting in size through 1982 and 1983. Unfortunately the project did not realise, until they were delivered to their headquarters near Mahasarakham, that the looms were of a different design from those used by the communities within which they were working.

[2] The thread from multivoltine silk worms is more irregular and comes in shorter lengths than that from bivoltine worms. As the latter are much more difficult to raise, being less hardy and more susceptible to disease, Thai farmers tend to keep the multivoltine variety despite the fact that the yield is considerably less; although the government is trying to change this state of affairs by promoting bivoltine worms (Business Review,Feb 1973,p 25). However, for the warp it is obviously useful to have long lengths of thread and for this reason Japanese bivoltine silk is imported and used (Pradit Charsombut,Aug 1980,p 5).

It is worth noting that the characteristic rough texture of Thai silk, which many people prefer to the smooth silks of China and Japan, is a product of using multivoltine thread and makes Thai silk distinctive.

[3] CBIRD decides which patterns/designs the members are to provide.

When the villagers had completed a piece of cloth CBIRD paid them between 80 and 100 baht. This is really a fee for their labour rather than a "profit" as the project had not yet begun to sell the cloth and it did not depend on the market price (as it did with the livestock groups). The variation in price was an attempt to bring some sort of quality control to the enterprise for at the present time little emphasis is placed on good workmanship as the production of flawless cloth is not perceived by the villagers to be very important.

The members of the group work as a unit, not as individuals. They produce approximately 27 pieces of cloth per month giving them a monthly return of between 2,160 and 2,700 baht. In terms of the annual income per member this represents a return of between 2,590 and 3,240 baht. At the time of the research CBIRD had not actually begun to market the cloth although they were endeavouring to find a European outlet. Two problems which they were facing with regard to finding a stable market demand related to the quality and to the pattern of the cloth. As mentioned, the villagers were not imbued with a sense of quality control and the production was therefore heterogeneous. If the cloth is to be sold to a sophisticated market such as Europe or the US this is unacceptable and it is essential that CBIRD emphasise to the membership (as they are trying to do) the importance of maintaining standards. Similarly, if cloth is to be sold to the West the patterns must be adapted to suit the demands of the market. The contact through whom CBIRD was trying to secure an outlet stressed that the market for "traditional" or "ethnic" patterned cloth was virtually saturated and that the designs should be altered to aim for the fashion fabrics market. Once again, this will necessitate a greater degree of supervision by CBIRD and discipline on the part of the members.

f) The Fertiliser Group

The fertiliser group, which contained 72 members, provided the chemical fertiliser 16-16-8. As explained in the rice chapter, for amounts upto 150 kilograms payment was deferred until after the harvest and for quantities over this weight half of the cost had to be paid immediately and the remainder after the harvest. The only factor that separated the CBIRD group from the host of other fertiliser programmes, and it was an important one as far as the farmers were concerned, was that CBIRD delivered the input to the village.

The Economic Stove and the Biogas Groups

Finally, there are two groups which although not income generating or agricultural, were intended to use resources more efficiently thereby saving farmers' money. The economic stove group is described in appendix 9.5, while the biogas group was organised as follows.

g) The Biogas Group

By April 1983, CBIRD had built four to five Chinese "fixed-dome" digesters for the production of biogas in

Baan Noon Tae [1]. Although termed the "biogas group" the four (or five) households involved did not form any sort of union and the term is inappropriate. The digesters were built individually and there was no cooperation between each of the members. The digesters provide two benefits to those who use them; firstly, they produce a "clean, smokeless and instant source of heat" (from a CBIRD document) and secondly, the effluent can be used as an organic fertiliser.

Before CBIRD arrived the villagers who had decided to have a biogas digester built had to dig a hole on a suitable site (ie; close to the cooking area) and build up the surrounding land so that the construction could be sunk into the ground. From this point on the members did very little as the construction process was too technically rigorous to be made into a community self-help activity (hence the inability to form a group - as with the making of the economic stoves and toilets). The cost of each digester varied between 3,600 and 3,800 baht. This money is lent to the villagers in the form of an interest-free loan to be repaid monthly at the rate of between 100 and 150 baht per month. As biogas was perceived to be a luxury (and as a status symbol) it was only the richer families who felt that they could afford to divert so much income to a non-essential enterprise

[1] The Chinese fixed dome digester was favoured to the Indian type because, "it gives a higher gas pressure which is suited to cooking sticky rice" (CBIRD document). In addition, the project felt that the experience from all over Thailand was that the Chinese type was being increasingly used in preference to the Indian.

(3,600 baht is 17% of the average total income of the agricultural households interviewed). It is very much an amenity for the wealthy (or was seen to be).

The question that should be asked though, is whether the benefits from biogas really do match the outlays. CBIRD calculated that the value in NPK terms of the effluent produced by the digester in one year is 740 baht. However, it is hard to illustrate this value to farmers who already often have supplies of free organic fertiliser (dung) but do not use it because of what they see to be overly large transport and labour costs. The point here is that farmers cannot envisage the benefits derived from organic fertilisation balancing with the costs and the trouble involved in applying it, and although they may be wrong in this respect it is still necessary to clearly and forcibly demonstrate it to them.

The value of the gas is harder to calculate. CBIRD thought that "under practical village conditions" gas production should be 2.0 cubic metres per day. The daily per capita gas requirement is approximately 0.25 cubic metres. On this basis the process should produce enough energy to supply a household of eight members (average household size: 6.2 members). Evaluation of the value of this output is difficult because farmers often collect wood rather than buy it and the cost is therefore an invisible labour cost. As children (and women) are those who usually perform the chore it is arguable that farmers perceive the cost as a minimal one - or not as a cost at all but as part of the normal running of their lives.

For these very understandable reasons the biogas project had not "taken-off" in Noon Tae and the majority of householders had not been convinced of its value. There is one further point. The biogas project, to a limited degree, is a visual display of wealth indicating that the family has almost 4,000 baht to spend on a non-essential luxury. It could be said that government agencies should not be involved in enhancing disparities in communities where income differentials are increasing, and that the project should be made a financially attractive proposition to the middle income earners too.

What the preceding description of CBIRD and some of its activities has not done is to investigate if the participants in the various projects are distinctive in any way, and if they attract farmers in a particular position or predicament. This gap will be filled by using the material gathered from the households who were questioned in Baan Noon Tae.

Table 9.4 shows the number of households interviewed in Noon Tae who were members of the various CBIRD groups. As the sample for the entire village was small (37 questionnaires) the number of families who were involved in each of the projects was even smaller. For this reason, except for the pig and the fertiliser groups which had memberships of 8 and 9 respectively, it is only really by combining member families that any statistically significant analyses can be carried out.

Table 9.4

CBIRD Membership in the Questionnaire Sample

	Member Households [*]
Pig Group	8
Goose Group	4
Rabbit Group	2
Commercial Chicken Group	3
Village Chicken Group	3
Fish Pond Group	1
Fertiliser Group	9
Silk Group	1
Duck Group	1
Vegetable Group	6
Biogas Group	2

[*] These 40 member households represented 23 families. In other words, the average household involved with a CBIRD activity belonged to 1.7 groups. The implications of this will be returned to later.

The households that belonged to the pig group had one distinguishing characteristic: their annual income of 14,520 baht was just over one half (53%) of the sample average (table 9.5). This is understandable - those families with a smaller income would have had a greater incentive to become involved in such income earning oppotunities as CBIRD was extending. However, the members of the fertiliser group show the reverse characteristic - their annual income is larger than the sample mean by 50%. How can this be explained? It could be argued that because the fertiliser group requires a cash outlay on the part of the farmer it is only the richer ones who are attracted to it. This is not particularly convincing though (look to chapter 5) and the bottom line must be that such hypotheses have little basis due to the small

Table 9.5

Characteristics of CBIRD Member Households

Groups*	Household Size	Total Land(rai)	Riceland (rai)	Total Income
Pig	6.1	22.0	16.6	14,520
Fertiliser	7.2	25.0	19.2	40,000
Pig + C.Chicken	6.4	19.5	14.7	21,640
All Livestock Groups	6.6	22.1	17.4	22,060
Livestock Groups 2	7.6	27.4	22.8	23,100
Non Income Generating	5.8	21.0	16.5	38,380
All Income Generating	6.5	20.7	15.8	21,440
Village Sample Average	6.3	21.3	15.6	27,260

* "All Livestock Groups" includes: the pig, commercial chicken, village chicken, goose, rabbit, and duck groups.
* "Livestock Groups 2" includes: the goose, village chicken, duck and rabbit groups.
* "Non Income Generating" groups includes: the village chicken, goose, biogas and home gardening groups.
* "All Income Generating" groups includes: the pig, duck, rabbit, commercial chicken, and silk groups.

numbers involved. For, table 9.5 shows that whatever meaningful combinations of groups one analyses [1] nothing particularly unusual about the membership, in comparison to the average for the village, is apparent. In the light of this one must presume that it is likely that CBIRD had been successful in attracting a broad section of the population into its various activities, even though a more detailed survey might well reveal that particular groups had conditions of membership which attracted particular villagers.

[1] The combination of groups in table 9.5 is designed to place similar activities together so that the sample size can be increased. For example:- all livestock groups; all the groups concerned with income generation; all those groups whose primary objective is something other than the generation of income.

Integrated Development and the CBIRD Project

At the present time, although the term "integrated development" is widely used, there is no consensus of opinion as to its exact meaning. This is because the term has been used to mean very many different things (Chang, June 1977,pp 4-13;Whang, Oct 1977,pp 2-10;Charan Chantalakhana,1980,pp 184-195;The Nation,Jan 24 1983,p 5):

- It can imply the integration of government agencies with the rural populace resulting in better communications between the government and the governed.

- Or it can mean the integration of government agencies at different levels in the hierarchy; tambon, amphoe, province, region, nation (this is often thought of as "vertical integration").

- Or it can be the integration of various government policies at a particular site so that possible conflicts between the sectoral policies can be eradicated (this is often termed "horizontal integration").

- Or it can be the integration of technical and socio-economic disciplines so that a complete system of rural development is achieved [1].

- Or, finally, it can mean the integration of crops and livestock into an "integrated farming system".

CBIRD, to varying degrees, embraced all five of these meanings. It was a single agency, virtually independent of any government ministry, which provided every element of the development programmes which it was initiating. It

[1] It is possible to identify an almost infinite number of systems within the farm and, ultimately the world, system. These are nested within each other, but even so they can be selected according to the problem that is being investigated (this is not to say that each is discrete; there is always a certain amount of linkage between one and others, and in this sense one is being necessarily devisive - something that systems analysis, at least in theory, tries to avoid). A "complete system of rural development" is seen to involve the combination of social, economic and agronomic development policies into a full and integrated programme.

attempted to cooperate closely with the target households identifying the areas in which it could be of most benefit. And, it was trying to diversify the economic base of the communities and provide farmers with alternative sources of income which were compatible (ie - integrated) with the demands imposed on them by their principal activities of rice and upland crop cultivation.

The previous account has shown that even though the project had barely begun to produce any concrete results there were numerous problems associated with its activities which cannot be viewed as mere "teething troubles". However, the overall success of the project (as far as this can be ascertained) has not been discussed and nor has the nature of "integration" within CBIRD.

CBIRD is publicly presented as a "self-financing" endeavour, the idea being that 10% of all the profits made by the various groups are deducted and then used to maintain the project. In private though, many of the officials concede that it will be virtually impossible to ever run it unsubsidised as the profits will never be sufficient to cover the costs involved. This is all the more pertinent when one remembers that a major hurdle which seemed to be appearing with respect to the income generating activities was the problem of finding stable markets and ensuring a consistent and well-disciplined supply of production (ie; keeping quality up and price down). Without these elements profits will continue to be small and variable (this applies to the commercial chicken, pig, rabbit and the silk groups). The problem can be "blamed" to a large degree on the competitiveness of the bigger producers and the middlemen who have cut their margins to a minimum. There was also a considerable element of poor management on the part of the farmers (look back), often due to a lack of discipline; and, in addition there was some evidence that the actual management was sometimes at fault:

With respect to the duck, village chicken, goose and rabbit projects documentation of profit, costs and returns was very poor. If CBIRD really is endeavouring to become self-financing (and profit margins are small) then it is obviously very important to keep accurate records. This was supposed to be one of the functions of the group managers and is an indication that, at least in this respect, they were either ill-trained, incompetent or negligent.

In spite of this criticism and the more specific problems associated with the individual projects, CBIRD was becoming 'successful' and was doing so in a number of different ways. Firstly, the inhabitants of Baan Noon Tae, without exception, felt that CBIRD was providing a useful contribution to their lives and they were more than satisfied with its efforts. As any project is designed to aid a target population, if that population views the project in a good light then clearly it has fulfilled a major objective. This CBIRD had done.

Secondly, the project had convinced the farmers that it s activities were worthwhile and consequently had enticed the majority of the village into participation [1]. A crucial element in this attraction was the no-risk clause which caused many of those who were unwilling to over-extend financially when it came to rice and upland crop cultivation, to sign up for the income earning activities. The question, however, is whether the groups can continue to have the support of the farmers. This is clearly something that concerns the levels of return which the farmers can obtain from the activities, for if profits drop too low the participants may loose interest feeling that the income derived from participation does not balance with the labour-time involved.

CBIRD has also been successful with its social projects which have not been discussed in any detail. By the middle of 1983 CBIRD had built (or initiated the construction of) 20-30 economic stoves, 43 latrines, 4-5 biogas generators, 48 water tanks (in cooperation with the PDA) and had dug one well and improved two ponds. These amenities, although they provide no income, raise the conditions in which the households live: they were often labour-saving; they reduced the possibility of disease; and they narrowed the gap in living standards between the rural households of the Northeast and the rest of the country. A gap which, in the 1960's and 70's was blamed, in part, for the growth of CPT membership in the region.

[1] Many Thai government development initiatives have received a poor response from farmers who often view the efforts as inappropriate to their situation or not as particularly advatageous. This can be seen in Baan Noon Tae and Tha Song Korn in the farmers response to the cooperative, the klum kasetakorn and the pig cooperative.

As CBIRD is o stensibly a "community based integrated rural development project", how has it fulfilled this categorisation - ie; in what sense is it integrated? Referring back to the five definitions noted earlier, it was stated that CBIRD embodied varying elements of all five.

It is structured so that there are no conflicts between government departments or between departments at different levels in the Thai administrative hierarchy (horizonatal and vertical integration). The project has been modestly successful in achieving these two modes of integration, and has done so by attempting to fulfill every element of it s programme without ever having to turn to other agencies for help. This is extremely important as one of the greatest criticisms of development efforts in Thailand has been the problem of designing and running successful projects within a bureaucracy which often has duplication of roles, conflicts of interest, a hierarchical and inefficient top-down command structure and an excessively centralised decision-making process (see, for analysis of the Thai bureaucracy: Riggs,1966; Mosel,1957; IBRD, Sept 1978,pp 123-130; Rubin, 1974) [1].

[1] NERAD (Northeast Rainfed Agricultural Development Project), a project based at Tha Phra was, like CBIRD, attempting to present farmers with an integrated development package. The project head complained that one of the main obstacles to implementing any such package lay with the nature of the Thai bureaucracy which in its segmented form and top-heavy command structure made it almost impossible to link the various aspects of a programme together. CBIRD had been fortunate in being able to bypass this problem due to its special position as a department of the PDA.

