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Community Woodlots And Their Impacts On Rural Household Fuelwood Supply And Rural Development

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COMMUNITY WOODLOTS AND THEIR IMPACTS ON RURAL HOUSEHOLD FUELWOOD SUPPLY AND RURAL DEVELOPMENT

By

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ABSTRACT

COMMUNITY WOODLOTS AND THEIR IMPACTS ON RURAL HOUSEHOLD FUELWOOD SUPPLY AND RURAL DEVELOPMENT

By

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Deforestation is a problem in many developing countries that has led to environmental degradation, loss of an ecological balance, and shortages in fuelwood supply which is a major source of energy for most household activities in rural areas. Under the social forestry scheme, community woodlots have been widely implemented in many developing countries, including Thailand, to supply fuelwood to rural communities and contribute to rural development.

The purpose of this study is to examine the effects of community woodlots on rural households' fuelwood supply and rural development. Two community woodlots in northeastern Thailand were studied, which differed in size, tree species planted, and development approaches. The study employed an ecological approach which included population, organization, environment, technology, and culture as an analytical framework.

The study demonstrated that cash income from the sales of *Eucalyptus* trees, fuelwood, and building materials were the major benefits of both community woodlots. No major differences in benefits were found among the villagers in different economic strata in the five villages studied. In both community woodlots, people participation in woodlot activities was not influenced by villagers' perception towards fuelwood shortage and the need for a woodlot. Nor was people participation necessarily affected by the involvement of villagers in the decision making process to adopt the community woodlot

project. It was also found that the numbers of tree species planted in the woodlots were not related to the amount of income generated. However, the amount of income generated was dependent on the size of woodlots.

The effectiveness of the community woodlot committees to manage the woodlots partly influenced village self-reliance on income from their community woodlots. This self-reliance on community woodlot income was also related to the size of woodlots. There was no direct relationship between self-reliance on fuelwood supply from the woodlots, the effectiveness of community woodlot committees, and woodlot size.

Both woodlots studied created some negative impacts to the project beneficiaries. These impacts included decline in soil fertility, drying up of ground water, and decrease in grasses for cattle, which were the direct effect of *Eucalyptus*. However, some respondents do like their woodlot because it provides the village a green area.

Community woodlots are one attempt to solve rural energy and forest degradation problems, and are appreciated or criticized by different groups of people for different reasons and views. This study demonstrated that community woodlot did lessen rural energy problem to some extent. The complexity of the relationships between social and biophysical factors or variables must be taken into account when studying their impacts and discussing their utility.

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EQUIVALENT

1 dollar	=	25 baht	(approximately)
1 hectare	=	6.25 rai	

CHAPTER 1

INTRODUCTION

1.1 Statement of the Problem

Awareness of the necessity to preserve, or even sometimes restore, the ecological balance of our environment has become quite acute in Thailand as in many other developing countries. Thai people, including farmers, have realized that it had become no longer possible to exploit the natural resources without threatening the physical environment, as they had been doing for centuries. This awareness, however, has come far too late - the natural forest cover of the country has already shrunk to an extent that it often leaves farmers in a difficult situation. On the other hand, no real global alternative to the traditional rural economy has been found yet.

Most of the population who reside in the rural areas in developing countries, including Thailand, depend heavily on fuelwood as their major source of household energy (World Bank:1984, Chatterji:1981). Most of the fuelwood the rural villagers collect for their household use comes from the natural forests. In Thailand, the need for fuelwood has increased faster than its rate of regeneration, due to population pressure and needs for agricultural land. Consequently, forest resources are nearly exhausted.

The rural energy crisis, more specifically the fuelwood crisis, is believed to have a direct link with environmental degradation. Fuelwood collection for household energy consumption is frequently referred to as one of the major causes of deforestation (Eckholm:1984).

The fuelwood crisis affects not only the ecological balance but also the rural life economically, socially, and culturally. Implementing social forestry projects in Thailand as in many other developing countries, was a response among others to the crisis by attempting to reverse the tendency of forest depletion. The number of social forestry projects increased as the urgency of tackling the problem seriously was felt among the

international community, the Thai authorities, and the people themselves.

The projects implemented under the social forestry scheme generally include community woodlots, farm forestry, and agroforestry. The objectives of such projects are twofold: to restore forest cover and to contribute to rural development. Concerning the first objective, reforestation constitutes an urgent and obvious need as the natural forest cover tends to disappear without being restored. Social forestry is meant to prevent the encroachment on the remaining forests and to regenerate patches of forests. The second objective (contribution to rural development) is complex and comprises several secondary objectives as follows:

- to provide energy and material to rural populations by supplying free or cheap fuelwood and wood for various purposes (building material, tools, etc.);
- to provide additional sources of food and income to rural villagers;
- to provide occasional employment in rural areas;
- to promote people participation, sense of community, and self-reliance;
- to supply the market with energy and material (NAS:1980, Evans:1982, TDRI:1990).

These objectives, not all of them being cited in individual projects, appear on paper as quite promising, and social forestry is quite often presented as a panacea to rural development by some of those in charge of forestry or rural development projects. It also is often perceived as such by the general opinion and seems to have become an alternative strategy in the circles of rural development.

Among the various types of forestry projects under the social forestry scheme, community woodlots are considered as a dominant model because they have the potential to provide benefits as described earlier and their ideal concept is to provide forestry benefits for the whole rural community rather than individuals (Evans:1982, Foley & Barnard:1984). In developing countries, the evaluation of community woodlot projects

tends to focus on the rates of new planting due to political pressure. These statistical data, though not a good measure of forestry achievement, can take on such importance that they create a need to continue with tree planting policy regardless of sensible practice. Such reasons for pursuing plantation forestry occur widely and influence some plantation programs (Evans:1982). In Thailand, very little has been done to attempt to measure the impact of the existing community woodlot projects and to evaluate the degree of success in meeting the objectives. For example, the Royal Forest Department can give statistics on the areas of land newly planted with trees and on the success, usually exclusively in financial terms, of the projects. But the data have little or no interest in their middle and long term evolution of the projects and the actual social and physical impacts. In particular, the rural development aspect of the projects is very often neglected. In other words, there are no real data and description to help make up a comprehensive picture of these projects. Consequently, it is nearly impossible to figure out on any scale if the global as well as local objectives are met, to what extent they have been achieved, if the impact is the one expected and if such experiments need redefining or even renewing.

A study of the impacts of social forestry projects thus appears as necessary, and two factors - time and space - make it possible. The first projects were implemented in Thailand some ten years ago. The comparative age of these first projects allows us to observe the evolution of the projects and their impacts in a relatively long span of time also allow us to make separate assessments at different stages because the fast-growing tree species which were planted have already yielded several crops. On the other hand, the number and variety of projects implemented all over the country make it possible for a research to exclude unrepresentative situations and select projects which, though comparable, are different enough to provide a fairly general view.

1.2 Purpose of the Study

The principle purpose of this dissertation is an attempt to complete a comprehensive study of the impacts of community woodlots on rural communities, paying special attention to the impacts on rural households' fuelwood supply and rural development as a whole. The community woodlots, in this study, refer to man-made forest plantations, not natural forests. As such, the main subjects developed will concern less the woodlots themselves than their impacts or products.

1.3 The Study Areas

It was possible to study either many projects superficially or a few projects in more detail. The latter solution was preferred for several reasons. First of all, some partial data on the projects selected, scattered here and there, are already available. Second, general data would not provide a comprehensive idea of the impacts of the community woodlot projects.

The sample area selected consists of two community woodlots situated in the Maha Sarakham province in the Northeastern region of Thailand. The first community woodlot is located in Kosumphisai district, and was initiated by the Royal Forest Department (RFD). The second community woodlot is located in Kantarawichai district, and was initiated by a non-government organization named the Population and Community Development Association (PDA). This region is relatively poor and most of the population depend on agriculture for their living. The natural forest which once covered the land has now disappeared except for a few scattered areas, and farmers face a severe shortage of wood all over the region.

Five villages are involved in the two community woodlots. A survey of the five villages was conducted by interviewing the sampled villagers about the issues concerning community woodlots and some basic household data. An in-depth interview of the

community woodlot committees was also conducted to view the overall picture of how they manage the woodlots.

1.4 Approach Employed in the Study

This dissertation employs an ecological perspective as its analytical framework, since it deals both with rural people and community woodlots. The advantage of using an ecological approach is that it allows one to view the relationship between people and the environment as interactive or interdependent. The ecological complex model focuses on four major factors: Population, Organization, Environment, and Technology. However, the environmental factor does not enter the model as a variable in this study. It is simply used as a factor to explain why community woodlot projects are promoted. The model serves to show how the rural villagers are affected by the changing environment, how they have organized themselves, what technology they employ to cope with the problems they have to face with, and what impacts occurred by applying such technology. The study views community woodlots as a technology proposed to the rural communities to alleviate the problem of rural households' fuelwood shortage and to generate income for the communities. This study added culture as another component to the ecological complex model because of the important roles of the cultural variables in many social forestry projects.

Under each component of the model, the key variables concerning community woodlot projects are identified and the relationships between the variables identified are hypothesized. In the analysis of data, each village is treated as a social system so as to examine the relationship between each village and the woodlot. A comparison across villages is then performed to understand how different villages manage the woodlots both biophysically and financially.

1.5 Organization of the Dissertation

This chapter briefly introduces the research and rationale of the study. Chapter 2 provides an overview of general energy and fuelwood issues and an overall presentation of the basic concepts of energy, forestry, and rural development as far as they concern this study. The concept of community woodlot projects as an alternative rural development strategy and the factors affecting the success and failure of the community woodlot projects are discussed. The issue of the rural energy problem, social forestry, and rural development in Thailand is also discussed. Chapter 3 is devoted to the theoretical framework used in conceptualizing the problem studied. Three components in the ecological complex model, namely population, organization, and technology, are used as a conceptual framework for the study. Cultural factors are also added to the framework. Chapter 4 presents the research methodology which includes selection of the study area, method of data collection, sampling procedure, sample size, and questionnaire. Chapter 5 describes socio-economic conditions of the province and of the villages studied as well as the historical background of the two community woodlots studied. Chapter 6 is devoted to the analysis of data and discussion of the research results. Chapter 7 presents the conclusions of the study and recommendations for further research.

CHAPTER 2

REVIEW OF LITERATURE

2.1 An Overview of General Energy and Fuelwood Issues

This research focuses on community woodlots, as both a source of renewable energy for rural households as well as their effects on rural development.

The importance of energy as a vital factor for rural development has been discussed in previous research (Earl:1975, Board:1982, Goldemberg:1987). Goldemberg (1987) stated:

> "If the world's poor are to achieve decent standards of living, developing countries must increase agricultural productivity and food distribution, deliver basic educational and medical services, establish adequate water supply and sanitation facilities, provide basic amenities, and build and operate new industries - all activities that require energy."

The basic needs in rural development are generally identified as nutrition, shelter, clothing, sanitation, health, education, and gainful employment (Goldemberg:1987). Energy is a also basic need, a means to improve quality of life and increase productivity and employment-all important to rural development (Soesastro:1980). To satisfy or improve those basic needs, energy inputs are directly or indirectly required. The shortage of energy is thus an important obstacle to rural development, contributing to the vicious cycle of poverty.