However, there is one serious criticism of the manner in which CBIRD has attained this unusual independence from the main body of the administration, and that is that it has not been achieved through integration but through detachment, and as a result there is still a duplication of roles and the ensueing waste of financial and human resources. For example; the supply of fertilisers and pesticides is now pursued by the Office of Agricultural Extension, the klum kasetakorn, the cooperative as well as CBIRD. This cannot be a sensible state of affairs and should somehow be rationalised. In addition, as a result of the divorce of CBIRD from any other department and the absence of communication between agencies [1] there is an accidental duplication of roles resulting from the fact that no one knows what the other is doing. This was evident in the Baan Noon Tae fish pond project. It was an entire year into the programme before the CBIRD management realised that kor sor chor had already excavated a village fish pond in Baan Noon Tae and that their aims and methods over-lapped. On realising this they decided that they

[1] Thai government ministries have often been thought of as independent "kingdoms" (see: Riggs,1966,pp 329-335) run by a minister who feels he is in competition with the other ministries as he tries to gain as large a proportion of the total budget as posssible. This means that there is little rationalisation of resources as the needs of the other sections of government are rarely taken into account when a request for funding is entered by a ministry. The 1978 World Bank report notes: "Annual resource allocations, both among government agencies and regionally, tend to be more heavily influenced by historic patterns of expenditure and by institutional or informal pressures than by national development priorities as articulated in the development plan [the national 5-year plan] or by an objective assessment of relative needs" (IBRD,Sept 1978,pp 29-30).

should cooperate with each other; but, even so it demonstrates a certain amount of poor planning which was the result of the tendency for projects to be run (CBIRD included) in isolation from each other.

CBIRD is also trying to design projects, "in partnership with villagers, focusing on community problems and desired practices" (CBIRD document). This can be seen as the integration of the administrative machinery with the rural populace. The emphasis on no-risk income generating activities, which the farmers found particularly attractive, and the identification of those parts of programmes which members could, and could not, undertake themselves are two ways in which CBIRD had tried to communicate with the villagers and involve them in the design and implementation of their development initiatives. However, there still remained the impression that the membership of the various groups were reacting to CBIRD's suggestions rather than vice versa and there was certainly a great deal of room for further communication. It would have been appropriate at the time the groups were gradually becoming operative for a detailed survey to have been done to record the members' criticisms, and to have then reassessed the design of some of the activities [1].

[1] CBIRD had carried out a detailed survey ("social preperation") prior to the establishment of the groups. However, there was no sign that a follow-up survey was being planned before the final assessment of the project's success. As farmers find it difficult to offer suggestions and constructive criticisms of activities which have not been implemented, the original survey can do no more than provide a preliminary framework on which to base the project design.

Whether CBIRD had achieved the integration of technical and socio-economic disciplines to create a complete system of rural development depends on the level at which one views the evidence. As a project at the village level it had succeeded in realising this form of integration. But at the household level it had not. Each group was very much a separate entity with few links to the other groups and little cross-fertilisation. Farmers would join the pig or the biogas group and it was left at that. This is clear from the pattern of membership: if the members of the fertiliser group are removed from the analysis [1] it leaves only seven of the eighteen households interviewed who belonged to a CBIRD group actually being involved in more that one activity. This is a very low level of 'integration' (39%) if that is what the project was attempting to achieve.

To some extent this criticism is unfair as the creation of a "complete system of rural development" is something that is more attractive and more useful on paper than in practice. For farmers in the Northeast have already evolved a complete system of existence and development projects should aim to fill the gaps rather than create another, superfluous, cycle. This is where the identification of useful projects through cooperation and communication becomes so important. Thus the pig

[1] The fertiliser group is not integrative in nature. It is merely another means, together with the cooperative, the BAAC and the kaset amphoe, by which farmers could purchase chemical fertilisers without actually having to go to commercial middlemen in Mahasarakham.

group and the vegetable group were both extremely appropriate, as individual projects, to the conditions in which the inhabitants of Baan Noon Tae lived, and there was no particular need for their integration with other projects (although the two groups could have benefitted from some coordination - vegetable residue could be fed to the pigs and the pig manure returned to the vegetable plot).

In a similar way to the above the creation of an "integrated farming sys tem" through integrated development is largely unneccessary for one already exists. The need is to identify, which CBIRD had tried to do, the areas in which the system could be improved or added on to.

The final two questions that should be posed regarding CBIRD are: firstly; did it provide a significant contribution to the welfare of those farmers who were involved with it? And secondly; is it feasible for the project to be expanded to become a regional or national initiative?

The first question can only be tentatively answered because "results", as such, had only just begun to appear. But, the project had certainly had a beneficial effect with respect to many of the non-income generating activities (latrines, water tanks, economic stoves); had contributed substantially through some of the agricultural (non-income generating) groups (vegetable, fertiliser); had increased the income of those members of the pig group; and, hopefully, was going to increase the income of the membership of, particularly, the commercial chicken group.

Whether the project could be extended in its present form is unlikely. Certainly the most successful aspects could be implemented over a larger area although, arguably, it would then stop being an integrated development project. It is hard to see it being implemented in its entirety however - the amount of investment both in financial terms and in terms of skilled man-power is such that Thailand would not have the resources available to devote to such an intensive programme. It is possible that it could be simplified and cut back so that the Department of Agricultural Extension and/or the Community Development Department would be able to take it over, but in so doing it would probably become too structured and inflexible and the programme would be little different from all the other government development projects which are imposed on the farmers from above and in which his advice is seldom sought. It is also, incidentally, extremely unlikely that the various departments associated with each type of project [1] would actually cooperate together.

But then it should be accepted that nothing can actually be organised in the best possible way and it is necessary to structure a programme so that it not only

[1] Water tanks, toilets: Community Development Department.
Fertilisers, pesticides and seeds: Department of Agricultural Extension.
Fishponds: kor sor chor and Department of Fisheries.

fits into the farm system, but also comes within the limits which the nature of the Thai bureacracy imposes (either this or change the nature of the bureaucracy). In the light of this constraint, which exists in all countries, the best course of action would probably be to take the most encouraging parts of the CBIRD project and to adapt and then incorporate them into the exis ting extension system.

How does CBIRD compare with the government programmes described in chapters five, six and seven? Undoubtably, the input per villager, both in terms of cash and man hours, is far greater that the Royal Thai Government could achieve nationally. Largely as a result of this, the design of each activity and the manner in which it is implemented is far more specific, taking into account differences between villages and even between households in individual villages. In addition, many of the methods (or the stated methods) are laudable [1]; for example, the emphasis on community problems and desired practices; on self-help; on integrated development; and on community participation [2].

[1] It has been shown that the stated objectives have not always been fulfilled when it has come to actual implementation.

[2] In general, CBIRD was far more sensitive to farmers' opinions, needs and desires. They had, in this sense, gone some way to breaking down the hierarchical framework in which many of Thailand's development projects have to operate.

However, far more important is the central aim of the project, for it seems to fill a gap which the national development efforts have failed to identify (or, perhaps, have failed to take action on): namely, that there is a need to provide both additions and alternatives to the cultivation of rice and upland crops.

Chapter Ten

Synthesis

This study aimed to investigate three inter-related questions with reference to two villages in the province of Mahasarakham, Northeastern Thailand; firstly, the nature of agricultural production in a marginal rain-fed environment; secondly, the relevance of government policies and programmes in the light of the constraints which faced the farmers, taking special note of the influence of the environment; and lastly, to look at the alternative strategies (if any) to which farmers resorted in their efforts to raise their standards of living. Having covered these three questions in some detail in the body of the thesis, it is now necessary to try and draw the disparate threads together to form a coherent and condensed summary of the argument.

In the past it has been usual for studies of the 'Green Revolution' to emphasise the socio-economic restrictions limiting uptake. As Farmer noted with reference to South Asian rice production, these are not the only factors involved, and "some of [the] problems are fundamentally related to insufficiently resolved difficulties in adapting the new technology to certain important local and seasonal environments" (Farmer,1979,p 304). This comment would most certainly not be lost on the farmers of Baan Noon Tae and Baan Tha Song Korn.

The inhabitants of the two villages were operating in an environment where the absence of irrigation facilities, the variability of rainfall - both seasonally and from year to year, the nature of the topography and the character of the soils all combined to create a situation in which the farmers could never guarantee the water conditions that would exist in their padis. Given that "the variability in the amount and distribution of rainfall is the most important factor limiting yields of rainfed rice..." (De Datta,1981,p 18) it is not surprising that this fact should have been the central reason why the technology of the Green Revolution had failed to make an impact in the communities. However, to understand this more fully it is necessary to examine in greater detail the strategy of rice cultivation in Noon Tae and Tha Song Korn.

The fields of the villages were far from homogeneous in terms of the conditions of water supply that they could expect to receive. Mirroring this, the farmers had identified and named a variety of padiland types which, although they referred to their topographical position ('upper', 'middle' and 'lower' padis), in effect also referred to their susceptibility to flood and to drought. Ethno-ecologically therefore, it can be seen that the farmers perceived their riceland in a far from standard manner, and indeed, beneath these three major divisions was a wealth of further subdivision and classification relating to such factors as salinity and permeability. In the light of this complexity it is not surprising that the strategy of rice cultivation had evolved in a similarly intricate way (indeed the strategy reflects the terminology and vice versa).

The rice varieties that the farmers chose to grow exhibited two contrasting, although not contradictory, features: firstly, a great specificity of response to varying edaphic and topographic conditions; and secondly, an emphasis on flexibility of response to the variable climate. The fact that the 'RD' rice types were neither specific enough to fulfil the first role or generalised enough to fill the second meant that, on their rainfed riceland, only one farmer planted an RD rice amounting to 0.5% of the total riceland. The willingness however, of farmers to turn to the HYV's when presented with the appropriate environmental conditions was illustrated by those farmers who had access to irrigated riceland and the associated close control of water - for they all planted these new varieties.

Fertiliser use, although widespread, was of low intensity and this can also be seen to be a reaction, in part, to the environmental difficulties of cultivation. For, when only 63% of the planted riceland is actually harvested and when 45% of plots yield less that 120 kilograms of paddy per rai (national average in 1980/81 = 271 kg/rai) the economics of high input cultivation becomes dubious. Indeed, the possibility of a high input/high output strategy becomes impossible and the farmers would instead be operating a system where high input/variable output production dominated. This is coupled with the fact that because rice in Thailand is taxed through the rice premium and this 'cost' is inevitably passed down to the farmer, the input/output price ratios become even less attractive to those who are intending to use chemical fertilisers.

Combined with the risks of investing in the face of uncertainty, the inhabitants also had a limited dispos able income with which to buy agricultural inputs. This imposed severe constraints on the larger farmers who would have to make that much larger an outlay to meet a particular fertiliser doseage (given that income varied little with farm size). But even so, it appeared that when farmers had the available income to apply large quantities of chemical fertilisers they were discouraged from doing so by the prevelance of low and variable yields. In this sense, the limitations set upon the inhabitants by income were often disguised.

If the recommendations of the District Agricultural Extension Office with respect to rice cultivation are placed against the farmers' actions there is a clear disparity between the two, and it is arguable that the policies are out of touch with the position in which the farmer finds himself. This is because the extension service has ignored <u>the special problems of growing wet-rice in a marginal rain-fed environment</u> where recommendations suitable for irrigated riceland do not apply and consequently, are irrelevant. What is strange is that the Training and Visit System of Extension which Thailand has adopted recognises the need to both remain in touch with farmers' needs and abilities; and also with the problems that they face. Taking fertiliser use as an appropriate example Benor & Harrison note that:

> "All too often extension agents recommend set quantities of N, P and K per hectare as 'optimal'. Apart from the fact that the doses are often not optimal (they are generally high) and are seldom adjusted to the specific fertility level of an individual farmer's field or the input-output price ratios prevailing at the time, few farmers can actually afford such an amount of fertiliser, at least intially" (Benor & Harrison, May 1977, p 16).

They then go on to say that a research programme should be:

> "...well-tuned to the needs of the farmers. Without a network of field trials upon which new recommendations can be based and without continuous feedback to research from the fields, the extension service will soon have nothing to offer the farmers, and the research institutions will lose touch with the real problems farmers face" (Benor & Harrison, May 1977, p 16).

Clearly, somewhere in the progression from project design to implementation the bases on which the extension process is supposed to have been built have been distorted. A possible reason (or part of a reason) is the continuing dislocation of research and extension in Thailand. They occupy different departments in the Ministry of Agriculture and Cooperatives and there is little cross fertilisation. Indeed, the US Presidential Mission to Thailand (US Presidential Mission, April 1982) considered one of the measures needed to improve agricultural production to be the "better coordination [of extension] with various research sources" (p 21). It also emphasised that it was necessary to organise research programmes so that they correspond with the "existing important principal problems of each area, aiming first at production increases in areas outside the irrigation limits..." (p 20). Without such coordination between research and extension it is impossible to create the 'unified extension service' that Benor and Harrison envisage (Benor and Harrison,May 1977,p 10) or to formulate relevant policies and to design relevent programmes. It is arguable that in this sense there has been only a modicum of progress since 1969 when the World Bank observed that the "...Northeast is merely the most striking example of the widespread predisposition to disregard the potential for rainfed agriculture - at least at the official level" (quoted in Donner,1979,p 629).

The strategy that farmers followed in their choice of which upland crop to grow and the manner in which to grow it was distinctly different from that for rice. This befits the difference between what is ostensibly a subsistence crop - rice, and what is a cash crop.

Farmers invariably chose to grow cassava and over 90% of the cultivated upland was planted to it. The over-riding reason why this was so was because man sampalang yielded a higher net return than any other crop of which they had knowledge. In the light of this fact, the attempts by the Thai government to encourage farmers to diversify into other crops is particularly unrealistic and, once again, goes against the advice contained in the

Training and Visit System of Extension, for it states:

> "Nothing should be recommended that does not increase farmers' incomes" (Benor & Harrison,May 1977,p 14).

Although profitability, at present, is the most easily identifiable reason why farmers chose to grow cassava there were numerous underlying factors which, it could be argued, would prevent a switch to an alternative even if it were demonstrated to be more profitable. For, unlike rice which must be cultivated within severe constraints imposed by the environment, upland cash crops must be grown within constraints imposed by various socio-economic factors and by the demands of rice (the former often being linked to the latter). It was the ability of cassava to be moulded around these limitations, without seriously affecting its yield, which enamoured it to the farmers of the two communities.

Cassava can be planted and harvested at any time of the year and can be cultivated for between 8 and 14 months, or even longer [1] (Somsak Chaewsamoot,1974,pp 5 & 8), the yield increasing with maturity. The timing of cultivation is therefore remarkably flexible and the way in which a farmer choses to grow it can be determined by the labour demands of rice or, increasingly, of non-agricultural income-earning opportunities.

In addition, the successful cultivation of the crop does not depend on a rigorous system of cultivation

[1] Although as the tuber gets older it becomes more fibrous and lignified so that the starch content, and thus the quality, is reduced (Onwueme,1978,pp 132-133).

practices as it does with rice and kenaf & jute. Weeding and labour intensive forms of land preperation (eg: raised beds) need not be indulged in; man sampalang will respond to such inputs but their absence will not negatively affect yields. Similarly, it can be grown on extremely impoverished soils and still give an acceptable yield, but will respond positively to the increased use of chemical and organic fertilisers. In other words, there are no necessities for the farmer, only possibilities.

This was supported by the data from the questionnaire which showed that for those cultivating cassava there was no relationship between the quantity of labour hired (either in total or per rai) and the size of the productive household, while there was a positive co rrelation between labour hired (both in total and per rai) and income. In contrast, among those farmers who planted kenaf or jute, just the reverse was true: there was a negative correlation between productive household size and labour use, and no relationship between income and labour use. Thus, it could be said, for the farmers growing bor it was necessary for them to use a certain minimum labour input whatever their income; while for cassava it was merely a possibility, and only those farmers with the available cash chose to make the outlay.

The reluctance of farmers to intensify upland cropping through, for example, the application of fertilisers, was a response, primarily, to two factors: first, the limited available income of most of the farmers; and second, the risks associated with making cash outlays on crops whose price, and therefore return, fluctuates through the year (note the difference to rice cultivation). It is also important to see upland cropping as inextricably tied into rice cultivation: farmers often felt that they could not afford to intensify paddy cultivation, and this was their subsistence crop. The fact that they were even less willing to intensify the cultivation of man and bor - cash crops - is not, when viewed in this context, at all surprising.

The households of Baan Noon Tae and Baan Tha Song Korn were therefore faced with a dilemma: population growth had meant that there was no free land onto which cultivation could be extended and indeed, holdings were becoming smaller as the pressures of population exerted themselves on a finite resource. But, the alternative to extensification namely, intensification, had only limited possibilities, for the marginal rainfed environment meant that the risks of intensifying rice cultivation were great. Similarly, on their upland - although for different reasons - the farmers were reluctant to invest even moderate sums of money in raising yields. In response to this dilemma, the households of the two communities were increasingly looking beyond the cultivation of crops to secondary agricultural endevours and to non-agricultural income-earning opportunities, both on- and off-farm.

In many respects one can see this development as being linked to, and also as a continuation of, the ideas put forward by Boserup and Brookfield (Boserup,1965; Brookfield,May 1972). Boserup envisaged agricultural innovation (intensification) occurring with pressure of population on the land; Brookfield extended this beyond the limits of subsistence requirements to incorporate the needs and wants of people being drawn into the money economy (he also goes into considerable detail regarding the importance of culturally determined needs [1]) by highlighting the 'innovation' of cash cropping. In Noon Tae and Tha Song Korn the farmers, under similar pressures to those described by both authors had, due to the problems of intensifying agricultural production [2] (the avenue of escape for Boserup) in a marginal environment, turned to the innovation of alternative, non-agricultural, means of income generation. They had, in these terms, resorted to an exogenous response.

Among the agricultural households of Noon Tae and Tha Song Korn who were interviewed, 64% of their total cash income was derived from non-agricultural sources. These included both on-farm (principally crafts) and off-farm (migrant labouring,seasonal work, remittances) activities

[1] "It proves useful to consider the level of subsistence as a 'surface' which has close orthomorphism with the surface of population density. Above this lies a superimposed surface of social needs, expressed in terms of the land requirement of social production. The combined surface represents the total pressure of needs on resources, and it may deviate very substantially from the population map" (Brookfield,May 1972,p 39).

[2] Brookfield does note that the environment exerts a limiting effect on the possibilities of intensification (unlike Boserup).

with family members travelling to work within the province, to other parts of Thailand and even to other countries of the world. In addition, a further 10% came from what has been termed 'secondary agricultural sources' - primarily, the raising and sale of livestock. It is the former group of activities - those which are non-agricultural, which are of most interest as they are evidence of a diversification of economic activity into areas outside those traditionally associated with farming communities.

In chapter eight it was indicated that those families with non-agricultural sources of income owned smaller land holdings than the average and were often unable to produce enough paddy to meet their subsistence requirements. In the face of this predicament they had been stimulated to search for opportunities to raise cash outside farming so that they could meet the deficit by purchasing additional rice with the income that they earned. Interestingly, when upland and riceland holdings were taken separately there was a stronger negative relationship between thii rai and off-farm income than there was with respect to thii naa. It is possible to hypothesise that (it is far from conclusive) this is further evidence of the pressures on farmers to have a greater cash income. It is no longer enough just to be able to guarantee a certain subsistence level of agricultural production; households need money to buy goods and to pay for services which they are being goaded into wanting and, into expecting. So, it is those farmers who do not have the resources to earn cash within the agricultural system (ie; through the cultivation of upland cash crops) who are under the greatest incentive to look beyond the limits of farming, and beyond the boundaries of their villages.

Therefore, although Noon Tae and Tha Song Korn can be seen as communities whose populations have a livelihood still firmly entrenched within rice cultivation and, to a lesser extent, upland cropping (and importantly, they continued to perceive themselves to be farmers), there had been enough of a diversification of economic activity for a caveat to be inserted into this categorisation: namely that they had integrated a further system of production into their lives and thus had evolved somewhat. In many ways off-farm income earning activities are more closely related, in terms of the pressures that induced farmers to indulge in them, to upland cropping than upland cropping is to rice, for they are both products of the accelerating need & desire among the inhabitants for cash.

Where does the future lie then; and how should policies be formulated so that they are of most benefit to the villages [1] ? Clearly, the kaset amphoe should adapt its recommendations so that they take account of the environmental constraints of the area. In addition, it is crucial that a viable and equally profitable and flexible

[1] It is accepted that the policies which are most suited to the position in which the inhabitants of the two study communities find themselves may not be those policies which are best for the region as a whole, or indeed for the province.

alternative to cassava is found. Farmers will simply ignore any advice that takes no account of the advantages that man sampalang presently holds over any other known upland crop. Further, there is a need to accept the limitations of agricultural production in the area, and to devise policies that will give farmers and their children opportunities to earn a living outside agriculture. And if the Thai government is really concerned with stemming the migration of rural peoples to the Bangkok metropolis then these new industries must be located in the Northeastern region.

However, whether or not the Khorat plateau could really become, even with considerable public investment, a vibrant area of industrial enterprise is difficult to ascertain. Some analysts maintain that "the Northeast is at last on the threshold of rapid change" (McCulloch,July 1982,p 46) and Khon Kaen, only 70 kilometres from Mahasarakham, has been designated a growth pole. But even so, the Northeastern region, with a third of the nation's population currently (1981) produces only 4.8% of it's manufacturing output (NSO[6],n.d.) having declined from a figure of 8.3% in 1969. With Bangkok being one of the most vivid examples of primacy anywhere in the world (it is 45x larger than the next biggest city in Thailand, Chiang Mai) and with 'decentralisation' arguably being no more than a paper policy as far as the Northeast is concerned [1], it is difficult not to be pessimistic

[1] The Fifth Five Year Plan (1982-86) does have an 'Industrial Restructuring and Decentralisation Programme'

about the long-term prospects for the region's development.

This belief is, to some extent, reinforced when the developments that are occurring, or that have occurred, are looked at in greater detail.

The few agro-industries to locate in the Northeast have encountered numerous problems. For example; the sugar industry has suffered from a combination of excessive production and declining world prices and the five mills located in the region have all had to struggle to maintain profitability. Inevitably, some of the consequences of this have filtered down to those farmers cultivating cane and in November 1982 the buying price of the crop was reduced from US$23.00 per ton to US$16.08 per ton (Business in Thailand,Nov 1982,p 56). The need to reduce production so that the ISO (International Sugar Organisation) export quota of 1.173 million tons for 1983 (reduced from 1.38 million tons in 1982; reflecting the global over-capacity of the industry) could be met caused the government to exert considerable pressure on farmers to diversify into other cash crops, and also to require that mills did not expand (there is a fine set by the government on over-production which, in 1982, stood at US$150 per ton). Indeed, it is more likely that mills will close (see: Business in Thailand, Nov 1982,pp 56-61). In contrast, the reverse problem has afflicted the pineapple canning factory which was recently constructed in Khon Kaen: it has been unable to meet its production targets due to a shortage of fruit.

Another, and perhaps the most significant, agro-industry to locate in the area is the Phoenix Pulp and Paper plant, also in Khon Kaen, which was set-up with considerable encouragement from the Royal Thai government. It was intended not only as a 'pioneer' industry through which others might be enticed into the region but also as a means to boost the upland cropping prospects of the area by creating a demand for kenaf which the plant uses to produce pulp. But, just as the plant came on stream a slump in world pulp prices meant that it was unable to compete on an international basis. Even after a 20% tariff was imposed on imported pulp in November 1982, paper producers in Bangkok could still buy pulp on the international market at a price which, together with the 20% surcharge, was still some 16% less than the cheapest rate at which Phoenix could produce the commodity [1] (Business in Thailand, Jan 1983,p 15). The failure of pioneer industries to be enticed to locate in the region means that it is difficult to envisage Khon Kaen, or any other town of the plateau, actually becoming a manufacturing centre, surely the essence of economic vitality. Thus, at the present time the provincial centres of the region are only service centres for government and commerce alike to which goods are sent to be distributed to the population of the area. There is very little production generated in the towns themselves.

[1] With the surcharge, in January 1983 imported pulp cost 7,540 baht per ton. The cheapest rate at which Phoenix Pulp and Paper could produce was at 9,000 baht per ton (Business in Thailand, Jan 1983, p 15).

However, perhaps the area of greatest optimism involves the development of primary industries: the Northeast has considerable potash and rock salt resources of which the potash is especially viable. Preliminary exploration has indicated that there may be six trillion tons of potash in the region much of it of 'carnallite' grade (82% purity), and much of this located in the central portion of the plateau around Khon Kaen and Mahasarakham. It is hoped that eventually these reserves might be exploited leading to a 20,000 million baht investment in their development (The Nation, 7 Feb, 1983,pp 9-10). Even more dramatically, in November 1981, Esso Petroleum and Production Khorat Inc. (having been awarded the concession in March 1979) found natural gas in Khon Kaen province (McCullogh, July 1982,p 51). Further discoveries have been made since that date with, in February 1982, Esso Standard announcing that the Nam Phong I field in Khon Kaen had reserves to produce gas on a commercial scale at 30 million cubic feet per day for ten years (Economic Times,Vol 1,No. 30,23 Feb 1983). But despite the excitement that has resulted from these discoveries, it is difficult to envisage the benefits from the development of such primary resources either adding considerably to employment in the region or leading to much additional investment. The plans at present are to build a gas separation plant not in the Northeast but on the Eastern Seaboard. Similarly, the potash will be taken to an integrated fertiliser complex located at Rayong, also on the Eastern Seaboard, while the rock salt will probably be used to feed a soda ash plant (part of a series of projects planned to be built in, and organised by, the ASEAN group of countries) again located on the Eastern Seaboard. Further, not only will the Northeast receive little benefit from the development of these natural resources but, in addition, it is likely that much of their 'value' will be reinvested in Bangkok, causing a net loss of worth from the Isan region.

The only area of significant economic growth in the foreseeable future is likely to be within the service sector, and even this would not spread to affect the lives of a significant proportion of the rural population. As the Governor of Khon Kaen, Chamnarn Pochana, observed in mid 1982: "Industry will help Khon Kaen's economy, but this may only increase the per capita income by 20% or 30%. Most of the money will be made in the service industries like hotels, restaurants and entertainment centres. The farmers will remain unaffected" (McCullogh, July 1982,p 52). If this is the outlook for the changwat of Khon Kaen, the industrially most vibrant province of the plateau, then the prospects for Mahasarakham and other changwats are indeed bleak.

Undoubtedly this is rather too negative an appraisal of the plateau's prospects but, to the villagers of Noon Tae and Tha Song Korn, it would probably seem to be an accurate assessment. For farmers, with limited education and access to information, can only perceive what is around them. And, in these terms, they are faced with a decreasing man/land ratio, severe environmental constraints restricting intensification and only a few opportunities to earn income outside agriculture within the immediate vicinity of their villages. In these circumstances, the younger inhabitants are increasingly inclined to leave for the Central Plains and Bangkok where, rumour has it, there are opportunities to be had.

However, these opportunities are not open to all the inhabitants of the Northeast and there is a need to develop the region for both social and poltical reasons. For, as the younger, more skilled, educated and motivated men and women leave, so the area will lose valuable human resources (together with the physical resources noted earlier) and become even less able to 'develop'. In circumstances such as this, the latent dissatisfaction of the populace with central government together with their feeling of seperateness and Isan identity might be reignited, causing problems similar to those of the 1970's when the Communist Party of Thailand controlled significant areas of the region. The so-called 'domino effect' in which Thailand is clearly seen as the next domino to fall is not entirely lost upon the administration. In addition, the development of the Northeast should not be viewed in isolation but as part of the national plan. It is the government's stated desire to stem the flows of migrants into the Bangkok metropolis (which are largely due to the combination of perceived opportunities in the capital and the absence of opportunities in the regions) and to decentralise economic activity. This obviously entails that the Khorat plateau should be developed.

These factors, and others, necessitate that money be invested in the region. Undoubtably, the core of the Plateau's economy will remain the agricultural sector and the search for further production increases and alternative crops must remain the first priority. But, it is also clear, at least from the evidence from Baan Noon Tae and Baan Tha Song Korn, that alternative income earning opportunities should also be developed in an attempt to broaden the economy and provide sources of income outside agriculture.

Appendix 1.1

Translation of Questionnaire

Page 1

Village:
Date:

House number:
Name of household head:
Marital status:
Age:
Place of birth:
Have you moved to the village:
- where from:

When did you arrive:
Occupation:
Education level:
Can you read and write:
Have you participated in any training coufses. If so, what:

Page 2

Details of Household members

Relationship to head of household:
Sex:
Age:
Marital status:
Education level:
Occupation:
Do they participate in agricultural production:
Do the members have any other work (eg:labouring) ouside agriculture. If yes: is it within the village or outside it (another changwat). Income/year:

Details of those members of the household who leave the village to work in the agricultural off-season

Relationship to head of household:
Occupation they go to:
Where do they work:
Do they remit money, how much per year:
What do they return to the village to do (eg: transplanting, harvesting etc):

Page 3

In your household is there anyone who belongs to a cooperative group

Name of group:
Name of person who is the member:

(Appendix 1.1: questionnaire, con't)

When did they become a member:
When was the group established:
Which government department runs this group:

What are the internal problems of the Agricultural Cooperative:

Why aren't you a member of the Agricultural Cooperative:

Page 4a

Land Identification: by plot (thii lum, thii raap, thii dorn, thii rai)

Area (rai, ngaan):
Tenurial Status:
How did you acquire the land:
If rented, what is the rate (cash or in kind):
Rented from whom:

Last year did you plant a crop (variety):
If unplanted, why:
Is the land harvested:
Was any of the crop damaged, how/why:
On this piece of land have you ever planted any other crop or variety of crop:

Page 4b

How long ago did you change:
Is the change permanent or temporary:
For what reason did you change:

Has production declined or not:
If it has declined did you apply fertilisers:
Have you used any other cropping techniques:
Why did production decline:
After you did the above did production stay the same, go up or decline:
If production is declining and you have take no action; why not:

Page 5

Do you rent any land out

Area:
Rate:
To whom:

(Appendix 1.1: questionnaire, con't)

Type of land:
For what crop:

Do you lend any land out

Area:
To whom:
Type of land:
For what crop:

Would you like to rent more land

For what crop:
At what rate:

Do you think that land is fragmenting:

Do you thing that tenancy is increasing:

Page 6

Last Years Production

Type of crop (variety):
Planted area:
Harvested area:
Production:
Amount sold:
In what form:
When:
To whom:
Where:
For how much:
Will you sell any more:
Are you waiting for higher prices or is there another reason:
Do you think middlemen are exploitative:
Why haven't you sold to the government:

This year will you have to buy rice:

Do you have enough storage space for rice:
Or do you have to sell immediately after harvesting because you have nowhere to store it:
Do you have storage facilities for other crops:

(Appendix 1.1: questionnaire, con't)

Page 7

Fertiliser Use

Crop variety:
Type of fertilisers (chemical/organic):
Amount used:
Cost:
Bought from whom:
When is it applied:
When did you start using it:
Who introduced you to its use:
Would you like to use more- why don't you:
If you don't use fertilisers, why not:

Pesticide & Herbicide Use

Crop variety:
Type of pesticide/herbicide:
Amount used:
Cost:
Bought from whom:
When is it applied:
When did you start using it:
Who introduced you to its use:
Would you like to use more- why don't you:
If you don't use pesticides or herbicides- why not:

Page 8

Details of Seeds Used (by crop)

Type:
Cost:
Bought from whom:
When did you start using them:
Who introduced you:
Would you like to use more:
If yes, why don't you:

Page 9

Labour Use (hired and long khaek)

What crop:
Cost:
When is it hired and for what:
For how long:
Relationship of labourers to household:

(Appendix 1.1: questionnaire, con't)

Is it hard to find labour to hire:
If you could hire more labour would you:

Page 10

Do you Own

Tractor:
Rotavator:
Cassava chipper:
Lorry:
Pickup:
Rice mill:
Other machinery:

Do you rent any of the above out:
If yes, specify- for what and how long, rate and to whom:

Do you Own

Water tank (size):
Biogas generator:
Latrine:
T.V.:
Radio:
Motorcycle:

Do you hire or borrow any of the following

Tractor/cultivator:
Cassava chipper:
Rice mill:
Lorry:
Other machinery:

If yes, specify- when and for what, for how long, at what rate, from whom.