The world energy crisis began to receive wide attention in the mid-1970s due to the first oil shock in 1973 (Baxendell: 1984, Brown:1982, Hitzhusen, and Macgregor:1987). This crisis caused a tremendous economic hardship not only to the developed countries whose industries and technologies rely mostly on fossil energy but also to the developing countries who depend heavily on traditional energy and have an accelerating rate of dependence on oil-based industries for developing their modern sectors. In addition to the oil and fuelwood crises, the recent alarming rate of

deforestation in most developing countries worsens the energy-deficit situation, especially in the rural areas that are highly populated. This statement is backed by studies showing a significant relationship between deforestation and the rate of population growth (Eckholm:1984, Allen:1985, and Shepherd:1986). Eckholm (1984) noted that deforestation and the firewood crisis are obviously closely linked. More often, recent research has revealed, fuelwood scarcity is as much a consequence as a cause of deforestation."

According to a study in 1976, land clearing for agriculture and wood gathering for fuel were referred to as two principal causes of deforestation. In fact, lumber harvesting for direct or industrial use was far less significant, as a source of deforestation, on a global basis (Eckholm:1976). It was estimated that 200-250 million subsistence farmers and land-hungry migrants living in a state of shifting cultivation and rural poverty were destroying some 51,000 square kilometers of tropical forest every year, which means that the rural poor could be blamed for at least 45 per cent of the tropical forest area destroyed annually on a worldwide basis (Brownder:1989). In 1989, while agriculture, livestock expansion, and fuelwood collection were still major causes of deforestation, demand for commercial forest products or timber harvesting has gained more recognition as a cause of deforestation (World Bank:1989).

The worldwide deforestation process that we are observing is one of the major ecological catastrophes of our time. The consequences are already being felt, and these are only the ominous hints of what might take place in the future. Moreover, the alarming speed of the deterioration is a matter of serious concern as the face of whole regions or countries can change in the span of a few years. Brown (1982) noted that the most important root of the energy crisis was the dependence upon crude oil by many nations. Hosier (1982) further argued that the energy crisis in developed countries is

based on the oil-price increase while the one in developing countries is a crisis of fuelwood shortage. However, Hosier's argument is only partly true because many developing countries, (including Thailand, whose industries are oil-based) are also affected by the fluctuation of oil prices in the world market.

It is not an overstatement to say that the developing countries are faced with a two-edged sword in the field of energy: 1) the rising price of oil which reduces the potential uses of fossil fuel energy and corrodes foreign exchange reserves in oil-importing countries; and 2) deforestation which may cause a price increase or a shortage of fuels such as fuelwood and charcoal (Allen:1985). The fuelwood crisis, is the main focus of this study because about 70-80 per cent of the population in developing countries reside in rural areas, and the majority depend heavily on traditional sources of energy, most of which are renewable, such as firewood, charcoal, crop residues, and animal dung (World Bank:1984).

The use of fuelwood, which is the major energy source for most household activities, is the most immediate cause of the growing shortage of energy in rural sectors in most developing countries (Hosier:1982, Montalembert:1983, Eckholm:1984, Baxendell:1984, Blair:1988). In 1978, it was estimated that almost 60 per cent of the total volume of wood extracted in the world was used as fuelwood. Of this, 90 percent was used in the developing world (Montalembert:1983). Eckholm (1979) noted:

> "About half of all the wood cut in the world each year is burned as fuel, mainly by the one-third of humanity who still rely on firewood for cooking and heating. At least 1.5 billion people burn anywhere from one-fifth of a ton (in parts of Africa and South Asia) of wood a year, putting an awesome pressure on the world's vegetation that is often ignored in official statistics."

FAO (1983) pointed out that the problem of fuelwood use has three important dimensions: forestry, energy, and environment. That is why its role in rural energy systems must be clearly perceived as a problem not only of subsistence but also of

development. In other words, the need for forest conservation runs the risk of remaining at the stage of wishful thinking as long as the process of forest clearing is the only response to two basic needs: new means of subsistence (new land), and for resources (timber, fuelwood...).

If the need for energy is taken into account only, which is central to this study, we will see how much energy use depends on and affects the forest. It is reasonable to consider community woodlots as an appropriate means to provide renewable energy source and promote rural development because of its crucial role in providing fuel and other benefits such as income and employment for rural sectors.

The information and data of the demands, supplies, and problems of fuelwood shortage discussed here are derived from FAO, which has been continuously studying the subjects of fuelwood and charcoal for more than thirty years. Fuelwood production represented 5.4 % of world energy consumption in 1978, coming just after oil, coal, and gas (Montalembert:1983). Fuelwood accounts for more than 90% of the energy needs for 90% of the population of the developing countries (Chatterji:1981). For over 2000 million people in developing countries, of whom approximately half live in Asia, fuel and charcoal, together with agricultural residues and animal dung, have always been the most commonly used source of energy and often the only available one. Makhijani (1975) stated:

> "Wood is the poor man's oil. Throughout the underdeveloped world, men, women, and children spend a considerable portion of their time cutting trees, gathering twigs and branches, and tending fire to have the energy they need for cooking and a modicum of heat and light."

In addition, the studies that have been carried out over the past decade concluded that in most third world countries there would be continued dependence on renewable energy resources, mainly wood for fuel (Eckholm:1984, Montalembert:1983, Blair:1988).

Fuelwood obviously holds a special place in rural energy systems. FAO outlined the main characteristics of fuelwood in rural energy systems as domestic requirements and rural industries. Cooking food and heating homes, which usually account for the biggest percentage of overall energy consumption in the developing countries, are the essential elements of fuelwood for domestic requirements. For rural industries, fuelwood is important for drying tea and tobacco, smoking fish, making brick, lime kilns, smithies, potteries and various village handicrafts (Montalembert:1983). This heavy dependence on fuelwood as a source of energy is one of the main causes of deforestation, and the crisis directly affects the farmers' lives as they face a shortage of energy supply.

When fuelwood becomes scarce it can affect rural life economically, socially, and culturally (FAO/SIDA:1987). For instance, time, otherwise spent for economic purposes, is spent for gathering fuelwood, thus affecting the households' economic status (FAO/SIDA:1987). Rural dwellers, especially women and children, have to walk farther and farther to collect the bare minimum of wood needed to survive. Scarcity in fuelwood has altered the patterns in food preparation, e.g. decreased the number of times households cook their food and caused people in some areas to eat partially cooked food or cold leftovers, which affects the quality of the family's diet and health (Hoskins:1979a, FAO/SIDA:1987). In Thailand, the fire lit for a traditional ritual after childbirth to warm the mother for a number of days is reduced when fuelwood is scarce. Incomes are also affected. For instance, silk making, which requires accurately controlled temperatures, and salt making, which requires hours of boiling, are affected by fuelwood shortages. Moreover, fuelwood scarcity leads to an increase of the price of fuelwood which makes it more difficult for poor people to gather it free or at minimum cost. There is also a shift from using fuelwood to using animal dung for cooking, which otherwise would have been used as manure for agriculture (Agarwal:1986).

Fuelwood shortage also results in environmental and ecological degradation. For example, over-cutting of the remaining woody vegetation accelerates deforestation and consequently leads to soil erosion, soil sedimentation, destruction of biodiversity, and global warming (Barney:1982, Montalembert:1983, Woodwell:1983, Wilson:1985).

A study conducted by FAO (Montalembert:1983) classified world fuelwood situations into 4 categories:

> 1. Acute scarcity situations, where the wood energy balance (accessible supply minus needs) is markedly negative, and minimum energy needs could not be met, even through overcutting of existing fuelwood resources. Some 96 million people were living in a situation of acute energy shortage.
> 2. Deficit situations, where population are still able to meet their minimum fuelwood needs only by cutting in excess of sustainable supply. Some of 1052 million people were living in this situation.
> 3. Prospective deficit situations, where supplies still exceeded demand in 1980, but which in 2000 will be in a deficit situation if present trends continue. Some 280 million people were living in this situations.
> 4. Satisfactory situations, zones which on the whole will still have sufficient supplies by the year 2000.

The world fuelwood situations, particularly the first two categories, have resulted in the necessity of finding other appropriate sources of energy for the national economies in general and for rural economies in particular. These problems have drawn the attention of international governments and also international agencies for development. As a result, many forest-based rural development (FBRD) projects, including industrial forestry and social forestry, have been launched in many developing countries which produce fuelwood to supply industrial and rural energy demands and also use forests as a source of food, fodder, and supplement income for households. As early as the beginning of the 1980s, there were over 130 forestry development projects implemented in developing countries by external grants and loans of more than $750 million from eleven international donors (Foley and Barnard:1984). However, industrial forestry, whose benefits do not usually go to people living near the forests, was the most heavily funded

forestry activity compared to others (Barnes:1982).

Industrial forestry, which was once supported by Westoby (1987) as a promising strategy for national development, has been proved to be insufficient because most of the benefits did not go to the poor. As he noted,

> "Nearly all the forest and forest industry development which have taken place in the underdeveloped world over the last decades have been externally oriented, aimed at satisfying the rocketing demands of the rich, industrialized nations. The basic forest products needs of the peoples of the underdeveloped world are further from being satisfied than ever: their needs for fuel, building materials, low-cost housing, cheap furniture, industrial and cultural papers---. The much more important role which forestry could play in supporting agriculture and raising rural welfare has been either badly neglected or completely ignored---. This is why there are so few village woodlots and fuel plantation." (Westoby:1987)

However, things are beginning to change. Social or community forestry began to receive both national and international attention in the 1970s (Noronha:1982). Under social forestry schemes, village or community woodlots have become a major activity in trying to produce fuelwood in order to supply the households' energy needs in rural areas.

Community woodlot projects are one of the responses of national governments and international agencies to the energy crises confronting rural populations in developing countries. In most cases, fuelwood production has been a major objective in global forestry programs due to the aforementioned problem of fuelwood shortage (ESCAP:1982). Studies have indicated a lack of people's participation in project planning and decision making as a key factor affecting the implementation of woodlot projects. At the same time, other studies have pointed to cases of successful woodlot projects, such as community forestry in China (Eckholm:1984), Saemaul Udong movement in Korea (Gregersen:1987), and community woodlots in Gujarat, India (Blair:1988), in which active community participation and strong support from the national government were the prime movers for accomplishing the goals of woodlots projects.

On paper, these projects present many advantages:

- They give a partial solution to the problem of deforestation by planting trees and making it no longer necessary for farmers to cut down trees from natural forests. Additionally they also contribute to the forest cover of the region concerned.
- They provide wood to communities who use it to meet some of their basic needs-energy and building materials among others.
- They imply people's participation at many levels, thus reinforcing the farmers' self-reliance.
- They can play an important role in rural development.
- They usually concern the most deprived layers of the population.
- They produce energy during an energy crisis when it is scarce and expensive.

Community woodlot projects have been implemented in many African and Asian countries including Thailand. The experiences indicate that not many of these projects have been successful due to social, cultural, and political constraints (Brechin:1982, Barnes:1982, Noronha:1985, West:1985). Community woodlot projects in Thailand are not exempt from such constraints, but most studies on community woodlot projects have failed to point out how community woodlots directly improve the quality for life of rural people and how community woodlots as a source of renewable energy contribute to rural development goals.

This research attempts to explore how community woodlots benefit rural households, how community woodlot projects may help rural people meet their energy needs for the household's activities in terms of fuelwood supply, how community woodlots help accomplish rural development goals in terms of income and employment, as well as other impacts caused by introducing woodlots to the community.