Is it hard to hire:
If you were able to, would you hire more:

(Appendix 1.1: questionnaire con't)

Page 11

Do You Own Any of the Following

Buffalo	)	number, do you sell them,
Cows	)	return

Pigs	)	
Ducks	)	
Fish	)	number, do you sell them, return,
Rabbits	)	is a government dept involved
Chickens	)	
Other animal	)	

Page 12

Credit Use

From whom (money lenders, cooperative, BAAC, other government organisation, commercial bank, neighbour, relative, other)

Amount:
Interest:
For how long:
For what purpose:
Would you like to borrow more money:
For what purpose:
Why can't you get it:
If you have never used credit, why not:

Page 13

Non Agricultural Sources of Income

Silk:	)	
Mats:	)	amount/year, when sold,
Market gardening:	)	government involvement,
Fishing:	)	when did you begin
Other:	)	

Other sources of Income- off farm:

Estimation of annual income:

What large outlays do you make during the year (eg: medical costs, schooling):

How much do you contribute to the temple fund each year:

Do you use family planning:

Appendices (con't)

Appendix 2.1

Cash Income per Family per Year, by Region (1931)

Region	Income (baht)
Central	279*
North	176
South	125
Northeast	83

* Because the depression affected the Central Plain earlier and more vigorously than the rest of the country, the author believed that the normal cash income of the region would have been even higher at approximately 330 baht per year.

Source: Zimmerman,1931,p 48.

Appendix 2.2

The Agricultural Land Reform Office

The Agricultural Land Reform Office was created after the promulgation of the Agricultural Land Reform Act to supervise the efforts at land consolidation (Amara Pongsapich,June 1982,p 48; Ramsay,Nov 1982,p 1075).

The programme had the following objectives:

1/ To survey the present land holding status.

2/ To buy land from those farmers who own more than that stipulated by law (it varies, but in the Northeast it is approximately 25 rai per family) or do not make use of it.

3/ To distribute this and other public land to landless farmers and to those with very small plots.

4/ To provide additional marketing and production services.

(adapted from: Amara Pongsapich,June 1982,p 51; US Presidential Mission,April 1982,p 46)

Appendix 5.1

The Training and Visit System of Extension

Benor and Harrison (Benor & Harrison,May 1977,pp 10-18) outline the major elements of the system as follows:

1/ Unified Extension Service. The most essential management principle is to establish a single line of communications from the governmental agency responsible for agriculture to the field-level extension worker. Unless the agency has the full administrative control of the extension service it is not possible to carry out extension systematically and effectively.

2/ Extension Exclusively. Extension personnel should devote all their working time to agricultural extension and not to administrative duties. Supply of inputs, recording of statistics etc; should not be their problem.

3/ Systematic Training and Visits. Work, duties and responsibilities should be closely supervised. A specific schedule of visits to farmers fields must be rigidly followed. Frequent training sessions for extension officers are integral to the system.

4/ Concentration of Efforts. Concentration of efforts should be practised to obtain clear, visible impact and continued progress. Agents should only be involved in agricultural extension, most effort should be put into a few major crops and for those crops only the few practices which will bring the best economic results should be concentrated upon. In addition, the officers should concentrate on selected contact farmers, so as to make an impact.

5/ Immediate Success. In the initial stages of extension it is very important to achieve an immediate impact so as to give farmers confidence in the service. From here the process should be self-reinforcing.

6/ Imitable Contact Farmers. It is impossible for extension workers to maintain regular contact with all farmers, so 'contact farmers' are focused upon who will assist in speading the new practices. Contact farmers must be willing to adopt practices and to allow fellow farmers to visit their fields. They should be 'average' farmers so that the community as a whole feels it can follow them.

7/ Best Use of Available Resources. Farmers should be taught to make the best use of available resources. Nothing should be recommended which will not increase income. Intially better cultivation practices should be concentrated upon (land preperation, weeding etc;) rather than on increased use of purchased inputs.

8/ Recommendations According to Ability. Extension agents should advise farmers to apply new practices on only small portions of their land. This reduces risk and means adoption is more likely. When success is evident then farmers will spead use by themselves. The officer should concentrate on advice relevent to the majority, but should be prepared to adapt for special cases.

When farmers have improved their practices then attention should be turnedto inputs; not greater use but better use. 'Optimum' levels of application should be avoided; it is better to recommend a minimum level.

9/ Research. Extension should be linked to a vigorous research programme, well-tuned to the needs of the farmers. Continued feedback from the farmers is essential.

10/ Supply of Inputs and Credit. The links between extension and supply of inputs and credit need to be carefully defined and developed. There should be close links between the extension office and the credit organisation and sources of inputs.

11/ Continuous Improvement. The system requires a built-in process for continuous adaptation to changing conditions.

Appendix 5.2

Explanation of Figures 5.3a - 5.3e and 6.1a - 6.1c

These figures are an attempt to show the inter-relationships, as they appeared in Baan Noon Tae and Baan Tha Song Korn, between the various factors impinging on the farmers in their decision making with respect to rice and upland crop cultivation. They specifically refer to four aspects of cultivation, namely; labour use, choice of rice variety or upland crop type, fertiliser application and pesticide use; and each has been isolated to make the relationships visually clearer. They can, however, be built up to reveal the entire system to which they refer. The arrows are weighted (a thicker arrow denoting a stronger influence) and they point towards the element that is being affected.

Appendix 8.1

Replies to the question: 'Would you like to rent any (more) land; if so, for what crop'

Crops	Households	
Cassava	39)	
Cassava or kenaf/jute	4)	thii rai
Kenaf/jute	2)	
Rice	9	
Rice/upland crops	2	
Vegetables	2	
No desire to rent land	20	
Not applicable	3	
Total	81	

Appendix 9.1

The Village Chicken Group

The members of the village chicken group were given five semi-mature birds; a cock and four hens. The project was designed to improve the quality of village chickens and to provide farmers with eggs and meat. The birds could be marketed either by the members themselves, or they could be given to CBIRD who sold them in the same manner as they did the production from the commercial chicken group. In exchange for the fowl each member was expected to supply CBIRD with chicks so that they could be raised in a controlled environment until they were mature enough to be distributed to other members. Profits, as such, are hard to gauge as its main aim was not to be income generating but to provide the villagers with better quality village chickens, thereby raising protein intake and improving the diet of the inhabitants.

One of the problems which the project had already encountered was to find enough good quality village chickens to form a breeding base. The use of imported breeds (as in the commercial chicken group) was not seen as a possibility because of the environment in which village chickens must survive: foreign stock are more suceptible to predators and diseases; they require higher levels of nutrition and management, and are poor scavengers (Charan Chantalakhana,Oct 1981,p 5). For these reasons CBIRD decided to try and breed a superior village chicken by selecting the best examples from the 60 communities involved in the project. Unfortunately, in this effort CBIRD had been unsuccessful as they were unable to find enough chickens of the quality they desired to form a breeding group.

Appendix 9.2

The Goose Group

The ten members of the goose group were given five geese; a male and four females. Like the village chickens they were provided in a semi-mature state so that they had passed the most vulnerable phase of their life cycle. In return the members were expected to give CBIRD fourteen goslings so that they could, in turn, be distributed to other members. At maturity the geese were killed and either eaten by the householders themselves or sold either through CBIRD or privately by the members. The project was not specifically designed to be income generating but was intended, once again, to improve the nutritional standards of the community while at the same time providing a possible means by which farmers could diversify their incomes. At the time of the research this particular project was only in its first cycle and no problems were apparent or criticisms made.

Appendix 9.3

The Duck Group

Each member of the duck group was provided with 20 adolescent ducks. Although no rigid specifications were given regarding the construction of their pens, CBIRD did provide rough guidelines and some supervision (But the villagers were expected to procure all the building materials themselves). Feed consisting of broken rice and bran was supplied by the project, the costs being deducted from any profits.

The fowl were raised for both eggs and meat, the idea being that they would only be sold after they had passed their most productive egg-laying phase. The members could market the eggs and the birds either privately or through CBIRD. As it turned out most of the members chose to use CBIRD as their marketing outlet. In contrast to the commercial chicken group where there were problems of finding a stable demand for its production, the project had no trouble disposing of the ducks. This was due to the far smaller numbers involved - 20 per member versus 200 per member - which meant that the market had not become saturated.

Appendix 9.4

The Rabbit Group

The ten members of this group were provided with two rabbits; a buck and a doe. The cages were built of chicken wire to a CBIRD design, the wire being supplied by the project and deducted from any profits. It was felt to be very important that the cages were constructed to the specifications as rabbits are susceptible to disease and the design was an attempt to minimise the chances of disease breaking out.

The offspring of the breeding pair were weaned at eight weeks, and marketed by CBIRD at the age of two months. The members were given approximately 40 baht per animal (less costs) and it was anticipated that each pair would produce 35-40 young per year. This would give each member household an average income of between 1,400 and 1,600 baht per year (feed costs were minimal). However, there are two observations that should be made:

Firstly, the breeding rate of the rabbits owned by the ten members in Baan Noon Tae had been below that estimated by the project. Upto March 1983 (ie- after over six months of the project being in progress), only 17 two-month old rabbits had been sold giving an average annual production of only 3.4 rabbits per member and providing an income of 136 baht. This is clearly far below expectations, even allowing for the fact that the project had only recently got under way.

The second observation regards cage construction. The cages were designed with a mesh floor so that droppings could fall through and the chance of disease minimised. But, the project had failed to guide the farmers and to check the cages closely enough resulting in many being built with solid floors. Although this fact had not caused any problems after six months of operation it is an indictment of the management of the project.

Appendix 9.5

The Economic Stove Group

These are stoves designed to burn wood and rice husks more efficiently than an open fire. This is an important consideration for in the Northeastern Region there is a severe shortage of fire wood and the few areas of forest that remain intact are (or are meant to be) protected.

The households who had signed up for involvement in the project numbered between twenty and thirty. As all the stoves were made at the same time the members were asked to decide among themselves which day they wished CBIRD to come to the village to organise the construction programme. On that day all the members gathered together to build the stoves under the guidance of a technician. It is important to stress that this was a cooperative process and the households were not constructing their "own" stoves. It was only afterwards that each member was allotted one - by lottery. The stoves are made fron brick and the costs involved are minimal - 25-30 baht - which is paid immediately by the villagers. In fact, this minimal sum is an over-costing designed to impress upon the farmers that CBIRD is not a charity.

One problem with the stoves is that they have a tendency to crack. To solve this they are now being built of rice husks and clay, rather than brick, as the former is more fire resistant. Another problem, this time of a cultural nature, is that there is a belief in the area that pregnant women will abort if they inhale the smoke from burning rice husks. Although this was only accepted by the more elderly portion of the population it still remains a constraint limiting the spread of the use of the stoves.

At the time the fieldwork was coming to an end CBIRD had begun to switch to a new design of stove - the Khmer economic stove. This only burns rice husks and is even more efficient than the original design.

Appendix 9.6

Sty Design

The stys had dimensions of 3.2 x 2.1 metres, giving each pig almost 1.7 square metres of space. The floor was gently sloping so that waste could be washed away and was constructed of concrete. In addition, the stys had wooden fences, concrete food and water troughs and a rush roof.

BIBLIOGRAPHY

APRACA — 'Agricultural Credit Policies and Programmes in Thailand', presented to the Fourth General Assembly of APRACA, Manila, Philippines, Dec 1982.

ACKERMAN E.A. — 'Where is a Research Frontier?', Annals of the Association of American Geographers, Vol 53, No 4, Dec 1963, pp 429-440.

ACTMAN G. — 'Tapioca Debacle: the Other Side of the Story', July 1981.

ALTON C. — 'The Economics of Dry Season Irrigation in Northeast Thailand', PhD thesis, 1977.

AMARA PONGSAPICH — 'The Development of the Concept of Private Land Ownership', Second Thai-European Research Seminar, June 14-18, 1982.

ASIAN BUSINESS — 'Thai Agriculture: Looking for a new Commodity Mix', Asian Business, June 1981.

ASIAWEEK — 'Winding Down a War', Asiaweek, April 8 1983, pp 16-24.

AXINN G.H. — 'The Role of Education in Rural Development: Stimulator or Oppressor', International Conference on Rural Technology: An Integrated Approach, Asian Institute of Technology, Bangkok, Thailand, June 1977.

BAAC — 'Annual Report 1982', Bank for Agriculture and Agricultural Cooperatives, Thailand.

BAAC — 'Agricultural Credit Policies and Programmes in Thailand', Presented to the Fourth General Assembly of APRACA, Philippines, December 1982.

BBMR — 'Rural Development', Bangkok Bank Monthly Review, Vol 22, No. 1, January 1981.

BBMR — 'Agro-Financing: Tapioca Industry', Bangkok Bank Monthly Review, Vol 22, No. 4, April 1981.

BBMR 'The Rise and Fall of Kenaf', Bangkok Bank Monthly Review, Vol 22, No. 7, July 1981.

BBMR 'A Strategy for Rural Development', Bangkok Bank Monthly Review, Vol 23, No. 11, October 1982.

BBMR 'Average Wholesale Prices of Commodities', Bangkok Bank Monthly Review, Vol 24, No. 7, JULY 1983.

BANGKOK POST 'Frightening Facts about our Forests', Bangkok Post, 26 July, 1980.

BANGKOK POST 'Mid Year Economic Review, 1983', Bangkok Post, 1983.

BARROWS H.H. 'Geography as Human Ecology', Annals of the Assocaition of American Geographers, Vol 13, No. 1, 1923, pp 1-14.

BAYLISS-SMITH T.P. 'The Ecology of Agricultural Systems, 1982.

BEHRMAN J.R. 'Supply Response in Underdeveloped Agriculture: A Case Study of Four Major Annual Crops in Thailand 1937-1963', 1974.

BENNETT J.W. 'The Ecological Transition: Cultural Anthropology and Human Adaptation, 1976.

BENNISON R.H. 'The Cassava Industry of Thailand', The Courier, No. 83, Jan/Feb 1984.

BENOR D. & HARRISON J.Q. 'Agricultural Extension: The Training and Visit System', World Bank, May 1977.

BERTRAND T. 'Thailand: Case Study of Agricultural Input and Output Pricing', World Bank Staff Working Paper No. 385, April 1980.

BLAIKIE P. 'The Theory of Spatial Diffusion of Innovations: A Spacious Cul-de-Sac', Progress in Geography, Vol 2, No. 2, 1978.

BLAUT J.M. 'The Ecology of Tropical Farming Farming Systems', Revista Geografica, No. 54, 1961.

BLAUT J.M. 'Two Views on Diffusion', Annals of the Association of American Geographers, Vol 67, September 1977, pp 343-349.

BOAS F. 'The Limitations of the Comparative Method of Anthroplogy' (1896), Race, Language and Culture, 1948, pp 270-280.

BOAS F. 'The Aims of Anthropological Research' (1932), Race Language and Culture, 1948, pp 243-259.

BOSERUP E. 'The Conditions of Agricultural Growth: The Economics of Agrarian Change under Population Pressure', 1965.

BRADY N.C. 'The Nature and Properties of Soils', 1974.

BROOKFIELD H.C. 'Intensification and Disintensification in Pacific Agriculture: A Theoretical Approach', Pacific Viewpoint, Vol 13, No 1, May 1972, pp 30-48.

BRUNHES J. 'Human Geography', 1952.

BUNTING T.E. & GUELKE L. 'Behavioral and Perception Geography: A Critical Appraisal', Annals of the Association of American Geographers, Vol 69, No. 3, Sept 1979, pp 448-462.

BURCHAM L.A. 'A Geographical Analysis of Population Migration in Notheast Thailand 1947-1972', PhD thesis, 1979.

BURROWS 'Introduction', in 1968 edition of C.R. Darwin's, The Origin of Species by means of Natural Selection... (1859).

BUSINESS IN THAILAND 'Exaggerating PPP's Problems?', Business in Thailand, January 1983, p 15.

BUSINESS IN THAILAND 'Mills for Sale', Business in Thailand, November 1982, pp 56-61.

BUSINESS REVIEW 'Thai Silk is Still the Tops', Business Review, February 1973, pp 25-29.

BUSINESS REVIEW 'Tapioca: The Need for New Markets', Business Review, March 1983.

BUSINESS REVIEW 'Kenaf: A Dwindling Crop', Business Review, April 1983.