2.2 Energy

Rosa, Machlis, and Keating (1988) have done an excellent review on the importance of energy to society from the point of view of ecology, economics, and sociology. Their discussion is organized into four sections: energetic theories of society, macrosociology of energy, microsociology of energy, and energy policy. Each section is chronologically reviewed.

These researchers have categorized the energetic theories into historical and contemporary versions. They reach the conclusion that most energetic theorists have failed to value fully the limits to energy growth imposed by the second law of thermodynamics (part of the energy involved in doing work is lost as heat to the surrounding environment) and have failed to take into account the vast differences in resource endowments available to, and interaction between, societies. This conclusion is particularly true for fuelwood situations (as an energy source) where the availability of fuelwood can affect the usage efficiency in the sense that people in the less serious situations might tend to use fuelwood wastefully. However, energetics did suggest a fundamental perspective: energy plays a crucial role in the link between societies and the biophysical environment.

The macrosociology of energy is discussed in terms of preindustrialization, referring to the low energy societies, and industrialization, referring to the high energy societies. For the preindustrialization stage, the relationship between energy, local ecological conditions and cultural factors is essential. This has been demonstrated by the works of Rappaport (1968), Lee (1969), Kemp (1971), and Harris (1971, 1979) who have studied how the flows of energy are conditioned by environmental circumstances and mediated by social practices.

Industrialized societies are more concerned about the relationship between energy

and economic growth. Several authors conclude that continued energy growth is essential to economic growth in industrialized societies (Schurr & Netscheret 1960, Starr 1971, Cook 1971, Linden 1975, and Allen 1979). This has also led to the conclusion that energy growth is essential to social well-being, such as health, education, and culture, as shown in the work of Mazur & Rosa (1974). From the review on the works of Makhijani & Lichtenberg (1972), Schipper & Lichtenberg (1976), and Buttel (1978,1979), Rosa concluded that there is a need in industrialized countries to reduce energy consumption through national economic and energy development policies due to the potential shortage of energy supply.

Microsociological research on energy finds its origin in the energy crisis of 1973 and in the urgency to demonstrate the relevance of social science to energy analysis and policy. Household energy consumption is the unit of analysis at this level. The two major conceptual models are economic rationality and attitude-behavior consistency models. The first model emphasizes market forces (prices) and conservation technology as an important role in energy conservation behavior, while the latter deals with the attitude of people towards energy shortage problems and how they respond to such problems. However, Stern and Oskamp (1987) suggested that economic rationality or an attitude-behavior model alone might not be sufficient to explain energy consumption patterns, conservation practices, and investment processes. The issues relating to energy and the consequent policies can be sensitive subjects in public opinion. In 1978, very little was known about public views on energy and a lot of people remained ignorant about basic energy facts. Some people did not even believe that the energy crisis was real (Warkov:1978). The knowledge of the public about energy crisis, thus, affects the policy solutions on energy.

The discussion and conclusion made by Rosa from the period of energetic

theories, to macrosociology and microsociology of energy, and energy policy, obviously indicate that many societies are facing a problem of energy scarcity which needs special attention from ordinary people to policy makers. Energy issues have become the major component of national social and economic development policies, not only in the developed but also developing countries.

In general, energy needs can be divided into three categories:

> "1. Domestic energy needs- cooking, heating, and lighting, for example.
> 2. Energy for agriculture and industry- that is, energy needs for economic growth and the creation of productive employment. Power for irrigation pumps, coke for steel production, or oil for the transportation of essential goods are examples.
> 3. Energy needs for the provision of essential social services such as education and medical care.
> Energy plays a much smaller role in the provision of social services than in the other two categories." (Makhijani:1975)

In developing countries, however, very little attention has been given to the domestic energy needs in the rural sectors where population density is relatively high. Goldemberg (1987) reported that energy planning has tended to focus on large-scale energy supply projects, such as oil refineries and central station power plants, and has not effectively dealt with the energy needs of the poor. Typically, the problems of the rural poor have been given the least attention in energy planning. The energy crisis has been seen almost exclusively as a problem of oil and other modern energy forms that shape the life styles of the elites.

Soesastro (1984) pointed out that in the past, energy was not a major concern in rural development planning. Energy problems of rural people were given attention only recently due to the effects of deforestation. Agriculture development was the primary concern for rural development. However, agriculture and energy are interrelated. Energy is necessary to agricultural production while at the same time it greatly influences the quality of rural life. Agricultural production relies greatly on energy, because increasing

production means using more energy for running irrigation pumps and for producing chemical fertilizer. More energy is also needed for processing and transporting agricultural products and for producing finished goods. To increase agricultural production, more energy must be injected into the system in the form of fertilizers, irrigation water, fuels for heating and cooking as well as modest amounts of electrical power. Energy and rural development cannot then be dissociated but must be considered as interdependent.

In Thailand the concern for energy problem stems from the concern over high prices of petroleum products and the country's dwindling forest resource. Growth of energy consumption in Thailand was rapid in the 1960s and during much of the 1970s , due to a rapidly growing economy. During the 1970s, the continued growth in energy consumption was also due to the fact that domestic energy prices were not adjusted in line with the jump in the international oil price in 1973. In 1981, the import bill from petroleum and its products matched the trade deficit at 42 per cent of the export value (Chirarattananon:1984). The point is that only a small share of petroleum products have been used in the rural sector.

The National Energy Administration (NEA) reported that commercial energy in rural areas accounts for only 13.5 per cent of the total commercial energy used and this figure includes the 4.8 per cent used in agriculture (Chirarattananon:1984). Similar to other developing countries, most of the rural population in Thailand still largely relies on the traditional energy sources of fuelwood and charcoal. Due to population pressure and needs for agricultural land, the requirement for fuelwood has increased faster than its rates of generation. As a result, rapid deforestation and depletion of forest resources have occurred. The forest area in Thailand has decreased from 209,200 square kilometers (41.00 per cent of the country total area) in 1975 to 143,417 square kilometers (27.95 per

cent of the country total area) in 1989 (Table 1).

In a 25-year period, the annual decrease in forest area has averaged 3.2 million rai (0.512 million hectares). However, reforestation of the depleted forest areas has been implemented only for 3 million rai (0.48 million hectares) in a 79-year period (1906-1985) or only 0.04 million rai (6,400 hectares) annually (Thailand:1987). Thailand has lost about 45 per cent of her forests over this 25-year period and has been categorized by FAO into the fuelwood deficit situation type.

Table 1. Population Growth and Rate of Change in Forest Land in Thailand.

Year	Population (million)	Forest Area (Sq.Km.)	%	Annual Change of Forest Area (%)
1975	-	209,000	41.00	-
1976	-	198,417	38.67	-2.33
1977	-	-	-	-
1978	45.2	175,224	34.15	-4.52
1979	46.1	170,229	33.18	-0.97
1980	47.0	165,470	32.25	-0.93
1981	47.9	160,932	31.36	-0.89
1982	48.8	156,600	30.52	-0.84
1983	49.5	154,028	30.02	-0.50
1984	50.6	151,513	29.53	-0.49
1985	51.8	149,053	29.05	-0.48
1986	52.5	149,053	29.05	0.00
1988	54.9	143,803	28.03	-1.02
1989	55.9	143,417	27.95	-0.08
1991	56.9	136,698	26.64	-1.31
1993	58.3	133,521	26.02	-0.62

Source : Forest Statistics Subdivision, Forestry Statistics of Thailand 1986, 1987, 1990, 1993 (Royal Forest Department,1986,1987,1990,1993)

There are many reasons why the country's forest is dwindling, such as shifting cultivation, needs for agricultural land, and both legal and illegal logging. With the

problem of deforestation all over the country, the rural people, who account for more than 70 per cent of total population, have been seriously affected by the scarcity of fuelwood which once was easily collected around the homestead or from the forests nearby. In Thailand fuelwood and charcoal together account for about 85 per cent of the rural household energy supply, and the major contribution of both fuelwood and charcoal is for cooking. Very little is used for heating, ironing, and fumigation (Chirarattananon:1984).

In this study the kind of energy considered is domestic energy, that is the energy used by households. The electricity used in almost every village in Thailand is hydroelectricity generated from the large dams located in different parts of the country. The most common source of energy in rural economies in the third world countries, and the one considered here, is fuelwood (charcoal or firewood) and not the commercial fuels as described in the definitions. Most of the fuelwood burned in developing countries is for household cooking and heating. For example, in Thailand, Ethiopia, Lebanon, Nepal, Sudan, and even oil-rich Nigeria, 90 per cent or more of the people cook with the traditional fuels or firewood and charcoal (Smith:1981). Although some other agricultural residues, e.g., rice straw and rice husk, are also used as energy sources, they are not included in this study as they represent but a very small portion of the whole.

It can be summarized from the above discussion that energy plays a very substantial role in economic and social development nationally. Energy is needed for national economic growth and social well-being. In developing countries where the majority of the population live in rural areas and depend upon fuelwood for their household energy supply, the problems of fuelwood shortage must be considered seriously and the needs for fuelwood must be met if social and economic development of the nations are to be achieved. Based on the definition of fuelwood given by

Montalembert (1983), fuelwood, in this dissertation, refers to **"wood and pulp material obtained from the trunks, branches and other parts of trees and shrubs to be used as fuel for cooking, heating or generating energy through direct combustion, not only in households but also in rural industries."** In this research, fuelwood, as a traditional energy input, from the community woodlots is viewed as having a major impact on the rural households and communities.

2.3 Rural Development

A large number of rural development programs, with differing concepts and strategies, have been implemented during the last few decades. Their purpose has been to upgrade the quality of life for the rural poor who make up the majority in developing countries. These development concepts and strategies have changed due to new development fashions and/or development preceptors designed to meet the needs of each country.

To understand the relationship between energy and rural development, it is crucial to discuss rural development concepts and strategies in general and how energy plays its role in the rural development context. Rural development is a very broad and abstract concept which has been used indiscriminately in most development projects implemented in rural areas. As Bryant and White (1982) noted:

> "Development is one of the most compelling concepts of our time. It provokes painful questions about values, techniques, and choices. It raises anew the classical query about the nature of the 'good society' as well as the problem of who is to decide on society's content and course. Because these are large and difficult problems, it is easy to lose them in generalizations, using the term development as a euphemism for change, modernization, or growth. Development, however, is more complex than any of these suggests."

The World Bank (1975), which has for long been involved in rural development projects all over the world, defines rural development as a strategy designed to improve the

economic and social life (increase agricultural productivity, employment and income, and provide minimum acceptable levels of food, shelter, education, and health) of the rural poor (small-scale farmers, tenants, and the landless).

Others may define rural development differently depending on different orientations or concepts. For example, Lowdermilk & Laitos (1981) defined rural development as a continuous planned social, political, and economic change in rural and urban social structures and organizations, which provide adequate incentives, production possibilities, and services to help rural people achieve higher levels of living, knowledge, and skills. FAO (1978) was more concerned with environmental problems and views the objective of development as to enable the rural populations to live a 'better life' in equilibrium with the environment and natural resources of the target area. Hoskins (1979 b) suggested a more people-oriented definition of rural development: development is not something one does to someone, but something people do themselves. A developmental role, thus, is a supportive role which facilitates local people solving their own problems in a way to gain control over their own futures. Similar to Hoskins, Bryant & White (1982) defined development as the increase of capacity of people to influence their future, which means that projects and programs not only need to accomplish physical and concrete changes, but need to do so in such a way that people have a greater capacity to choose and respond to these changes.

The examples given above reveal no standardized definition for rural development. The quoted definitions vary depending on the different objectives and perspectives of development organizations. As Kirchhofer & Mercer (1984) noted:

> "Rural development itself is like an old hat (shapeless and made to fit any head). The objectives, strategies, and target groups for rural development vary from government to government and region to region. Indeed, not all governments agree (and in fact many are opposed to the concept) that a community approach involving local people in decision making and benefit sharing, and addressing the

collective needs of the rural poor, is essential for rural development."

The issues of employment, equity, energy, and ecology are believed to be the international agenda of rural development for the remainder of the 20th century and beyond (Norman:1978). To achieve such development goals, many paths or strategies have been proposed. The evolution of development strategies began in 1969 when Agents of Change was first published. Since then, many development strategies, such as stages of growth, institution-building, grassroots approaches, integrated rural development, community development, village level projects and forests for people have emerged (Westoby:1985). Among various development strategies, economic growth as an indicator for development, which was once advocated as the best way to eradicate poverty, seems to be the most controversial. It is widely criticized for its leading to increasing inequality of income distribution, including increasing the gap between the rich and poor countries (Meadows, Meadows, Randers, and Behrens, 1972).

According to Redclift (1987), the concentration on "growth" in an economic growth model has resulted in resource depletion and unsustainable development, which has led to the emergence of the sustainable development concept in the early 1970s. On the other hand, Stockdale (1989) viewed the emergence of sustainable development as a synthesis of pro-growth and limits to growth perspectives.

Since the term "sustainable development" was launched, it has become a fashionable term used extensively by many development agencies and organizations. Because the term sustainable development has been used indiscriminately without a clearly defined concept, it is confusing and frustrating when the question is posed, "What should be sustained and how sustainable should it be?"

Repetto (1986) defined sustainable development as "...a development strategy that manages all assets, natural resources, and human resources, as well as financial and physical assets, for increasing long-term wealth and well-being. Sustainable

development, as a goal, rejects policies and practices that support current living standards by depleting the productive base, including natural resources, and that leaves future generations with poorer prospects and greater risks of our own."

According to Dixon & Fallon (1989), three distinct uses of the concept of sustainability can be identified. First, it is a purely physical concept for a single resource. In this usage, the scope is limited to particular renewable resources considered in isolation; sustainability means using no more than the annual increase in the resource without reducing the physical stock. Second, it is a physical concept for a group of resources or an ecosystem. Lastly, it is a social-physical-economic concept. The last concept is particularly important in the context of rural development because it does not consider only a sustained level of a physical stock or physical production from an ecosystem over time. It also considers some sustained increase in the level of societal and individual welfare.

Redclift (1987) noted that "...sustainable development is a concept which draws on two frequently opposed intellectual traditions: one concerned with the limits which nature presents to the human beings, the other with the potential for human material development which is locked up in nature." For a more sustainable development, Redclift further suggested that we need to consider to what extent energy is used efficiently within agriculture, and we need to consider population, together with ecological sustainability and energy efficiency. It was suggested, however, that achieving sustainable development was delayed by the overriding structures of the international economic system.

In the mid 70s, the term "alternative" development, which seriously focused on the content of development rather than the form, was promoted. According to Hettne (1982), alternative development is defined as:

-Need oriented (that is being geared to meet human needs, both material and non-material);

-Endogenous (that is, stemming from the heart of each society, which defines in sovereignty its values and the vision of its future);

-Self-reliant (that is, implying that each society relies primarily on its own strength and resources in terms of its members' energies and its natural and cultural environment);

-Ecologically sound (that is, utilizing rationally the resources of the biosphere in full awareness of the potential of local ecosystems as well as the global and local outer limits imposed on present and future generations);

-Based on structural transformation (so as to realize the conditions of self-management and participation in decision making by all those affected by it, from the rural or urban community to the world as a whole, without which the above goals could not be achieved).

Alternative development strategies have been used in various rural development projects such as irrigation, livestock, agriculture, fishery, health and nutrition, as well as forestry development projects. It has been pointed out that in such alternative development strategies, there is no universal path to development. Every society must find its own strategy (Hettne:1982) as can be seen in many developing countries which are still seeking to adapt the best development strategy for their own situation.

Very often development strategies employed by developing countries did not fully achieve development goals. As Westoby (1985) noted, many underdeveloped countries followed the changing precepts of the development establishment, "a few rich were getting richer while the poor were increasing in numbers and getting poorer."

As noted, energy has received particular attention in development circles after

the first oil crisis in 1973. The focus of energy and development has been on how energy contributes to economic growth. Studies show that there is a strong correlation between energy consumption and economic growth in terms of GNP, by comparing annual energy consumption per capita between developed and developing countries: the former consumed energy per capita many times more than the latter (Earl:1975, World Bank:1984). Some critiques were made due to the fact that fuelwood and charcoal are usually excluded from the statistics of energy use per capita, which may give a misleading impression of the stage of economic progress reached. In addition, developing countries make a greater use of forest energy as an essential part of their economy than developed countries do, but this usually non-traded commodity is not included in the calculation of GNP per capita, which consequently undervalues the real standard of economic growth reached in developing countries (Earl:1975).

In developing countries, fuelwood and charcoal are important as energy supplies for economic growth and as a renewable source of locally available energy. However, they have not received sufficient consideration in national energy planning and development policy (ESCAP:1982). It is important that in the developing countries where priority is given to rural development policy, consideration of energy needs for rural poor should be taken into account. It is also important to note that forestry cannot be divorced from development (Earl:1975, ESCAP:1982, Douglas:1983, Westoby:1985, Blair:1988). Thus the developing countries need to identify rural energy, especially fuelwood, as a major component of energy, and must form rural development policies at the national level by the cooperation of ministries or agencies which are directly involved in rural development affairs. This policy should be implemented throughout the countries, both regionally and locally, where rural energy problems exist and rural development programs are proposed.

A recent survey on the rural energy system in Thailand showed that the supply of fuelwood was estimated at 14 million cubic meters/year, while the demand was expected to be 40.21 million cubic meters/year (FAO:1982). In 1983, it was estimated that fuelwood and charcoal together accounted for 61.7 per cent of residential energy consumption in Thailand. Of this, 93 per cent was due to rural consumption. The source of fuelwood was found to be 35 per cent from the user's own land, while 14 per cent came from land belonging to other people. Forest resources accounted for 49 per cent of the total fuelwood demand. It was also estimated that by the year 2001, there will be a deficit of 36.1 million cubic meters of wood for fuelwood purposes (Tingsabadh:1987). If this trend continues, the well-being of rural people who depend heavily on fuelwood for their energy supply will deteriorate.

Thailand started its first National Economic and Social Development Plan in 1961. The main focus of the first four National Development Plans (1961-1981) were the development of infrastructure at both national and local levels to support development activities. Although good progress resulted from these efforts, current evaluations indicate that large areas of the country benefited only slightly from these early development exercises. As a result, the Fifth National Development Plan used a strategy which called more on people participation: development activities were focused at the sub-district (Tambon) level, both at initial planning stage and at the final implementation stage.

The emphasis on reforestation with fast-growing trees under community control or on "social forestry", in order to increase forest area, was recently placed in the sixth Plan (1987-1991) while people participation and self reliance are still the main focus for rural development. Tingsabadh (1987) reported that the idea of social forestry was mentioned in the natural resources and energy policies in the Sixth National Economic

and Social Development Plan of Thailand. Under the natural resources policy, the plan says:

> "Community Forestry - the government will encourage and support private/popular organizations at the local level to cooperate in afforestation and to derive benefits from the planted forests. The emphasis will be on planting of multipurpose tree species and encouragement of economic utilization of trees." (Sixth Plan, P. 236-7)

Under the energy policy, the plan says:

> "Encouragement of production and utilization of energy in rural area in appropriate forms. The government will encourage the establishment of woodlots for household and community use. It will promote private efforts at commercial afforestation and encourage the dissemination of energy conservation information relating to present use of fuels. Research on development on biomass energy will be encouraged. The use of LPG and rural electrification will also be encouraged." (Sixth Plan:338-9)

The Sixth Plan, however, still focused mainly on developing commercial energy, such as petroleum, natural gas, and lignite, which are mainly used in urban and industrial sectors. Although the government saw a need to integrate forestry as part of rural development programs, forest resource development was not clearly and sufficiently addressed under the rural development master plan in the Sixth Plan. Instead, it was only discussed under the natural resources development master plan, which has a different focus of development. Land and water resources, transportation, health, education, and agriculture were seen as more crucial for rural development.

The Seventh Plan (1992-1996) stresses development of indigenous energy resources, management of more effective energy consumption, an adjustment for energy prices to better reflect the production cost, and the promotion of competition in energy market. This plan has taken a further step regarding community forestry. It encourages an issuance of an act to ensure the consistency between natural resources conservation and changing situations. For example, the Community Forest Act should be enforced to

provide the people and private development organizations with the opportunity to legally join in forest conservation (NESDB:1991). Until recently, the contribution of the forest resource to the livelihood and welfare of the rural people and as a renewable energy input for rural development has not been fully expressed in the rural development context at policy level.

The discussion above summarizes the general concept of rural development and the evolution of rural development strategies. Forestry for rural people is one of the latest alternative development strategies which aims to help rural people have a better living by helping them meet their energy needs (fuelwood), provide food and raw materials, generate income and employment, promote self-reliance, and improve environmental conditions. The degree of achievement of such development goals varies due to how successfully forestry projects have been implemented, the most important factors to the success being the development strategy employed and the socio-cultural constraints existing in the community. The impacts on rural development goals, i.e., **income, employment, and self-reliance** created by forestry projects (community woodlots) are the key variables for the rural development context considered in this study. The next discussion focuses on social forestry and community woodlots which have been a major forestry related rural development strategy in many developing countries.

2.4 Social Forestry and Community Woodlots

Due to the energy crisis, which mainly took the form of fuelwood shortage in developing countries, and the attempts of governments to seek alternative rural development strategies to alleviate energy problems in rural areas, social forestry has come into focus as one of the most promising solutions (ESCAP:1982, Cernea:1985, West:1985). Consequently, social forestry, as an alternative rural development strategy,

is recognized worldwide. For example, the United States Agency for International Development (USAID) has shifted its focus to forestry and firewood development programs. The World Bank has announced its intention to increase its support for such activities as village woodlots, farm forestry and environmental rehabilitation. In Nairobi, the International Council for Research in Agroforestry has been set up, which is aimed at coordinating efficient land use by combining wood and food production (NAS:1980). Referring to the international development issues mentioned in the previous section (employment, equity, energy, and ecology), social forestry has a potential to create employment, provide energy for domestic consumption, and fix a degraded ecological condition. In addition, social forestry is a need-oriented approach which aims to help rural people meet their domestic energy demands in particular and to solve environmental problems in general. According to FAO (TDRI:1990), the essential benefits of social forestry include:

- Generating income and stable employment for the local people;
- Producing a sustained basis of forest products such as fuelwood, construction wood, fodder, and food for the community;
- Control of local ecological degradation and maintenance of land productivity;
- Strengthening rural community institutions.