CBIRD 'Guidelines for Integrated Village Biogas Project', 1982.

CBIRD 'Objectives of CBIRD Project', (no date).

CDD 'Community Development in Thailand', Community Development Department, Ministry of Interior, Feb 1983.

CALDWELL J.A. 'American Economic Aid to Thailand', 1974.

CALDWELL M. et al 'Symposium on Thailand', Journal of Contemporary Asia, Vol 8, 1978.

CARTER A.C. 'The Kingdom of Siam', 1904.

CHAIRERK SUWAN-NARAT 'Village Organic Fertilisers', A Study on Policies and Programmes for Eradication of Rural Poverty in Selected Districts in Thailand, The Thai University Research Institute, Bangkok, Thailand, October 1981.

CHAN S.K. 'Long-Term Fertility Considerations in Cassava Production, Cassava Cultural Practices, Proceedings of a Workshop Held in Brazil, E.J. Weber, Julio Cesar Toro M & M. Graham (edits), 1980.

CHANG H.T. 'Integrated Rural Development as a Means for Development Benefit to Reach Asian Small Farmers', International Conference, Rural Development Technology: An Integrated Approach, Asian Institute of Technoology, June 1977.

CHARAN CHANTALA-KHANA 'Some Problems in the Development of Integrated Farming in Thailand', Report of the International Workshop on Integrated Livestock/Fish/Crop/ Forestry Production Systems for Small Farmers and Fishermen, Chiangmai, Thailand, 1980.

CHARAN CHANTALA-KHANA 'Village Poultry', A Study on Policies and Programmes for Eradication of Rural Poverty in Selected Districts in Thailand, The Thai University Research Association, October 1981.

CHINNAWOOT SOON-THORNSIMA — 'Rural Savings and Credit in Thailand', Develpment Planning Division, ESCAP, January 1979.

CHORLEY R.J. & HAGGETT P. — 'Models in Geography', 1967.

CHORLEY R.J. — 'Geomorphology and General Systems Theory' (1962), The Conceptual Revolution in Geography, W Davies (edit), 1972, pp 282-300.

CHORLEY R.J. — 'Geography as Human Ecology', Directions in Geography, R.J. Chorley (edit), 1973.

CHUMPHOT SUVAPHORN — 'Model of Agricultural Development in the Less Developed Country: A Study of Rice Production in Thailand, PhD thesis, 1975.

CHUNG C., COX M., ENGLISH J. & PORTER I.C. — 'Thailand: Selected Issues in Rural Development', Background Working Paper No. 4, November 1978.

COMPLETION REPORT — 'Rainfed Rice Improvement Pioneer Project, Northeast Thailand', Rice Division, Department of Agriculture, Ministry of Agriculture and Cooperatives, Bangkok, Thailand, June 1980.

CORDEN W.M. — 'The Exchange Rate System and the Taxation of Trade', Thailand: Social and Economic Studies in Development, T.H. Silcock (edit), 1967.

COURSEY D.G. & BOOTH R.H. — 'Root and Tuber Crops', Food Crops of the Lowland Tropics, C.L.A. Leakey & J.B. Wills (edits), 1977.

CRUICKSHANK J.G. — 'Soil Geography', 1972.

DARWIN C.R. — 'The Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life', 1859 (1968 edition with forward by Barrows).

DAVIES W.K.D. — 'The Conceptual Revolution in Geography, 1972.

DE DATTA — 'Principles and Practices of Rice Production', 1981.

DEMAINE H.	'The Role of Farmers' Associations in Agricultural Development: A Case Study from Northeast Thailand', Occasional Paper, Dept of Geography, SOAS, Univ of London, 1976
DEPARTMENT OF LABOUR	'Seminar on Rural Employment Programmes and Local Level Planning for the Satisfaction of Basic Needs in Thailand, with Special Emphasis on the Experiences and Lessons of the Tambon Development Programme, 1975-1976', Department of Labour & ILO-ARTEP, June 1979.
DEPARTMENT OF LAND DEVELOPMENT	'Detailed Reconnaissance Soil Map of Mahasarakham, Province Series No. 13, Ministry of National Development, Bangkok, Thailand, 1972 (Thai).
DEPARTMENT OF LAND DEVELOPMENT [1]	'Land Suitability Map for Water Impoundments: Changwat Mahasarakham', Department of Land Development, 1972.
DEPARTMENT OF LAND DEVELOPMENT	'Soil Survey of Changwat Mahasarakham: 2518', Ministry of Agriculture and Cooperatives, Bangkok, Thailand, Document No 140, Jan 1975 (Thai).
DEPARTMENT OF LAND DEVELOPMENT	'Meterological Data: Changwat Mahasarakham, 1978,Document No. 132, Ministry of Agriculture and Cooperatives, October 1979.
DIREK PATMASIRIWAT	'Credit Expansion for Rural Poor Areas', National Institute of Development Administration, 1981.
DIXON C.J.	'Landuse and Marketing in Northeast Thailand: A Case Study of the Lam Pao Area', PhD thesis, 1974.
DIXON C.J.	'Development, Regional Disparity and Planning: The Experience of Northeast Thailand', Journal of Southeast Asian Studies, Vol VIII, No. 2, September 1977.
DIXON C.J.	'Settlement and Environment in Northeast Thailand', Journal of Tropical Geography, Vol 46, June 1978, pp 1-10.
DONAHUE R.L., MILLER R.W. & SHICKLUNA J.C.	'Soils: An Introduction to Soils and Plant Growth', 1977.

DONNER W. — 'The Five Faces of Thailand, An Economic Geography', 1978.

DUCKHAM A.N. & MASEFIELD G.B. — 'Farming Systems of the World', 1970.

DUSIT DHEPPITOON — 'The Strategy of Community Development in Thailand', International Seminar on the Comparative Study of Community Development (UNESCO), Final Report, Dec 1983.

ECONOMIC TIMES — 'Khon Kaen: Provincial Report', Economic Times, Vol 1, No. 30, 23 February 1983.

EDITORIAL — 'Symposium on Thailand', Journal of Contemporary Asia, Vol 8, 1978, pp 3-4.

ELLEN R. — 'Environment, Subsistence and System: The Ecology of Small-scale Social Formations, 1982.

EYRE S.R. & JONES G.R.J. — 'Geography as Human Ecology', 1966. Eyre & Jones (edits).

FAO — '1983: FAO Fertiliser Yearbook', Food and Agriculture Organisation of the UN, Vol 33, FAO Statistics Series No. 56, 1984.

FEER — 'Food for the Economy', Far Eastern Economic Review, 12 April 1984.

FEER — 'Last of the Many', 'The Thoughts of Phirun' and 'The Fast Ebbing Tide', Far Eastern Economic Review, July 19 1984, pp 26-28.

FANIRAN A. & AREOLA O. — 'Essentials of Soil Study, with Special Reference to Tropical Areas', 1978.

FARMER B.H. — 'The 'Green Revolution' in South Asian Ricefields: Environment and Production', The Journal of Development Studies,Vol 15, 1979, pp 304-319.

FEBVRE L. — 'A Geographical Introduction to History', 1925.

FEDDERSON P. — 'Tapioca Debacle: The Solution is Free Trade', June 1981.

FEENY D. — 'The Political Economy of Productivity: Thai Agricultural Development, 1880-1975', Univ of British Columbia, Asian Monographs 3, 1982.

FINANCIAL TIMES — 'Thailand a Victim of its Tapioca Success', Financial Times, August 7, 1984.

FORDE C.D. — 'Habitat, Economy and Society: A Geographical Introduction to Ethnology', 1934.

FRAMINGHAM C.F., SOMNUK SRIPLUNG & HEADY E.O. — 'Agricultural Situation and Policy Issues', Agricultural Development Planning in Thailand, K.J. Nicol, Somnuk Sriplung and E.O. Heady (edits), 1982.

FUKUI H. — 'Paddy Production Technology, Present and Future', Thailand: A Rice Growing Society, Y. Ishii (edit), 1978.

FULLER T.D., PEERASIT KAMNUAN-SILPA, LIGHTFOOT P. & SAWAENG RATHANAMONGKOLMAS — Migration and Development in Modern Thailand, The Social Science Association of Thailand, Chulalongkorn University, Bangkok, Thailand, 1983.

GEERTZ C. — 'Agricultural Involution. The Process of Ecological Change in Indonesia, 1963.

GELLNER E. — 'Thought and Change', 1964.

GRAHAM W.A. — 'Siam', 1924.

GRANDSTAFF T.B. — 'Rice Varieties in NERAD Tambons in Chaiyaphum and Roiet', 1981.

GRIGG D.B. — 'The Agricultural Systems of the World: An Evolutionary Approach', 1974.

GRIT PERMTANJIT — 'Poltical Economy of Dependent Capitalist Development: Study on the Limits of the Capacity of the State to Rationalize in Thailand', Chulalongkorn University Social Research Instituite, Thailand, 1982.

GROSSMAN L. — 'Man, Environment Relationships in Anthropology and Geography', Annals of the Association of American Geographers, Vol 67, 1977, pp 126-144.

GUELKE L. — 'An Idealist Alternative in Human Geography', Annals of the Association of American Geographers, Vol 64, No. 2, June 1974, pp 192-202.

HANKS L.M. — 'Rice and Man: Agricultural Ecology in Southeast Asia', 1972.

HANKS L.M. — 'The Thai Social Order as Entourage and Circle', Change and Persistence in Thai Society, G.W. Skinner & A.T. Kirsch (edits), 1975.

HARRIS D.R. — 'The Ecology of Agricultural Systems', Trends in Geography: An Introductory Survey, R. Cooke & J. Johnson (edits), 1969.

HARRIS M. — 'The Cultural Ecology of India's Sacred Cattle', Current Anthropology, Vol 7, 1966, pp 51-

HARTSHORNE R. — 'The Nature of Geography: A Critical Survey of Current Thought in the Light of the Past' (1939), 1964.

HARVEY D. — 'Explanation in Geography', 1969.

HARVEY M.E. & HOLLY B.P. — 'Paradigm, Philosophy and Geographic Thought', Themes in Geographic Thought, M. Harvey & B. Holly (edits), 1981.

HETTNER A. — 'The Surface Features of the Land: Problems and Methods of Geomorphlogy' (1928), translation by R. Tilley, 1972.

HODGSON J.M. — 'Soil Sampling and Soil Description', 1978.

HOLT-JENSEN A. — 'Geography: Its History and Concepts', 1980.

HOLTSBERG C. — 'Rice Pricing Policy', Basic Needs and Government Policies in Thailand, P. Richards (edit), 1982.

HOWELER R.H. — 'Soil-related Cultural Practices for Cassava', Cassava Cultural Practices, Proceeding of a Workshop Held in Brazil, E.J. Weber, Julio Cesar Toro M, M. Graham (edits), 1980.

HUGHES A.C. — 'Note on Cassava Production on the Northeast Land Settlements', January 1980.

HULL C.H. & NIE N.H. — 'SPSS Update 7-9', 1981.

HUNTINGTON E. & CUSHING S.W. — 'Principles of Human Geography', 1934.

HUNTINGTON E. — 'Civilisation and Cimate', 1924.

IBRD — 'Northeast Thailand: Rainfed Upland Crop Improvement Project', Vols I & II, World Bank (ILACO), November 1974.

IBRD — 'Thailand: Towards a Development Strategy of Full Participation, A Basic Economic Report', September 1, 1978.

IBRD — 'Thailand: National Agricultural Extension II Project, Staff Appraisal Report, World Bank, July 1979.

IBRD — 'Income, Consumption and Poverty in Thailand, 1962/63 to 1975/76', World Bank Staff Working Paper No. 364, November 1979.

IBRD — 'Thailand: Industrial Development in Thailand', A World Bank Country Study, June 1980.

INGRAM J.C. — 'Economic Change in Thailand: 1850-1970', 1971.

INSOR D. — 'Thailand: A Poltical, Social and Economic Analysis', 1963.

ISHIKURA H. — 'Present State and Prospects for Pesticide Use in Rice Cultivation in South-East Asia', Rice in Asia, The Association of Japanese Agricultural Societies (edit), 1975.

JICA — 'Agricultural Cooperatives and Small-scale Rural Development', Interim Report of Joint Study on Integrated Small-scale Rural Development in Northeast Thailand: Present Situation, Japan International Cooperation Agency, 1981.

JACOBS N. — 'Modernisation Without Development. Thailand as an Asian Case Study', 1971.

JOHNSON S.H. — 'Major Policy Issues in the Development of Irrigation in Thailand', Naay Baay Seedthakit Kaset Khong Prathet Thai(Thai journal), 1979.

KKU-FORD — 'An Agroecosystem Analysis of Northeast Thailand', Khon Kaen University & the Ford Foundation, Aug 1982.

KKU-IDRC — 'Semi-arid Crops Project: 1977 Annual Report', Khon Kaen University, 1978.

KAMEGAI K. — 'Establishment of Farmers Organisations and its Role in Small-scale Integrated Rural Development, Present State and Future Prospects' Interim Report on Small-scale Integrated Rural Development in Northeast Thailand (2), Analytical Considerations, Jan 1982.

KANOK WONGTRAGAN — 'Rice: Background Information on Agricultural Marketing in Thailand', Issues Papers on Agricultural Technology and Domestic Agricultural Marketing, prepared for the US Presidential Mission to Thailand, USAID, May 1, 1982.

KATCHAMAT SUVAPHOL — 'Analysis and Evaluation of the National Economic Development Plans of Thailand, 1961-71, from a Comparative Regional-Urban Development Perspective', PhD thesis, 1978.

KEMP J.H. — 'Legal and Informal Land Tenure in Thailand', Modern Asian Studies, Vol 15, No. 1, 1981, pp 1-13.

KEYES C.F. — 'Isan: Regionalism in Northeastern Thailand', Cornell Thailand Project, Interim Report No. 10, Data Paper No. 65, Southeast Asia Program, Cornell University, March 1967.

KEYES C.F. — 'Ethnic Identity and Loyalty of Villages in Northeast Thailand, Southeast Asia: the Politics of National Integration, J.T. McAlister (edit), 1973.

KEYES C.F. — 'In Search of Land: Village Formation in the Central Chi River Valley, Northeast Thailand', Contributions to Asian Studies, J. Brow (edit), Vol 9, 1976.

KIEATVIBOON — 'Socio-economic Information: Physiographical, Demographic, Socio-economic and Cultural Aspects', The Joint Study Project for Integrated Small-scale rural Development in Northeast Thailand, TOBAN-Northeast Project, June 1981.

KINYON L., THAWACH LEELA-SUWANICH & NICOL K.J. — 'Regional Delineation and Data Management', Agricultural Development Planning in Thailand, K.J. Nicol, Somnuk Sriplung & E.O. Heady (edits), 1982.

KIRK W. — 'Problems of Geography', Geography, Vol 48, 1963, pp 357-371.

KIRSCH O.C. — 'Agricultural Cooperation in Thailand', Research Centre for International Agrarian Development, Publication: 12, 1981.

KLAUSNER W.J. — 'Reflections in a Log Pond', Collected writings of William J. Klausner, 1972.

KLAUSNER W.J. — 'Reflections on Thai Culture', Collected Writings of W.J. Klausner, 1982.

KRANNICH C.R. & KRANNICH R.L. — 'Family Planning Policy and Community Based Innovations in Thailand', Asian Survey, Vol XX, No. 10, October 1980.

KRIRKKIAT PHIPATSERITHAM — 'Trends in Land Tenure and Security', report prepared by USAID/Thailand, Thai University Research Assoc'n, Report No. 5, Nov 1979.

KROEBER A.L. — 'The Nature of Culture', 1952.

KROEBER A.L. — 'Relations of Environmental and Cultural Factors', Environment & Cultural Behaviour, A.P. Vayda (edit), 1969.

KUHN T.S. — 'The Structure of Scientific Revolutions', 1962.

KUZNETS S. — 'Economic Growth and Income Inequality', Economic Growth and Structure: Selected Essays, 1965.

LAMOREAUX P.E. 'Reconnaissance of the Geology and Groundwater of the Khorat Plateau, Thailand', Geological Water Supply Paper 1429, US Department of Interior, 1959.