Before further discussion, some common but confusing terms used in forestry projects are to be described. The term 'social forestry' has been defined in various ways and from different point of views. According to the World Bank (1989), social forestry is different from industrial and large-scale government forestry because it involves rural people growing trees for their own use. Social forestry seldom involves large blocks of trees or forests. Instead, it involves a few trees here and there, a small village woodlot, trees along the road and trees interspersed in fields. FAO (1978) used the term social

forestry interchangeably with 'farm and community forestry'. For Rao (1983), social forestry and community forestry are more or less the same. According to Burch (1984) social forestry covers community, farm, and subsistence forestry. The major differences among these three types of forestry projects are that community forestry is based upon growing trees on public or community land as opposed to farm and subsistence forestry, and community forestry calls for some degree of people participation whereas farm and subsistence forestry does not. Farm forestry is based upon growing trees on individual or household owned land and subsistence forestry normally refers to the practice of permitting landless people to grow trees on unowned marginal land for direct household consumption. Blair (1988) divideed social forestry into two types only, i.e., community and farm forestry. Noronha (1982) and Rao (1983) both viewed the direct participation of local people in a forestry activity which is not a large-scale industrial forestry as a key factor of social forestry. Mehl (TDRI:1990) viewed social forestry as a means to reduce forest encroachment, to promote afforestation, to reduce rural poverty through forestry, and to promote sustainable agricultural and forestry production through environmentally sound land use. Mehl also categorizes social forestry into five different forms, i.e., state owned and managed, joint management system, community concession, private owned/state regulated, and community owned and managed. Mehl describes the five different forms of social forestry as follows:

> "State owned and managed - the state owns the forest, provides most management inputs, makes the management decisions, and supervises activities in the forest. The community or communities around the forest are allowed to extract trees products and other forest goods, with the amounts controlled or supervised by the state. The community often pays for the products it extracts - either as cash payment or more commonly as labor - to help the state replant and maintain the forest. The tree products the state allows the community - fuelwood, tree fodder, some timber - are expected to meet household needs.

Joint management system - the state owns and supervises the forest. Management decisions on use of the forest, however, are split between the state and the community. The division of management responsibilities is often spatial: the community is given part of the forest area to manage while the state manages the rest. The community may have access to the state controlled area for minor forest products. The division can also be made between types of products: the state maintains control over the trees while the community is allowed to manage the rest, often for agriculture or pasture. The community is often allowed residual products, such as fallen branches or leaves, from the state's trees.

Community concession - the state remains the owner of the forest, but it grants concession rights to the community (or individual) to manage and oversee it. In this form, the state maintains regularity control and has the power to revoke the concession if the community uses the forest or land in ways contrary to the state's regulations. While the state can also provide technical and management assistance. Under this form, the community has rights to enter into commercial relations with companies.

Private owned/state regulated - nearly all forms of community forestry using private land are included in this form. The community (again, the term ' community' includes individuals) own the land, manage it, and profit from its use. The community has the rights to enter into contracts with companies or other organizations. The state may provide technical assistance (extension). More importantly, the state regulates tree production and the marketing of tree products.

Community owned and managed - the community owns the forest, manages and, most important, has regulatory control over it. The community alone has the rights to enter into commercial arrangements with the state or industries, granting the rights to use the forest. The community regulates use of the forest and can revoke the agreements if the state or companies are found to breach the community's regulations. It is essentially the reverse of the State Owned and Managed Form, with the roles of the state and the community switched. This form can be found in Papua New Guinea and in some South pacific societies."

The concept of social forestry, preferably called community forestry or communal forest by the Thais, was adopted in Thailand more than a decade ago. There is, however, no exception in Thailand on the confusion about the real meaning or precise definition of the term 'community forestry'. It seems that the concept of community forestry has been evolving based on the Thai forestry experiences. Nevertheless, many

people whose works are related to community forestry activities tend to use the definition of community forestry defined by FAO. Pragtong (1990) categorized community forestry by its purposes, namely traditional and development (Pragtong:1990). The traditional community forests which comprise sacred groves, watershed, temple forests, communal recreational areas and natural forests are mainly for conservation purposes. The development community forests are referred to as tree plantations, i.e., village woodlots for fuelwood and other forest products, school woodlots for agricultural education and lunch program for poor students, and temple woodlots for recreation and meditation. Mehl (1990) summarized that social forestry programs in Thailand have been undertaken by both the government and non-government organizations (NGOs). Among the government programs, there are several forestry programs such as forest villages, the STK land usufruct certificate program, village woodlots, forestry extension, and Isan Khiaw (Green Northeast).

According to Mehl, the **forest village** concept was first used by the Forest Industry Organization (FIO), a government forestry enterprise, as a part of its forest plantation management setup. These villages aimed to settle landless people in contiguous groups where they could earn their living as plantation laborers. Forest villages run by the FIO are exclusively for people who work in tree plantations, whereas those managed by the Royal Forest Department (RFD) are for people in remote areas, whether they are near plantations or not. In both schemes, the basic principle is to uplift the living standard of the people concerned while ensuring that natural resources such as land, forests, and water are prudently used for the lasting benefit of the nation.

The **STK Land Usufruct Certificate Program** was started in 1982 by the RFD to try a more rapid and widespread approach to help the millions of poor occupants in reserve forest areas. STK land-use rights are similar to those issued under the Forest

Village Program, but the program does not include infrastructure development and government services which are to come later under regular rural development programs. Under the STK program, RFD grants usufruct rights of 2.4 ha (15 rai) of land to each household of forest occupants. The land remains the property of the state. It can be inherited by direct descendants, but not sold, rented, given away, or mortgaged. By granting usufruct rights, the farmers are expected to gain a sense of secure possession of the land. This in turn should give them an incentive to settle on it permanently and to invest in their holdings. They are expected to switch from short-rotation field crop monocropping, with its short term financial gains but long-term environmental loss, to a more sustainable, ecological sound agricultural system that includes tree growing. By including permanent, sustainable agroforestry systems, the STK program is expected to halt further forest encroachment by reducing the need for migration to clear new productive agricultural land.

The **village woodlot** project was first initiated in Northeast Thailand by the National Energy Administration and the Royal Forest Department funded by USAID. The project, lasting from 1981 until 1984, involved planting *Eucalyptus camaldulensis* on 42 sites in fuelwood deficit areas in seven provinces. Major objectives were to provide a sustainable supply of fuelwood within the villages, thus reducing the rate of forest degradation by reducing the need for people to obtain fuelwood from forests and other state land.

Forest extension was set up by the RFD in 1979 as a pilot project based on "fuelwood plantations in combination with agroforestry and resettlement" with FAO-UNDP funding. The pilot project had four major objectives: forest rehabilitation through communal and individual tree planting, socio-economic development through an integrated forestry-related scheme, staff development for RFD community forestry

personnel, and infrastructure development in the project site. The project continued until 1986 and provided a basis for a broader forestry extension project initiated in 1987, also with FAO-UNDP support. Initial project activities include identifying RFD staff capacity in extension work, developing a skeletal forestry extension infrastructure, and testing innovative methods of community forestry extension.

Isan Khiaw was an attempt of the military to coordinate various concerned agencies to develop the water, land, and forest resources in the Northeast. The forestry component of Isan Khiaw included both reforestation of state forest lands and tree planting in villages. The reforestation of state lands was carried out by the military and the RFD, with soldiers planting seedlings supplied by the RFD. The provincial forestry officials were then responsible for maintaining the replanted areas. The community forestry program included numerous types of village and private tree planting. Trees were planted along roadsides, along waterways and ponds, in school yards and temple grounds, and in other community lands. Seedlings for the woodlots and community lands usually came from the RFD. Village woodlots like those initiated by the RFD were planted. Villagers were encouraged to plant trees in their homestead and on their farms. Villagers preferred to plant fruit trees on their homestead and farms; these seedlings were obtained from the Department of Agricultural Extension.

By 1990, there were over 200 NGOs working on forestry related issues throughout Thailand. The followings are some of the leading NGOs working on social forestry projects in Thailand: Project for Ecological Recovery (PER), Population and Community Development Association (PDA), Local Development Assistance Program (LDAP), Tree Farmers' Association of Thailand, Catholic Relief Services (CRS), and Save the Children.

The forestry related activities undertaken by different NGOs vary according to

their different objectives. For example, PER plays a major role in providing information and assistance to other NGOs working on social forestry. PDA encourages villagers to establish village woodlots, and provides training, technical, and marketing supports for the villagers. Save the Children works on agroforestry programs with both individual farmers and village community forestry groups.

Social forestry is a confusing term because it has been used interchangeably with community forestry, and sometimes referred to as community woodlots. Many books, project reports, and articles use the term social forestry when discussing community woodlots. This study, however, does not seek to generate a new definition of social forestry, but uses social forestry as an umbrella term for any forestry activity that meets the following criteria as defined on the basis of the woodlots studied :

- small scale;
- involve local people in the projects and benefit them,
- equitably distribute resources to local people;
- decentralize forestry benefits to meet local needs (McDonough:1989).

The major interest, however, will be given to community woodlots, which are sometimes called village woodlots or energy forest/plantations. They are usually considered as forestry activity under the social forestry scheme because community woodlots have characteristics that meet all criteria of social forestry as defined above. The ideal concept of community woodlots is to provide forestry benefits for the whole rural community rather than individuals (Foley & Barnard:1984). **To be clear and specific, the term community woodlot will be used for discussion in the analysis part of this research.**

It is important to state here that most community woodlot projects proposed for rural development in Thailand are the kind that are man-made and not the natural forest, and are normally termed as plantation forest. A plantation is defined as "A forest crop or

stand raised artificially, either by sowing or planting" (Ford-Robertson:1971). Its characteristics include orderliness, regularity, and relative ecological simplicity, which show it to be man-made and clearly distinguish it from natural forest. This definition is applicable to most community woodlots implemented in Thailand where a single species, *Eucalyptus camaldulensis,* is planted.

Evans (1982) noted that there are five forest types that can be identified according to their origin. First, afforestation of bare land where there has been no forest for at least 50 years. Second, reforestation of land which has carried forest within the last 50 years but where the previous crop is replaced by an essentially different one. Third, reforestation of land which has carried forest within the last 50 years by renewal of essentially the same crop as before. Fourth, forests established by natural regeneration with deliberate silvicultural intervention and assistance from man. Finally, forests which have regenerated naturally without assistance from man, e.g. most natural forests in the tropics. For Evans, only forest types in classes 1 to 3 are considered plantation.

Both community woodlot types studied in this dissertation can be put into class 2 of the above description of forest types. The areas of both woodlots were once covered with natural forests but were converted into agricultural land for cultivating kenaf and cassava, then later were replaced by *Eucalyptus* plantation.

Evans further described several benefits of plantation forestry (including village or community woodlot) to the economies of developing countries:

> "1. Resource creation, rather than solely exploitation, to meet demand for wood and wood products.
> 2. Development of a flexible resource able to yield many kind and size of products for internal demand or for export or both - village woodlots, fuelwood crops, large scale industrial plantations for pulpwood, small plantations for sawtimber, or veneer logs, etc.
> 3. Use of land often of little or no agricultural value.
> 4. Creation of employment in rural areas.

5. High level of employment per unit of investment - plantation establishment is labor intensive.
6. Use of many skills already common in agriculture, and most additional training can be done 'on the job'.
7. Extensive plantations bring development of an infrastructure of roads, communications, services, houses, shops, schools, etc., often to remote areas.
8. Important secondary benefits include integration of tree planting with other land-uses and the environmental role of forests."

The magnitude of social, cultural, and economic impacts are largely determined by the size of plantation itself. Browder (1989), however, argued that plantation forestry alone is not a panacea for Third World energy inadequacy. Nor is it always an appropriate vehicle for achieving economic development objectives. He also indicated that the economy of fuelwood plantation forestry tends to favor large enterprises over small producers, often requires government subsidization, and offers little promise of significantly serving household energy needs.

Since the 1970s, afforestation has become an important part of national forest policies for several countries, and the importance of trees and forests in the environment has become more widely realized. But much of the expansion in afforestation has been for industrial purposes, pulpwood, sawtimber, and plywood veneer. Until recently, tree planting in the tropics was almost wholly for industrial purposes, though this remains the dominant reason. Planting for firewood in agroforestry developments and for protection (to reduce soil erosion, control water run-off, combat desertification, provide shelter and shade) are all becoming increasingly important (Evans:1982).

Turning to the term community woodlot, it is defined by FAO (1978) under the heading "Small-Scale Forestry" with a single main product, normally firewood. It is also noted that:

> "Until recently, experts widely accepted the community woodlot as a dominant model in social forestry. Many of them thought that massive fuelwood planting could be best induced if large areas of communal lands were used. Therefore, introducing this model through the community as a natural social grouping

> seemed logical. Planting for social forestry was conceived, and treated operationally, as a collective activity. Social foresters emphasized establishing woodlots on communal owned land." (World Bank:1989)

On the other hand, Thaiutsa (1988) viewed community woodlots as small-scale plantations owned and operated by the community to serve the community's needs, to provide useful source of extra income, and to help the rural poor, and firewood is not necessarily the only single product of woodlots. Evan (1982) stated that community woodlots have the potential to provide fuelwood, building materials, food, fodder, grazing, salable products, and raw material not only for households but also the whole community. In addition, community woodlots can provide stable and pleasant surroundings, shade, shelter, beautification, and habitats for wildlife. It has also been pointed out that they also reduce soil erosion, local flooding frequency, downstream sedimentation in reservoirs, and ameliorate village climates (NAS:1980, Kirchhofer & Mercer:1984). Foley & Barnard (1984) stated that the involvement of poor people in tree growing and benefit sharing is the theoretical attraction of community woodlot programs. Arnold and Falconer (1987) summarized that social forestry (including community woodlots) has the potential to generate income and employment, while advocating food security. Gathering and processing forest products, such as fuelwood, fruits, resins, nuts, rattan, bamboo, and various fibers, can provide income that in turn can be used to purchase food. Often, the opportunities are seasonal and fit slack times in agriculture.

In practice, community woodlots are not all comparable in size, operating methods or management, and ownership of land (Kirchhofer & Mercer:1984, Foley & Barnard:1984). In India, for example, there are two types of community woodlots: "supervised" and "self-help." Under the supervised system, the Forestry Department undertakes the work of planting, maintenance, and protection on the land set aside by a village. After harvest, the village receives 50 per cent of the net profit. Under the self-help system, woodlots are entirely managed by the village with free seedlings and

technical advice provided by the Forestry Department, and the village receives the entire profit. In some village woodlots in Africa, while trees are planted on communal land, the individual who planted each of the trees regards herself or himself as the owner of the identifiable trees. Kirchhofer & Mercer concluded that the primary characteristics of community woodlots include collective decision making and action, and the sharing of benefits and costs by the community as a whole. West (1985) also emphasized that the main characteristic of community forestry is the collective adoption of projects. Finally, Cernea (1985) assumed that:

> "Community would influence their members to plant, would mobilize labor and promote self-help, and would collectively protect the young plantations on 'their' land. It was also assumed that they could ensure the wide distribution of benefits among the small farmers who make up the majority of the community."

It can be concluded from the above discussion that community woodlots generally have two important characteristics. First, the physical factors which are size of land, tree species, capital, materials, and labor. Second, development approaches which emphasize collective adoption, people participation, and role of local organizations in managing the woodlots. These two major characteristics make community woodlots different from other types of forestry projects because the design of community woodlot projects are normally located on public or communal lands and the projects call for collective adoption and people participation in all stages of the project cycle. Evans (1982) suggested that the projects aimed at encouraging tree planting by rural communities, like community woodlots, should include the following characteristics to ensure their success: (1) participation and involvement of the local people; (2) commitment and financial provision by government over a long period; (3) use of integrated land-use planning so that all needs are met - food, fuel, fodder, posts and poles, timber, shade, etc.; (4) provision of technical expertise; (5) institutions capable of

carrying out program requirements; (6) security of land tenure for the tree crop; (7) adequate facilities to meet requirements, e.g. nursery; (8) choice of project objectives that meet the needs of the community and reasonable expectation of villagers; (9) the period of time between the proposal being put forward and its implementation should be kept short; and (10) adequate sociological and economic information about the rural communities involved.

Most of the forestry related development projects implemented by the Thai government have mainly emphasized forest village, community woodlots, agroforestry, and watershed management. Of these projects, community woodlots have been the principal approach in producing fuelwood to supply the communities' need and encourage self reliance on the wood by rural communities. In 1981, community woodlots were first established as a component of Renewable Nonconventional Energy Projects supported by the USAID and Royal Thai Government with the following objectives:

- To provide a sustained supply of wood fuel for the communities which own a woodlot and also for the communities which do not have a woodlot;
- To lessen the pressure resulting from the cutting of trees on the public in general;
- To create employment opportunities and increase income for rural families;
- To develop techniques to be used as an important first step toward a countrywide scheme;
- To stimulate interest in tree farming by demonstrating the benefits derived from such development (RFD/NEA,1984: in Tingsabadh:1987).

Tables 2 & 3 show the number of village woodlots implemented under the Renewable Non-conventional Energy Projects from 1981-1984, and the number of target villages for village woodlot projects in 1987-1990.

A historical review of fifteen community woodlots by Saphasri and Pragtong (1983) indicated that most community woodlots in Thailand have been carried out by a number of governmental organizations, i.e., the Royal Forest Department (RFD), the Land Development Department, and the Department of Public Work. The objectives of those community woodlots were either to provide a source of fuelwood and charcoal or to supply the needs for other kinds of wood necessary to the rural communities.

In 1988, there were 17 community woodlot projects carried out by various governmental authorities (Pragtong:1988). Most of them are located in the Northeast and North of Thailand where problems of fuelwood shortage, forest encroachment, and deforestation are severe. Recently, many non-government organizations (NGOs) have also promoted community woodlot projects throughout the country, but with more focus on the conservation purposes, due to the nation-wide deforestation problem rather than promotion of fuelwood.

The Royal Forest Department and the NGOs have come to an agreement that community forests (woodlots) are the forests (woodlots) owned and managed by the rural people and for the benefits of rural people. Moreover the NGOs suggested that the real community forests (woodlots) must be concerned with the needs of villagers only.

Generally, the types of community woodlots in Thailand can be divided into the externally sponsored, where woodlots are initiated and sponsored by the external agencies, e.g., the Royal Forest Department, USAID, district officer, etc., and the locally sponsored woodlots, where villagers themselves are interested in having a woodlot.

A study (ODI:1986) reported that the major social forestry projects in Thailand are dominated by government. Land is under government ownership, and even where

Table 2. Village Woodlots Implemented by RFD and NEA, 1981-1984.

Province	1981 Sites	1981 Area(ha)	1982 Sites	1982 Area(ha)	1983 Sites	1983 Area(ha)	1984 Sites	1984 Area(ha)	Total
Maha Sarakham	-	-	1 vil (1 plot)	24.0	4 vil 2 sch 1 tem (7 plots)	92.8	2 vil 1 sch 1 tem (4 plots)	72.0	188.8
Yasothorn	-	-	6 vil (5 plots)	70.4	6 vil 6 sch 2 tem (14 plots)	87.7	3 vil 3 sch	44.9	203.0
Roi-Et	-	-	3 vil	40.0	3 vil 4 sch (7 plots)	84.8	2 vil 3 sch (5 plots)	28.8	153.6
Si sa Ket	1 vil (1 plot)	12.8	2 vil (2 plots)	32.0	3 vil 8 sch (11 plots)	80.2	6 vil (6 plots)	62.4	187.4
Khon Kaen	-	-	-	-	4 vil (4 plots)	88.0	1 vil (1 plot)	16.0	104.0
Kalasin	-	-	-	-	5 vil (4 plots)	96.0	2 vil (2 plots)	32.0	128.0
Surin	-	-	-	-	3 vil (2 plots)	32.0	1 vil (1 plot)	16.0	48.0
Total	1 plot	12.8	10 plots	166.4	48 plots	561.4	23 plots	272.2	1,012.8

Source: Derived from The 1990 TDRI Year-End Conference, Industrializing Thailand and Its Impacts on the Environment, Research Report No.2 "Deforestation and Poverty: Can Commercial and Social Forestry break the Vicious Circle?" 1990. (vil=village, sch=school, tem=temple)

Table 3. Royal Forest Department Village Woodlot Projects, Number of Target Villages, 1987-1990.

Region	1987	1988	1989	1990	Total
North	148	80	85	76	907
Northeast	200	238	238	231	907
Central	37	57	63	71	228
South	-	16	6	14	36
Total	385	391	392	392	1,560

Source: Derived from The 1990 TDRI Year-End Conference, Industrializing Thailand and Its Impacts on the Environment, Research Report No.2 "Deforestation and Poverty: Can Commercial and Social Forestry break the Vicious Circle?" 1990.

usufruct arrangements have transferred some control to households, there are stringent governmental restrictions on species selection, timing and intensity of harvest, the type of product to be extracted, and other important management decisions. It has been claimed by the RFD that most community woodlots implemented have been quite successful. Success of community woodlots, however, has been mostly determined by areas and number of trees planted, number of woodlots established, and income derived from selling trees of the woodlots.

In most countries, the lack of collective decision-making and people participation have been a major constraint to the accomplishment of community woodlot projects. People participation is another term which needs to be clearly defined, because people participation has been credited as an essential ingredient for successful development projects. But the term and scope of 'participation' are defined differently and determined by rural development practitioners. As a result, the concept of participation is diversely applied in the rural development context, which causes difficulty in implementing and evaluating projects.

People participation has different interpretations. Noronha (1982) suggested that it is important to examine who participates, both at stage of project formulation, and at stage of implementation. Hoskins (1979) referred to people participation in community woodlots in the extent of project design, implementation, and benefit sharing. The World Bank (1988) viewed people participation in four different ways: farmer contribution in resources or labor; farmer identification of project priority; farmer organizations and cooperatives; and recovery of project costs. People participation, according to Lohani (1980), had a broader range compared to the definitions defined by others and includes conceptualization and identification of problems, decision making, resources mobilization, implementation, sharing of benefits, and evaluation and control. It has also

been suggested that participation can be viewed in terms of a continuum from self-initiated action by people to action imposed on villagers from the outside (FAO/SIDA:1987) (Figure 1).

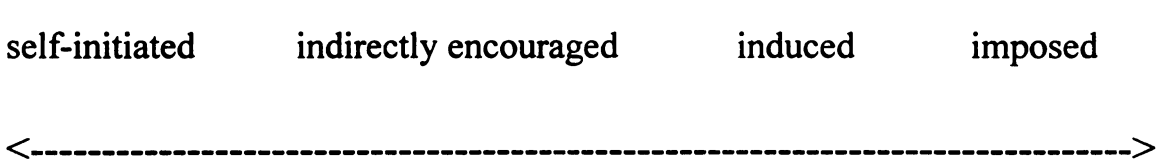


Figure 1. A Continuum of "Participation".