LAND DEPARTMENT 'The Land Code: Act 2497', The Land Department, 1954 (in Thai).

LAND DEVELOPMENT DEPARTMENT 'Detailed Reconnaissance Soil Map of Mahasarakham', Province Series No. 13, Ministry of National Development, Bangkok, Thailand, 1972, (in Thai).

LAND DEVELOPMENT DEPARTMENT 'Land Capability Map: Rice', Land Development Department, Ministry of Agriculture and Cooperatives, Thailand, 1977 (in Thai).

LAND DEVELOPMENT DEPARTMENT 'Land Capability Map: Upland Crops', Land Development Department, Ministry of Agriculture and Cooperatives, Thailand, 1977 (in Thai).

LAND DEVELOPMENT DEPARTMENT 'Land Use Map: Changwat Mahasarakham', Land Development Department, Ministry of Agriculture and Cooperatives, Thailand, January 1979 (in Thai).

LANGTON J. 'Potentialities and Problems of Adopting a Systems Approach to the Study of Change in Human Geography', Progress in Geography: International Reviews of Current Research, Vol 4, 1972, pp 126-179.

LEONOR M. 'Access to Primary Schools in Thailand', Basic Needs and Government Policies in Thailand, P. Richards (edit), 1982.

LIGHTFOOT P. & FULLER T. 'Circular Rural-Urban Movement and Development Planning in Northeast Thailand', 1982.

LIGHTFOOT P. & FOX J. 'Institutional Credit and Small-Scale Farmers in Northeastern Thailand', Occasional Paper No. 5, Centre for South-east Asian Studies, University of Hull, 1983.

LONDON B. 'Metropolis and Nation in Thailand: The Political Economy of Uneven Development', 1980.

LUI K. — 'Transportational development and Agricultural Marketing in Changwat Loei, Northeastern Thailand', PhD thesis, 1973.

LYELL C.B. — 'Principles of Geology, being an Attempt to Explain the Former Changes of the Earth's Surface by Reference to Causes now in Opeation, three volumes, 1830-1833.

MOAC — 'Agricultural Statistics of Thailand: 1967', Division of Agricultural Economics, Ministry of Agriculture, Bangkok, Thailand, 1970.

MOAC — 'Agro-economic Zones for Agricultural Extension and Development', Division of Agricultural Economics, Ministry of Agriculture and Cooperatives, September 1972.

MOAC — 'Agricultural Statistics of Thailand: Crop Year, 1976/77', Division of Agricultural Economics, Ministry of Agriculture and Cooperatives, No. 72, 1977.

MOAC — 'Agricultural Statistics of Thailand: Crop Year, 1977/78', Division of Agricultural Economics, Ministry of Agriculture and Cooperatives, 1978.

MOAC — 'Rainfed Rice Improvement Pioneer Project: Northeast Thailand', 1978 Annual Report, Rice Division, Ministry of Agriculture and Cooperatives, Bangkok, Thailand, June 1979.

MOAC — 'A Survey Report on Rainfed Agricultural Projects in Northeast Thailand', Volume: The Final Report, Ministry of Agriculture and Cooperatives, Northeast Regional Office of Agriculture, Tha Phra, Khon Kaen, Thailand, April 1980.

MOAC — 'Rainfed Rice Improvement Pioneer Project', Completion Report, Rice Division, Ministry of Agriculture and Cooperatives, Bangkok, Thailand, June 1980.

MOAC — 'Agricultural Statistics of Thailand Crop Year 1980/81', Centre for Agricultural Statistics, Office of Agricultural Economics, Ministry of Agriculture & Agricultural Cooperatives, Bangkok, Thailand, 1981.

MOAC — 'Selected Economic Indicators Relating to Agriculture', Office of Agricultural Economics, Ministry of Agriculture and Cooperatives, Bangkok, Thailand, No. 84(6), 1982.

MABRY B.D. — 'Peasant Economic Behaviour in Thailand', Journal of Southeast Asian Studies, Vol 10, 1979.

MAHIDOL UNIVERSITY — 'Population and Development', Mahidol University Sheet, 1982.

MALTHUS T.R. — 'An Essay on the Principle of Population and a Summary View of the Principle of Population' (1798), 1970.

MATSUSHIMA S. — 'High Yielding Rice Cultivation: A Method for Maximising Rice Yield through Ideal Plants', 1976.

McCULLOGH R. — 'Winds of Change over Khon Kaen', Business in Thailand, July 1982.

MEER, VAN DE C.L.J — 'Rural Development in Northern Thailand: An Interpretation and Analysis, 1981.

MEKONG COMMITEE — 'Trials in Farmers' Fields: Northeast Thailand Irrigation Projects 1975-1978', Interim Committee for Coordination of Investigation of the Lower Mekong Basin, Nov 1979.

MICKELWAIT D.R., MURRAY C.A. & ROTH A. — 'Rural Development Strategies in Thailand: A Review of the Organisation and Administration of Rural Development for AID', USAID/Thailand, June 1979.

MIKESELL M.W. — 'Geography as the Study of the Environment: An Assessment of Some Old and New Commitments', Perspectives on Environment, I. Manners & M. Mikesell (edits), 1974.

MIZUNO R. — 'The Social Organisation of Rice Growing Villages', Thailand: A Rice Growing Society, Y. Ishii (edit), 1978.

MOERMAN M. — 'Agricultural Change and Peasant Choice in a Thai Village', 1968.

MORGAN W.B. & MOSS R.P. — 'Geography and Ecology: the Concept of the Community and its Relationship to Environment', Annals of the Association of American Geographers, Vol 55, No. 2, June 1965, pp 339-350.

MORRILL R.L. — 'The Shape of Diffusion in Space and Time', Economic geography, Vol 46, 1970.

MORSS E.R. with HATCH, MICKELWAIT, & SWEET — 'Strategies for small Farmer Development', Westview Special Studies in Social, Political and Economic Development, 1976.

MOSEL J.N. — 'Thai Administrative Behaviour', Towards the Comparative Study of Public Administration, W.J. Siffin (edit), 1957.

MOSS R.P. — 'Biogeography and Ecosystems', Themes in Biogeography, J.A. Taylor (edit), 1984, pp 106-131.

MUSCAT R.J. — 'Development Strategy in Thailand: A Study of Economic Growth', 1966.

NEDB — 'The Second Economic and Social Development Plan (1967-71)', The National Economic Development Board, Office of the Prime Minister, Bangkok, Thailand.

NESDB — 'A Five Year Comprehensive Plan for the Development of Agricultural Cooperatives', National Economic and Social Development Board, Feb 1979.

NESDB — 'Social Indicators: 1980' National Economic and Social Development Board, Thailand, 1980, (in Thai).

NESDB[1] — 'The Fifth National Economic and Social Development Plan (1982-86)', National Economic and Social Development Board, Office of the Prime Minister, Bangkok, Thailand.

NESDB[2] 'The Fourth National Economic and Social Development Plan (1977-81)', National Economic and Social Development Board, Office of the Prime Minister, Bangkok, Thailand.

NESDB[3] 'The Third National Economic and Social Development Plan (1972-76)', National Economic and Social Development Board, Office of the prime Minister, Bangkok, Thailand.

NSO[1] '1978 Agricultural Census Report, Whole Kingdom', National Statistical Office, Office of the Prime Minister, Thailand.

NSO[2] '1978 Agricultural Census Report, Northeastern Region', National Statistical Office, Office of the Prime Minister, Thailand.

NSO[3] '1978 Agricultura: Census Report Central Region', National Statisitcal Office, Office of the Prime Minister, Thailand.

NSO[4] '1978 Agricultural Census Report Southern Region', National Statistical Office, Office of the Prime Minister, Thailand.

NSO[5] '1978 Agricultural Census Report Northern Region', National Statistical Office, Office of the Prime Minister, Thailand.

NSO[6] 'Gross Regional and Provincial Product 2520-2524', National Statistical Office, Office of the Prime Minister, Thailand.

NSO 'Statistical Yearbook: Thailand, 1976-1980',National Statistical Office, Office of the Prime Minister, No. 32 (no date).

NSO 'Quarterly Bulletin of Statistics', National Statistical Office, Office of the Prime Minister, June 1974.

NSO 'Quarterly Bulletin of Statistics', National Statistical Office, Office of the Prime Minister, Volume 28, No. 3-4, 1980.

NSO 'Statistical Summary of Thailand: 1982', Statistical Reports Division, National Statisitcal Office, Office of the Prime Minister, 1982.

NARONG SINSAWASDI — 'Local Leaders and Community Activeness: An Empirical Study of Forty Thai Rural Communities', Research series in English No. 2, Thai Kadi Research Institute, Thammasat Univ., 1980.

NATION REVIEW — 'Farming: Future Growth Must be from Yields', The Nation Review, March 3, 1983.

NATION, THE — 'Tambon Council: Bottom-up Approach for Rural People', The Nation, August 18, 1981.

NATION, THE — 'An Integrated Farming Approach', The Nation, January 24, 1983.

NATION, THE — 'Government Sources Reveal New Elements of CPT's Conflicts', The Nation, Feb 3 1983, p 5.

NATION, THE — 'WB, DMR Meet on Potash Venture', The Nation, Feb 7, 1983,pp 9-10.

NEHR C.D. — 'The Dynamics of Politics and Administration in Rural Thailand', 1974.

NETTING R. — 'Cultural Ecology', 1977.

NG R.C.Y. — 'Some Landuse Problems of Northeast Thailand', Modern Asian Studies 4:1, 1970, pp 23-42.

NG R.C.Y. — 'A Study of Recent Internal Migration in Thailand', The Journal of Tropical Geography, Vol 31, Dec 1970.

NG R.C.Y. — 'Social and Economic Determinants in Rice Cultivation in Northeast Thailand', Studies of Contempory Thailand, R. Ho & E.C. Chapman (edits), 1973.

NG R.C.Y. — 'The Land Holding Pattern', Lam Pao Land Use Survey Report Series No. 2, SOAS, University of London, April 1974.

NG R.C.Y. — 'The Demographic Pattern', Lam Pao Land Use Survey Report Series No. 1, SOAS, University of London, May 1974.

NIE N.H. et al. — 'Statistical Package for the Social Sciences (SPSS)', 1975.

NORMAN D.W. & GILBERT E. — 'A General Overview of Systems Research', _Readings in Farming Farming Systems Research and Development_, W.W. Shaner, P.F. Philipp & W.R. Schmehl, 1982.

ONCHAN & MEYER — See: Tongroj Onchan & Meyer R.L.

ONWUEME I.C. — '_The Tropical Tuber Crops: Yams, Cassava, Sweet Potato and Cocoyams_', 1978.

PDA — '_General Data: Mahasarakham Province_' Unpublished Population and Community Development Association Document, 1983.

PATERSON J.L. — '_David Harvey's Geography_', 1984.

PAYUNGSAK SESAVEJ — '_Some Comments on the Tambon Development Programme_', Seminar on Rural Employment Programmes and Local Level Planning with Special Emphasis on the Tambon Tambon Development Programme, ILO/ARTEP, June 1979.

PENDLETON R.L. — '_Thailand: Aspects of Landscape and Life_', 1962.

PESCOD M.B. — 'Environmental Management in Rural Areas of Thailand', _Developing Economies and the Environment: The Southeast Asian Experience_, C. MacAndrews & Chia Lin Sien (edits), 1979.

PHAISAL LEKUTAI — 'Agricultural Marketing: Causes of Low Agricultural Prices to Farmers and Future Prospects', _Interim Report of Joint Study Integrated Small-Scale Rural Development in Northeast Thailand_, Analytical Considerations, Jan 1982.

PHISIT PAKKASEM — '_Thailand's Northeast Economic Development Planning: A Case Study in Regional Planning_', PhD thesis, 1973.

PHISIT PAKKASEM — 'Development Planning and Implementation in Thailand', _Finance, Trade and Economic Development in Thailand: essays in honour of Khunying Suparb Yossundara_, Prateep Sondysuvan (edit), 1975.

PLATENIUS — '_Northeast Thailand: Problems and Potentialities_', 1963.

POOT H. 'Evaluation of the Tambon Development Program in Thailand', Asian Employment Programme, Working Papers, ILO/ARTEP, 1979.

POTTER J.M. 'Thai-Peasant Social Structure', 1976.

PRADIT CHARSOMBUT 'Mat Making and Fish Net Making in North-Eastern Thailand', Rural Off-Farm Employment Assessment Project, Working Paper No. 4, Kasetsart University, September 1980.

PRADIT MACHIMA 'Growth and Development of Agricultural Cooperatives in Thailand', Bangkok, Thailand, March 1976.

PREECHA KUWINPANT 'Marketing in North Central Thailand: A Study of Socio-Economic Organisation in a Thai Market Town', Chulalongkorn University Social Research Institute, 1980.

RAMSAY A. 'Tenancy and Landlessness in Thailand: How Severe a Problem?', Asian Survey, Vol XXII, No. 11, Nov 1982, pp 1074-1092.

RAMSSON R.E. 'Closing Frontiers, Farmland Tenancy and their Relation: A Case Study of Thailand: 1937-1973, PhD thesis, 1977.

RATZEL F. See: 'Freidrich Ratzel, A Biographical Memoir and Bibliography', H.G. Wanklyn, 1961.

RIGGS F.W. 'Thailand: The Modernisation of a Bureaucratic Polity', 1966.

ROGERS E.M. 'Categorising the Adopters of Agricultural Practices', Rural Sociology, Vol 23, 1958.

ROSENFIELD A., BENNETT A., SOMSAK VARAKAMIN & LAURO D. 'Thailand's Family Planning Program: An Asian Success Story', International Family Planning Perspectives June 1982, pp 43-50.

RUBIN H.J. 'The Dynamics of Development in Rural Thailand', Special Report No. 8, Center for South East Asian Studies, Northern Illinois University, 1974.

RUTHENBERG H. 'Farming Systems in the Tropics', 1980.

SANAN CHANTKAM — 'An Increase in Short-duration Upland Crop Production', A Study of Policies and Programmes for Eradication of Rural Poverty in Selected Districts in Thailand, The Thai University Research Association for the NESDB, Bangkok, Thailand, October 1981.

SAUER C.O. — 'The Morphology of Landscape', Land and Life, A Selection from the Writings of Carl Ortwin Sauer, J. Leighly (edit), 1963.

SCHNORE L.F. — 'Geography and Human Ecology', Economic Geography, Vol 37, 1961.

SHELTON H.M. & SUNTRAPORN RATNA-DILOK NA PUKET — 'The Integration of Crops and Livestock in Rainfed Upland Farming Systems in Northeast Thailand', FAO/UNDP International Expert Consultation on the Use of Improved Technology for Food Production in Rainfed Areas of Tropical Asia, Annex II, 1974.

SILCOCK T.H. — 'The Rice Premium and Agricultural Diversification', Thailand: Social and Economic Studies in Development, T.H. Silcock (edit), 1967.

SILCOCK T.H. — 'The Economic Development of Thai Agriculture, 1970.

SNIT SMUCKARN — 'Popular Participation: A Key to Successful Development Programmes', Seminar on Rural Employment Programmes and Local Level Planning with Special Emphasis on the Tambon Development Programme, ILO/ARTEP, June 1979.

SOMBOON SUKSAMRAN — 'Political Buddhism in Southeast Asia: The Role of the Sangha in the Modernisation of Thailand', 1977.

SOMSAK CHAEWSAMOOT — 'Cassava Production and its Future in Thailand', FAO, 1974.

STEWARD J.H. — 'Theory of Culture Change; The Methodology of Multi-Linear Evolution', 1955.

STEWARD J.H. — 'The Concept and Method of Cultural Ecology', Man, Space and Environment, English & Mayfield (edits), 1972.

STODDART D.R. — 'Darwin's Impact on Geography', Annals of the Association of American Geographers, Vol 56, No. 4, December 1966, pp 683-698.

STODDART D.R. — 'Geography and the Ecological Approach: The Ecosystem as a Geographic Principle and Method', Man, Space and Environment, P. English & K. Mayfield (edits), 1972.

STOTT P.A. — 'The Red Forest of Thailand: A Study in Vernacular Forest Nomenclature', Nature and Man in South East Asia, P.A. Stott (edit), SOAS, University of London, 1978.

STOTT P.A. — 'The Savanna Forests of Mainland Southeast Asia: An Ecological Survey', Progress in Physical Geography, Vol 8, No. 3, 1984, pp 315-335.

SUCHART PRASITH-RATHSINT — 'Leading Demographic and Social Issues of Thailand in the 1980's, Thailand in the 1980's, S. Xuto et al (edits), 1981.

SHIGERU SUGITANI — 'Thai Development Policy and External Assistance', Readings in Thailand's Political Economy, Vichitvong Na Pombhejara (edit), May 1978.

SUNANTAR SETBOON-SARNG & KANITHA SRISILPAVONGSE — 'Agricultural Credit: More 'Bread' for the Farmers', Business in Thailand, Jan 1982.

SUNGSIDH PIRI-YARANGSAN — 'Report on Rice Price Stabilisation Policies, Crop Year: 1980-1981', Chulalongkorn University Social Research Institute.

SUNTHORN RAJVONG-SUEK — 'An Ananlysis of the Competition Between Kenaf and Cassava Production in the Northeast Thailand, 1967-1976', Faculty of Economics, Thammasat Univ, Bangkok, Thailand, August 1977.

SUPACHI PANIT-CHPAKDI — 'Employment Effects of Tambon Development Programme: A Note', Seminar on Rural Employment Programmes and Local Level Planning with Special Emphasis on the Tambon Development Programme, ILO/ARTEP, June 1979.

TATE D.J.M. — 'The Making of Modern Southeast Asia', Volume II: The Western Impact, Economic and Social Change, 1979.

TAYLOR J.A. — Themes in Biogeography', J.A. Taylor (edit), 1984.

THAILAND BUSINESS	'Tapioca: Its Time to Take a Good Look at the Roots', Thailand Business, May 1982, pp 29-34.
TINNAKORN DARARATTANASILP	'Cassava: Background information on Agricultural Marketing in Thailand', Issues, Papers on Agricultural Technology and Domestic Agricultural Marketing, Prepared for the US Presidential Mission to Thailand, May 1982.
TONGROJ ONCHAN & MEYER R.L.	'Credit, Agricultural and Food Policy of Thailand', Department of Economics, Kasetsart University, Thailand, Staff Paper No. 42, April 1980.
TRAKARN THAKRANON-THACHAI	'The Principle of Social Service Banking: Recommended Thai Solution', December 1980.
TURTON A.	'The Current Situation in the Thai Countryside', Roots of Conflict, A. Turton, J. Fast & M. Caldwell (edits), 1978.
TURTON A. et al	'Thailand: Roots of Conflict', A. Turton, J. Fast and M. Caldwell (edits), 1978.
UN-ESCAP	'Analysis of Rainfall in Northeast Thailand as a Basis for the Planning of Irrigated Agriculture', UN-ESCAP, Committee for the Coordination of investigations of the Lower Mekong Basin, Limited Working Paper MKG 13, September 1974.
USAID	'Rainfed Agriculture Intensification: Project Identification Document', USAID, 1981.
USAID	'The Incentive Factor of Input/Output Price Relationship: the Fertiliser Case', Issues, Papers on Agricultural Technology and Domestic Agricultural Marketing, Prepared for the US Presidential Mission to Thailand, May 1982.
USAID	'Thai Rice Policy', Issues, Papers on Agricultural Technology and Domestic Agricultural Marketing, Prepared for US Presidential Mission to Thailand, May 1982.

US PRESIDENTIAL MISSION — 'Background Information on Agricultural Technology Generation and Diffusion in Thailand', prepared by: the Working Group of Agricultural Technology Generation and Diffusion, April 1982.

UMA SUKONTHAMAN, SUCHARIT PIENCHOB — 'Roles of Education in Thai National Development', Chulalongkorn University Document, no date.

USHER D. — 'The Thai Rice Trade', Thailand: Social and Economic Studies in Development, T.H. Silcock (edit), 1967.

VANDENBOSCH A. & BUTWELL R. — 'The Changing Face of Southeast Asia', 1967.

VASANTHA NARENDRAN — 'Agricultural Marketing in Khon Kaen Province, Northeast Thailand', Chulalongkorn University Social Research Institute, Thailand, 1980.

VAYDA A.P. — 'Environment & Cultural Behaviour', (Vayda, editor), 1969.

VIDAL DE LA BLANCHE — 'Principles of Human Geography', translation by M.T. Bingham, 1926.

VIVAT SHOTELERSUK — 'Agricultural Production and Productivity in a Traditional Agriculture (Northeast Thailand)', Phase I, Academic Report, The Joint Study Project for Integrated Small-Scale Rural Development in Northeast Thailand (TOBAN-NE Thailand Project), June 1981.

WEBER E.J., JULIO CESAR TORO M GRAHAM M. — 'Cassava Cultural Practices', Proceeding of a workshop held in Brazil, 1980.

WEBSTER C.C. & WILSON P.N. — 'Agriculture in the Tropics', 1980.

WHANG I.J. — 'Training Strategies for Integrated Rural Development', Seminar on: Strategies for Training in Support of Integrated Rural Development, Korea, October 1977.

WILSON C.M.	'Thailand: A Handbook of Historical Statistics', 1983.
YAMADA N.	'Possibilities of Increasing Rice Production in Southeast Asia by Improving Agricultural Technology: High Yielding Varieties and Fertiliser Use', Institute of Developing Economies, 1978.
YONGYUTH CHALAMWONG & MEYER R.L.	'Wealth and Credit: A Descriptive Analysis of Farm Household Balance Sheets', Rural Off-farm Employment Assessment Project, Working Paper No. 12, Kasetsart University, November 1980.
YUAVARES TUPBUN, JOHNSON S. & EARLY A.	'Economics of Three Tank Irrigation Projects in Northeastern Thailand', Workshop on Irrigation Water Management Research in Northeastern Thailand: Papers for Discussion, Khon Kaen, May 1980.
ZIMMERMAN C.C.	'Siam: Rural Economic Survey 1930-1931', 1931.

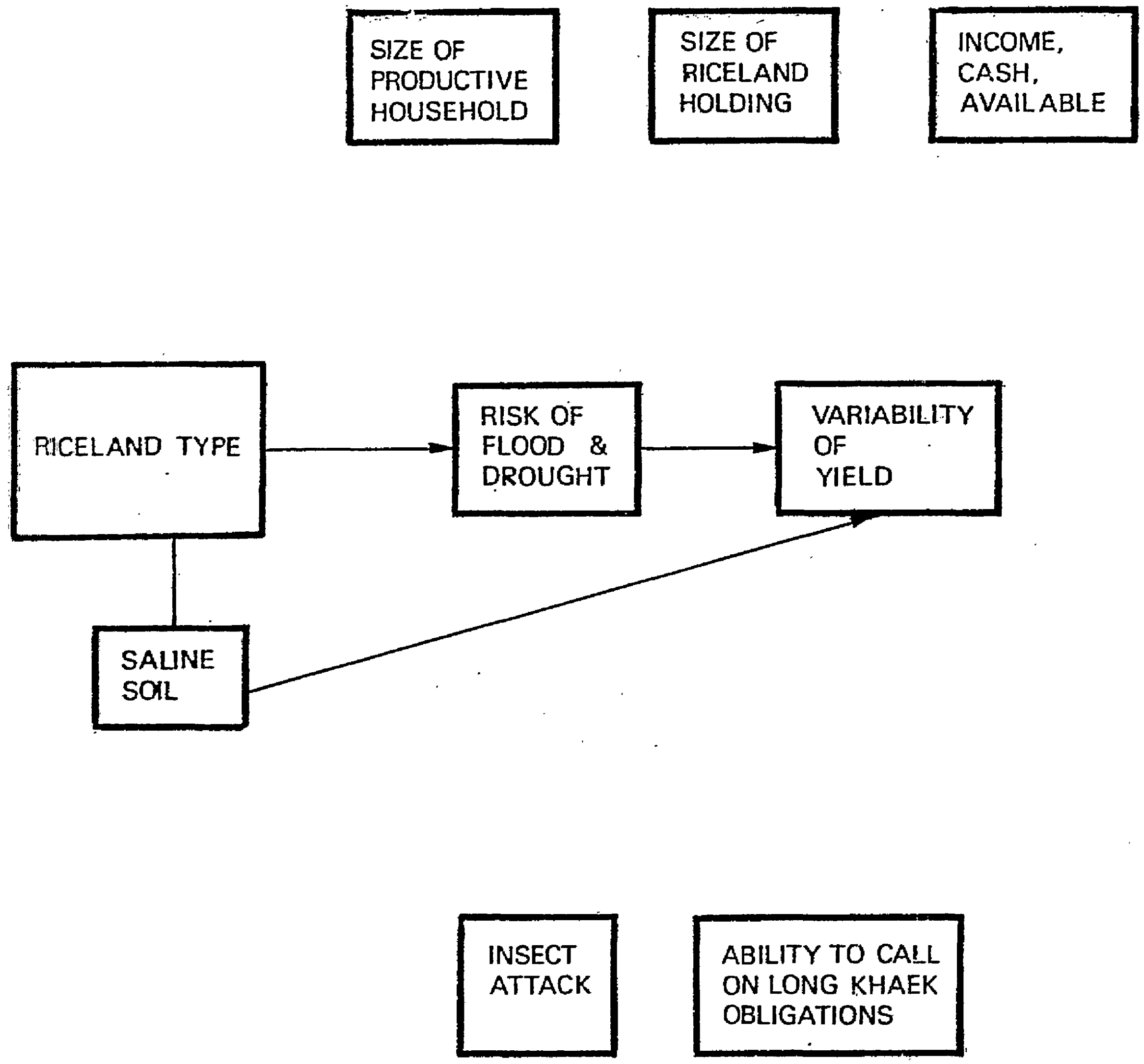


Fig. 5.3 a Base Diagram: Constraints Influencing Rice Cultivation

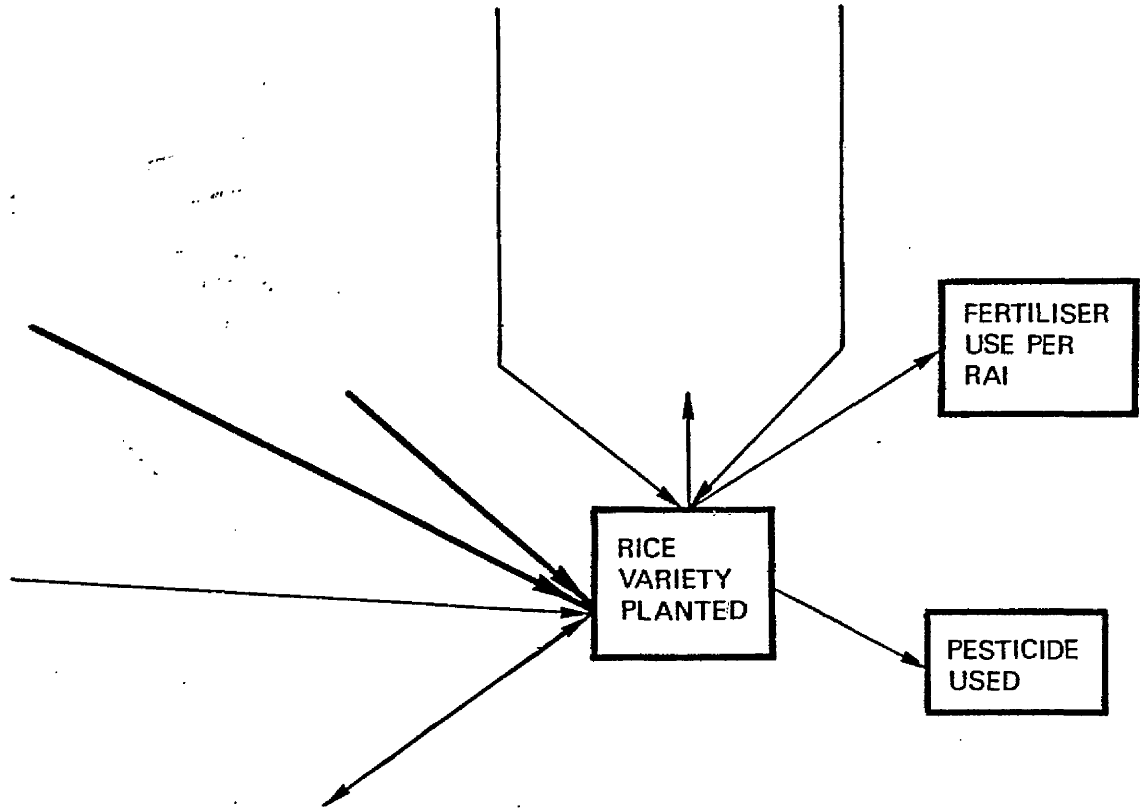


Fig. 5.3b Factors Influencing ,and which are Influenced by the Choice of which Rice Variety to Cultivate

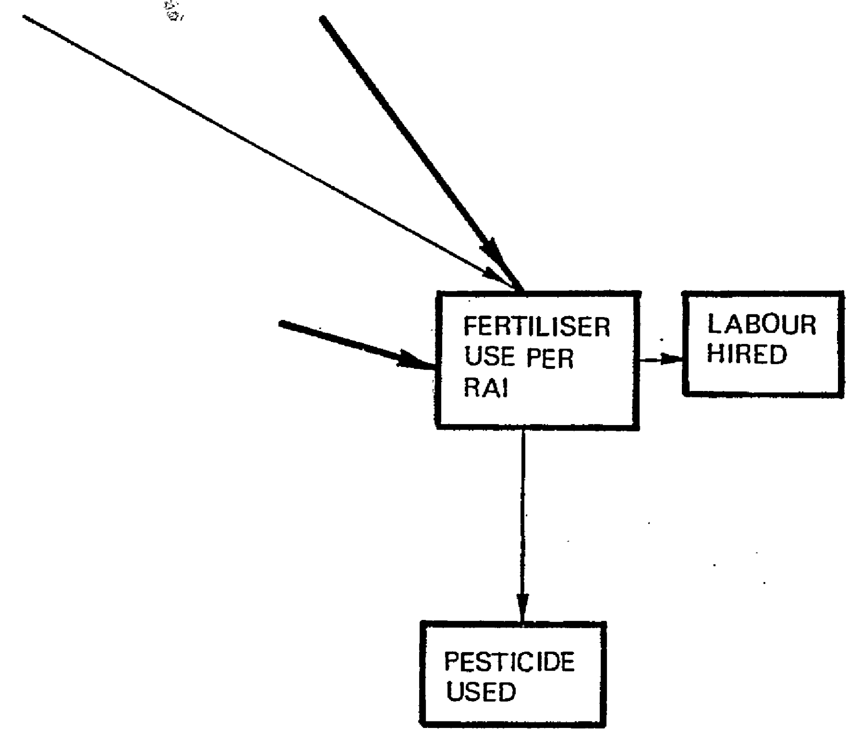


Fig. 5.3c Factors Influencing ,and which are Influenced by , Intensity of Fertiliser Use on Rice