In reference to Figure 1, self-initiated action arises when people individually or collectively see a need to solve a common problem and feel urged to organize and plan an action themselves. An imposed action, on the other hand, is often the result of pressure by a person of authority, or a fulfillment of a past obligation without real identification with the activity.

Though criteria of people participation are established for some development projects, in practice they are not easily measured or evaluated. In community woodlot projects, people participation tends to consist of planting trees and maintaining the woodlot. Engaging the community in implementing schemes of this type is largely passive and is normally restricted to the provision of hired labor for planting, and to an agreement to cooperate to protect the plantation. The projects are normally initiated and planned by the government who also provides technical and financial supports. Inputs such as fertilizers and seedlings are provided without any outlay by the community (Foley and Barnard:1984).

Lack of participation in woodlot projects has been attributed to factors such as local organizations, land-use conflicts, perceptions toward community property

resources, genders, development approaches, labor, political commitment, and local culture (Brechin:1982, Escap:1982, Cernea:1985, FAO:1985, FAO/SIDA:1987). To entail more participation local organizations can refer to village development councils/committees, village woodlot committees, women groups, youth groups, temples, or other local institutions. Skutsch (1983) pointed out that the success of community woodlots is related to the cohesion of the village. Where local organizations are weak, it is more difficult to mobilize people participation in the projects (Kirchhofer & Mercer:1984).

The problem of land-use conflicts, in some cases, has been the result of using public land, which normally has economic value for local people, especially the poor, and which is legally owned by the government, but customarily utilized by local people. If such land is taken back by the government for community woodlot projects without local consent, the projects might be negatively affected (Foley & Barnard:1984). Bromley (1985) observed that in developing countries, changes in resource management by proclamation by the central government have created perverse incentives at the local level and have discouraged villagers from initiating local-level institutional arrangements that might improve resource use practices.

The World Bank (1989) indicated that the issue of communal land has caused social forestry programs focusing on village woodlot models using community or state lands to be less successful than programs that involve individual farms and other private lands, where costs and benefits are much more clearly defined, due to the "commons" syndrome. In other words, individuals overuse the commons since they do not own it; if they do not use it, others will. The problem of "commons" syndrome simply implies that villagers to some extent have the knowledge of zero-sum game: if someone loses, there will be someone who gains.

This issue is particularly intractable, since it runs contrary to the need for community members to cooperate in establishing woodlots, in abstaining from premature harvesting, and in protecting them from animals. Erasmus (1977) pointed out that Rural Third World people are reluctant to work for 'the Common Good' when the rewards are imprecise and uncertain: they lack incentives to participate. The same point on unclear potential benefits and difficulties in effecting equitable distribution of benefits which affect people participation was made by Chowdhry (1985). Thomson (1979) has also made a similar point with specific reference to fuelwood projects in the Sahel. Local people were reluctant to participate when the link between their efforts and their potential rewards was unclear. A good example of the problem of using communal land for tree planting was given by Cernea (1981). He reported that the underlying reasons for the failure of community forestry in the Azad Kashmir region of Pakistan was that while in legal terms Shamlat land (communal land) continued to be considered communal, in reality much of it was operated and used as private land. Thus the assumption that Shamlat land would provide benefits to the small farmers was not true. In Niger, project participants argued that reforestation was not their affair but the concern of the government because they viewed village woodlots as foresters' property. As a result, the villagers were reluctant to participate in the project (Thomson:1980).

Gender has been another factor contributing to failure of community woodlot projects. A number of West African woodlot projects have failed due to the lack of involvement of the women in projects which were located in regions where women traditionally do all crop maintenance tasks. The projects were planned with local village men who willingly planted the trees. Since women were not involved in the project the trees died from lack of care (Hoskins:1979b).

Issues of development approaches used in forestry projects have been

controversial. The top-down approach has been criticized as an inappropriate strategy for forestry projects owing to the lack of involvement of local people in identifying their real needs, selecting tree species, and formulating the projects (Hoskins:1979b). For example, in Niger, a World Bank financed rural development project, which included the establishment of 500 hectares of village woodlots, failed because the villagers themselves had not been involved in formulating the project. They uprooted the seedlings because they perceived the village woodlot area as a traditional grazing ground, access to which was now precluded because of the project (Spears:1978).

However, there was evidence, for example, in Gujarat, India that bottom-up or village self-help approach, which allowed local people to take over the organization and management of woodlots, was not very successful in terms of meeting the targets for self-reliance woodlots. The villages were not able to manage the woodlots themselves. As a result, the Forestry Department concluded that more emphasis should be placed on 'Supervised Woodlots' rather than a 'self-help' approach (Foley & Barnard:1984).

The issues of labor in community woodlot projects are the availability of labor, traditional division of labor, and whether labor should be voluntary (without payment) or paid. The example given earlier of the role of women in taking care of all crops in West African woodlot projects is related to the division of labor by sex which affected the outcome of woodlot projects. In the villages in Niger, where woodlots have succeeded, it was usually because they had been planted and managed by the Forest Department using paid labor (Foley & Barnard:1984). Government commitment and response through legislation, technical support, and financial support are believed to be major factors determining local participation (World Bank:1989). A strong political commitment of governments which resulted in the success of community forestry projects has been evident in China, Korea, and India (Eckholm:1984, Gregersen:1987, Blair:1988).

Cultural factors in terms of beliefs, values, traditions, and local knowledge can also affect people participation in community woodlot projects. Farmers are more likely to plant trees which are familiar and yield direct benefits to them. Promoting alien trees which do not match their preferences or go against their beliefs might cause a project failure. *Eucalyptus* is a good example because it has been questioned by people in many countries that promoted them for community woodlot projects. For instance, many farmers wondered if *Eucalyptus* would harm their crops, soils, and environment while the governments believed that *Eucalyptus* were appropriate for reforestation purposes. As a result, farmers did not participate in *Eucalyptus* planting projects and, more seriously, some even demolished the tree nurseries (Walsh:1989). Another example of the difference in perceptions was given by French (1986) who stated that farmers seldom perceive problems in the same way as do foresters. For example, farmers in Malawi felt that there was little urgency in planting trees for fuelwood while the government was very serious about this problem. In the Casamance region of Senegal where the forestry service encouraged planting cashews, rural people burned the trees to evict the evil spirits which these trees were reputed to shelter. In southern Niger, people refused to plant baobab even though these trees are highly valued, because of the perception that these trees are a divine gift. A farmer who grows baobabs faces the risk of tampering with the divine course of events (FAO:1985).

Similar to other countries, sociological factors such as people participation, involvement of local people in selecting tree species, local organization, and land tenure have contributed to the success or failure of community woodlots in Thailand (Thamrong Nawasawat:1986, Odi:1986, Tingsabadh:1987). For example, *Eucalyptus camaldulensis*, a dominant species once recommended by the Royal Forest Department as a promising species to be planted for firewood in the infertile soil of dry sites in Northeastern

Thailand, has become a controversial issue for its negative effects on the soils and ecology. Moreover, the actual market for the *Eucalyptus* stands are uncertain. The "*de jure*" owner of forest reserve lands (namely the government of Thailand) and the "*de facto*" controller of land (who are generally the local people who have encroached the forest land) have always been in conflict when the government wants the land for public uses. It was difficult to call for participation in some community woodlot projects due to legislative restrictions of forest reserve lands and the collective nature of people. In some villages, effective leadership and local organizations have proved to have a positive effect on community woodlots.

Given the difficulty to ensure people participation with the constraints mentioned above, some studies have indicated that farm forestry would be a better solution than community forestry for solving rural energy problems, if the local organization is weak. The justification for such beliefs is that farm forestry does not demand massive communal participation like community forestry (Thomson: 1980, Eckholm:1984, Cernea:1985, West:1985). Noronha (1982) and Brokensha (1984), however, argued that benefits from farm forestry or individual tree-planting would go to the rich or farmers who have more land while the landless, who also need fuelwood and fodder, do not generally get seedlings. Hoskins (1982) also argued that:

> "Some social scientists have gone so far as to suggest that no communal projects are possible, and that only family groups or individually owned trees will actually be maintained and distributed with equity. I would not go so far, but would caution that the model of communal woodlots is not an easy one to apply."

Although community woodlot projects might be more appropriate, they seem more difficult to implement. However if the main purpose of forestry development is to help the whole community meet their household energy needs, which includes the poor and landless farmers, rather than just individuals, then forestry development projects are

justified. Such projects hopefully will lead to a better nutritious status, higher income, improvement of ecological conditions, and the halt of deforestation.

It can be summarized that community woodlots, under social forestry program, have many advantages as compared to other types of forestry activities. Fuelwood, food, fodder, poles for construction, raw materials, income, employment, and environmental improvement are obvious examples of the benefits drawn from community woodlots. Although other types of forestry projects can provide similar benefits, community woodlots are more attractive to rural development programs in the sense that community woodlots are normally designed to benefit the whole community which includes small and landless farmers.

2.5 Objectives of the Study

There are three principle objectives of this research:

1. To describe the benefits of community woodlots to local villagers and communities.
2. To examine why community woodlots provide such benefits and how community woodlots accomplish the goals of rural development.
3. To investigate other possible impacts of community woodlot projects on households and communities.

2.6 Summary

This chapter has discussed the general energy issues and the importance of the inclusion of fuelwood in the national social and economic development policies of the developing countries whose populations rely on fuelwood as a major source of household energy. The concepts of rural energy, rural development, social forestry, and community

woodlot have also been discussed.

Social forestry is believed to be one of the most promising rural development strategies in solving the problem of deforestation, fuelwood crisis, and environmental degradation. Social forestry, especially community woodlots, is perceived as particularly important for rural development not because of its contribution to physical infrastructure but mainly because of its importance as a sustainable source of energy for rural people and of other benefits such as income, employment, food, and raw materials. These community woodlots can be viewed as a means to strengthen development processes or approaches themselves and to create some concrete outcomes such as income, employment, food, and raw materials. The review of literature in this chapter shows that the factors affecting success or failure of community woodlot projects vary from place to place and from culture to culture. From this review it is clear that to ensure the success of community woodlot projects, the socio-cultural factors must be carefully examined.

In the context of this study, community woodlots are particularly important because they are a type of technology proposed to cope with the problems of fuelwood shortage and environmental degradation. They are managed by a goal-oriented local organization called community woodlot committee with the cooperation of all the community. Though these community woodlots are expected to benefit the rural villagers in project areas, it is possible that these woodlots might also create some negative impacts to the project beneficiaries. The next chapter presents a model on how community woodlots and their effects on rural villagers and the environment can be viewed.

CHAPTER 3

THEORETICAL FRAMEWORK

In this chapter, one of the most frequently used approaches in studying the relationship between people and the environment will be discussed. It will be discussed in terms of its origin and its application to different disciplines. Then, the particular analytical framework used in this dissertation will be discussed. This analytical framework will be used in a later chapter to address the impacts of community woodlots on the rural dwellers in the villages studied. The chapter concludes with an explanation of the potential of this approach in discussing the relationship between rural villagers and community woodlots along with the research propositions.