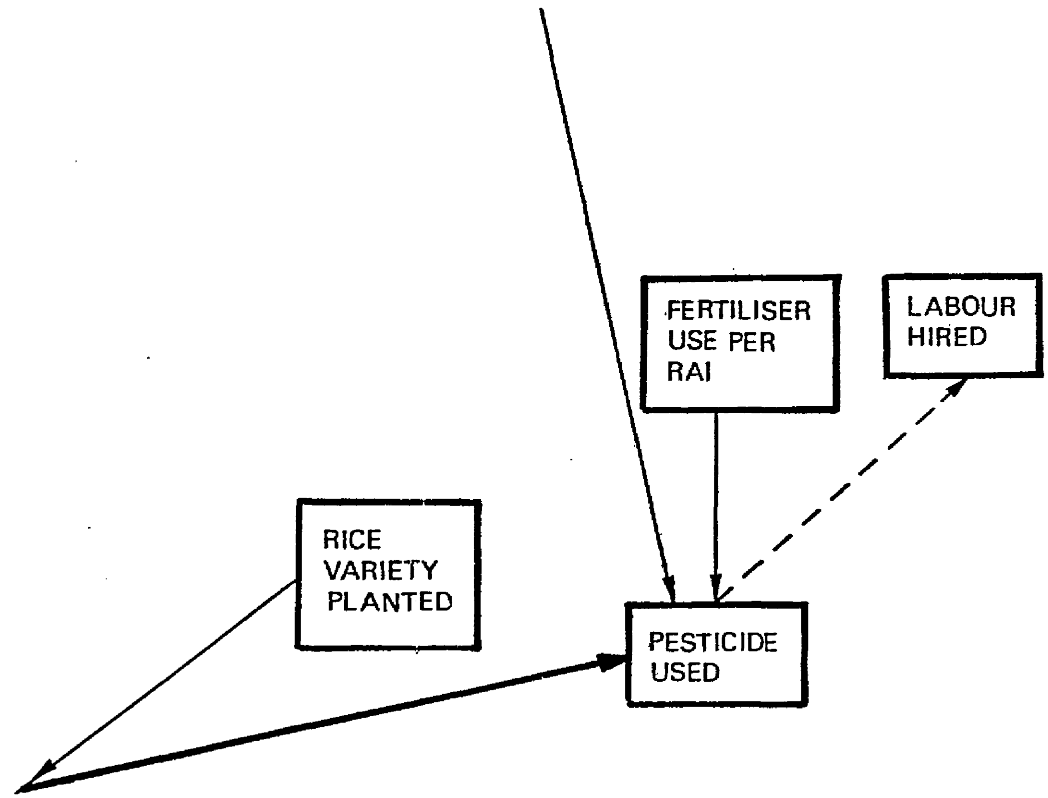


Fig. 5.3d Factors Influencing, and which are Influenced by,Pesticide Use on Rice

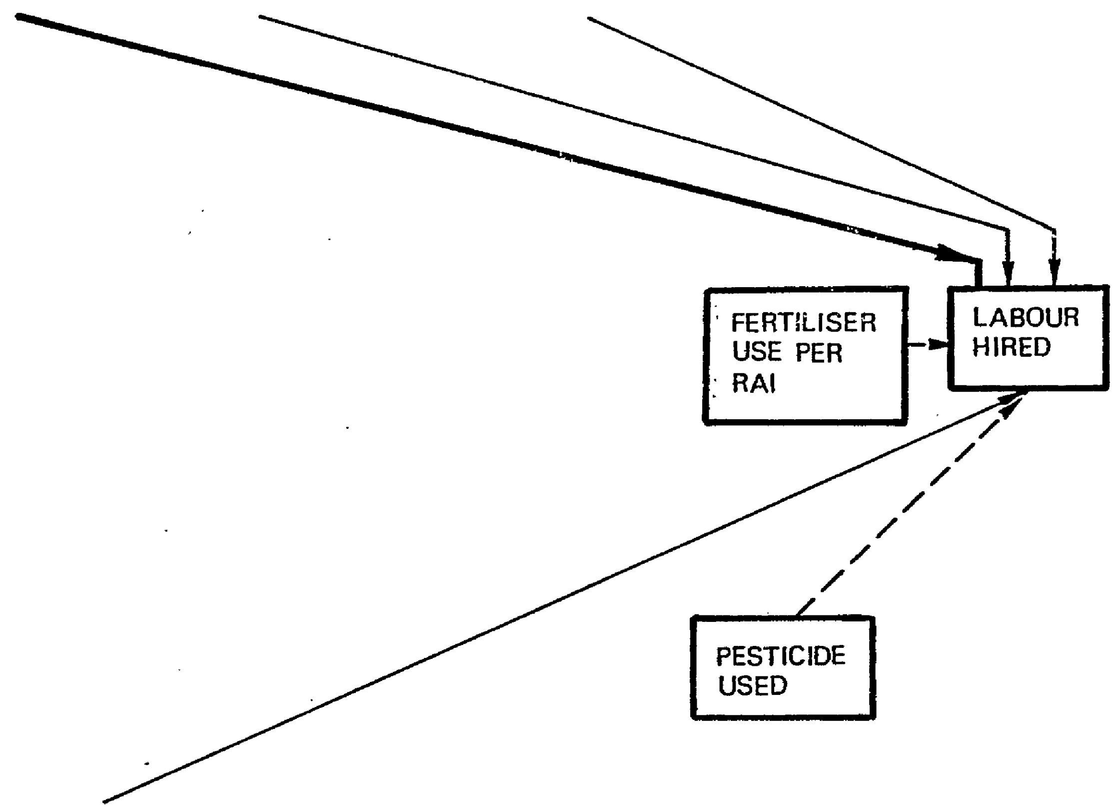


Fig. 5.3e Factors influencing, and which are influenced by ,the Labour Hired by Rai

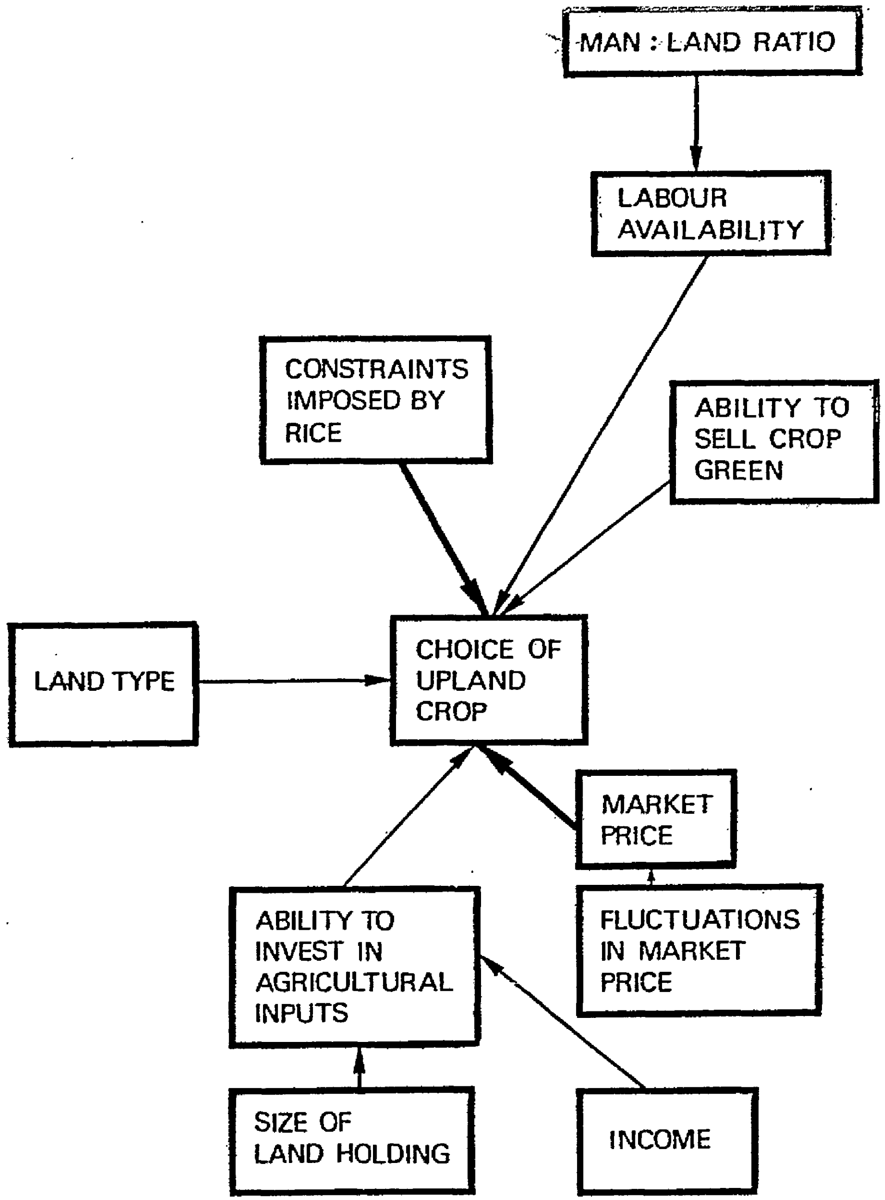


Fig. 6.1a Factors Influencing which Upland Crop to Cultivate

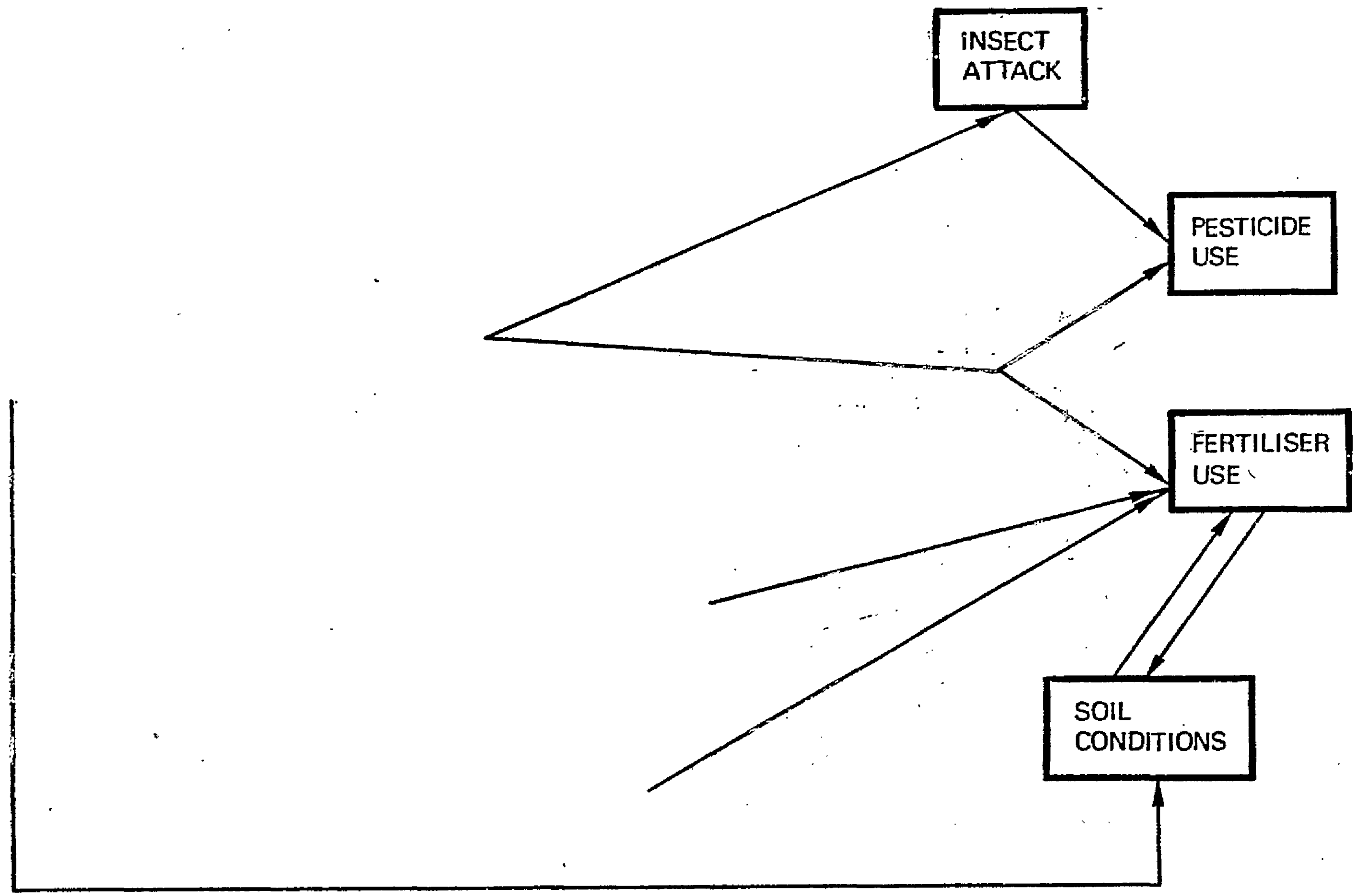


Fig. 6.1b Factors Influencing the Use of Fertilisers and Pesticides on Upland Crops

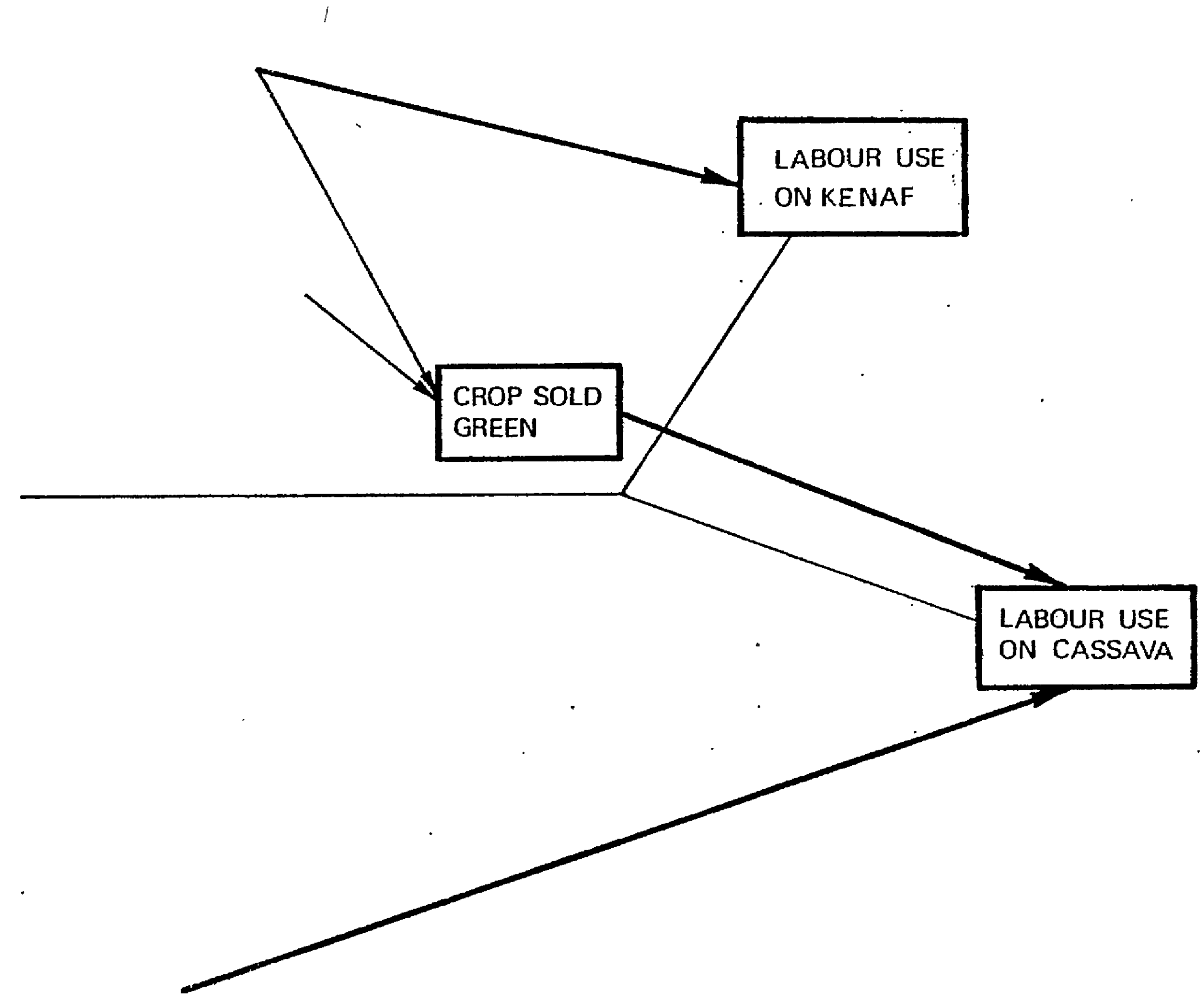


Fig.6.1c Factors Influencing the Intensity of (hired) Labour Use on Kenaf and Cassava

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Figs 6.1a; b; c.