3.1 The Ecological Approaches in Various Social Science Disciplines

Social scientists have numerous theories which provide a framework within which researchers work. To understand research problems clearly and thoroughly, and to reflect the central vision of the problems to be analyzed, an appropriate conceptual or analytical framework is needed. Because this study deals with the impacts of community woodlots on villagers and rural development, the appropriate analytical framework should encompass both social and environmental factors. An ecological framework also should help address the interrelationship between the local villagers and their community woodlots.

The ecological framework for viewing society and social problems has received increasing attention in the 1960s and 1970s. This framework applies the concept of ecology, which focuses on the relation of organisms or groups of organisms to their environment, to the study of the human social system. The ecological perspective, according to Micklin (1984), focused primarily on populations, environments, and their interrelationships. It is designed to address questions about the behavior of

organisms/populations in an environmental context. The unit of analysis can range from a specific population and its habitat to an entire ecosystem. The primary advantage of this framework is a structure that enables the researcher to include a variety of interrelated population and environmental variables at various levels, thereby allowing for the complexity of environments which can be overlooked with other frameworks.

Koppel and Schlegel (1981) reviewed major frameworks for the analysis of energy-rural development interactions in developing countries. The frameworks reviewed include socio-technical analysis, evolutionary perspectives, dependency, social impact analysis, and ecological approaches. Most reviewed frameworks have some limitations in understanding energy-rural development interactions. For example, socio-technical analysis, which focuses on the "flow" metaphor as an approach to understanding energy-rural development interactions, views the presence of rural social systems only in the form elicited by energy "flows." The evolutionary perspectives attempts to identify systematic processes underlying the distribution of technologies and patterns of technology use across geographic and social space as well as across time. Its major limitations are a tendency to improperly generalize historical patterns of energy use and social change and the misleading that results from aggregating a wide range of energy uses and fuel types in terms of a single heat measure. The dependency framework views the energy question in developing countries as an element of the international political economy. The energy-rural development interaction are seen in the context of the dynamics of underdevelopment. It is noted that this framework should place more emphasis on political interests to help distinguish those who participate in energy-related decision making from those who are affected by decisions about energy-related issues. It should also illuminate the aspects of urban-rural relationships which influence energy-rural development interactions and the interactions of those relationships with class-

related variables. Applying social impact assessment to rural energy research may encourage sensitivity to correlations between energy patterns and important rural development performance indicators such as employment, health, and income. But the lack of theory regarding energy and rural social systems is a major problem of this framework. Koppel and Schlegel (1981) concluded that the ecological approach is probably the leading candidate to use in social research on energy and rural development because it draws from a paradigm that encompasses both energy and social systems. They further suggest that applying physical and biological principles to explain social change is logical only in the ecological perspective.

In social sciences, the ecological perspective has been adopted in such disciplines geography, economics, political science, psychology, anthropology, and sociology. The purpose of the following review is to confirm the benefits of applying ecological approaches to different social science disciplines.

In **GEOGRAPHY**, the ecological perspective began to receive attention after the writing of Schnore in 1961 (Micklin:1984). According to Micklin (1984), geography can be divided into a number of specialities, e.g., physical geography, resource geography, social geography, cultural geography, and human geography. He noted that only human, social, and cultural geography reflect a concern with relationships between man and the physical environment. He further reported that the older conceptions of human geography viewed the unit of analysis as the "natural geographic region", whereas more recent approaches emphasize areas defined in terms of human activity systems. The use of an ecosystem concept was explicitly proposed by Berry (1973) who presented a "behavioral model of spatial process" which viewed the ecosystem as a product of interacting natural and cultural processes. Berry noted that with the emphasis on man's intrusion into and control of the natural environment, geographers are increasingly likely

to explain patterns of resource use and availability in terms of social organization and beliefs and perceptions. Berry's model is considered an ecological approach in the way he views the relationship between human cultural factors and the exploitation of natural resources.

Berry and Johnson (1986) stated that there are two traditions in geography in studying the human impacts on natural resources: (1) the earth science tradition of physical geographers, and (2) the "man-land" tradition of cultural geographers. The former stresses the importance of physical processes in the resource use equation and is concerned particularly with the degradation of the physical resource base. The latter tradition emphasizes the role of cultural and livelihood systems in shaping the physical environment and is more interested in the impact of environmental change on human population than on the diminution of the physical resources base. Both approaches are useful but very seldom have been effectively integrated. One of the major issues that dominates the contemporary geographic assessments of environmental change is the integration of livelihood systems into environmental and resource systems. Berry and Johnson (1986) examined various human impacts on resource systems--such as an expansion and intensification of agriculture, desertification, and irrigation--by reviewing the works of geographers and others that share a geographic perspective within a man-environment tradition. They found that the assessment of the human impacts on resources has been based on interactive man-environment model. This model rejects both environmentalism and cultural determinism and recognizes that not only do human systems modify their environment but also that natural fluctuations and rhythms affect people, which is the fundamental concept of the ecological approach. They further summarized that the works reviewed address fundamental people-environment issues, and most work starts from the utilization components of the human system rather than

from the characteristics of the physical system.

ECONOMICS: Bromley and Szarleta (1986) developed a conceptual view of the choice process central to the way in which humans (social systems) interact with the natural environment (ecosystems). They defined resource as something with value to humans, directly or indirectly, that can be controlled by humans. They also introduced the concept of "non-resources" (things that have not yet assumed economic value) and "negative resources" (things that have a negative economic value). Then they offered a "choice exchange" model which explains that the key factors involved in the human use-abuse of resources are choice, decision, values, goals, institutional rules, and systematic " control center" (the position of individual and collective choice exercised with respect to the use of a resource), vested interests, profit, and trade-off. This model can be viewed as an ecological approach because it considers resources as having neutral, positive, and negative impacts on humans. In turn, resources can be affected or controlled by humans, and humans have the choice to select any kind of resources that can fulfill their objectives.

In **POLITICAL SCIENCE**, Sprout and Sprout (1965) employed an ecological perspective. They defined the perspective in terms of the "ecological triad", environed organisms (population), milieu (environment, including social relationships), and the interrelationships between the two. These three elements constitute an ecosystem. The environed organism was described by the Sprouts as surrounded by an environment which influences, conditions or affects human values, choices, and decisions. By employing the ecological approach to discern the dynamics of foreign policy and international politics, Sprout and Sprout (1971) found that there is an increase in the likelihood of competition among nations for scarce resources. They also pointed out that there is a need for governments, the major actors in the international ecological system,

to find ways for a more equitable resource distribution.

Cadwell (1970) examined the politics of environmental policy by focusing on governmental issues related to management of the natural habitat, including resource use and environmental protection. He argued that through excessive population growth and resource destruction the ecological basis of life is in danger of being destroyed. He focused on public policy formation and enforcement as the means by which governments respond to human disruptions of the ecosystems. He also viewed nongovernmental modes of response--e.g., cultural orientations towards growth and consumption--as important conditions influencing the relationship between humans and nature. Cadwell' s perspective reflects man-environment relationships which is the basis of the ecological approach.

PSYCHOLOGY: Egon Brunswik and Roger Barker were pioneers in the application of an ecological perspective in the field of psychology. In psychology, Brunswik emphasizes the analysis of the interrelation between two systems, the environment and the behaving subject (Berry:1976). These interrelations are viewed largely as adaptive events. Brunswik viewed culture as human beings most important instrument of adaptation to a particular habitat. He includes culture as part of the overall habitat to which the individual adapts, whereas cultural ecologists consider culture as the entity which adapts to the natural habitat (Berry:1976). Though the use of the term ecology by Brunswik has not been very precise (Leeper:1966), there is a constant theme in his use of term, which indicates the relationship of culture and environment.

Barker (1963) viewed behavior as taking place within ecological units termed "behavior settings." He also viewed environment and behavior as "mutually causally related systems." Thus, the direction of the relationship between behavior and environment is not simply one way. Behavior is adaptive to environment both by

adjustment and reaction. In contrast to Brunswik, Barker recognizes the distinction between physical and sociocultural components of the environment by proposing that "people are the source of behavior variance in relatively stable environment," while in "varied and changing environments, the contribution of environmental inputs to the variance of behavior is enhanced."

An ecological perspective has also been employed in cross-cultural psychology. The interest in the ecological approach stemmed from an emphasis on cultural-behavioral relations as being insufficient in explaining cross-cultural behavior because there is a variation in natural habitats across culture. Berry (1976) suggested that three variables, i.e., ecology of the biophysical environment, culture, and behavior, must be taken into account in any satisfactory cross-cultural research. These three variables have received considerable attention in the short history of cross-cultural psychology. Ecological factors include the physical environment and the learning environment, as well as some economic and demographic features of the maintenance system. Cultural variables include the indigenous social structure and diffusions from other cultures. And the behavioral elements include both learned and innate behaviors. The behavioral element may be argued to be a matter of culture, returning as it does to group-shared forms of behavior (Whiting:1973). Edgerton (1971) was able to discern some systematic relationship among the ecological, cultural, and behavioral variables in his study of individual and group adaptations among East African pastoralists and agriculturalists. His study supports the value of the ecological approach.

ANTHROPOLOGY: Moran (1986) noted that during its early decades anthropology seemed bent on proving that environment was not very important to the way societies were constituted. However, it did not take long for anthropologists to turn their attention to the interaction between people and habitat. The influence of the

writings of Julian Steward (1938), who noted that human societies did not interact with total environments but only with particular features of it, resulted in the development of a sub-area within anthropology known under different names such as cultural ecology, ecological anthropology and human ecology, (Netting:1977, Hardesty:1977, Moran:1982). Though these three names are basically the same, it was initially called ecological anthropology to emphasize its foundations in ecological rather than anthropological theory.

According to Anderson (1973), the ecological perspectives in anthropology can be divided into three categories: cultural ecology, ethnoecology, and quasi-population or systems ecology. **Cultural ecology** is concerned with the process by which a society adapts to its environment (Steward:1955). It emphasizes the role of physical environmental factors in shaping, limiting, or determining various forms of group-shared behavior and the regularities which lie behind them (Berry:1976). According to Steward (1955), there are three fundamental procedures of cultural ecology and include three analyses: (1) the relation between environment and exploitative or productive technology; (2) the behavior patterns involved in the exploitation of a particular area by means of a particular technology; and (3) the extent to which the behavior patterns entailed in exploiting the environment affect other aspects of culture.

Essentially, there are two extremes-the weak and the strong versions of cultural ecology-between which cultural ecologists vary (Berry:1976). The "weak" version is an approach which emphasizes the functional interdependencies between physical-environmental and cultural variables. In other words, it focuses on the interrelations of cultural and environmental variables in networks and patterns of dependencies and is less concerned with establishing hard and fast causal relations. In contrast, the "strong" version is a causal approach that attempts to account for cultural origins or development.

This view claims that environmental phenomena are responsible in some manner for the origin or development of the cultural behavior under investigation. In this approach, environment is seen as strongly determining, limiting, and affecting behavior and cultural processes.

Cultural ecology is different from sociological ecology in that it attempts to identify origins of the particular cultural features of different areas rather than derive general principles applicable to any environment. It is pointed out that the cultural ecology approach is deficient in its failure to work with a theory of human behavior. Culture becomes the substitute for a behavioral analysis, which gives the impression that it is not people who are the agents of environmental impacts so much as their culture, or ways of doing things.

There are further problem with the cultural ecology model concerning natural systems or ecosystems. Humans may participate in ecosystems, but they do so out of will; they are not biologically-driven agents in natural food chains--at least, not in contemporary society (Bennett:1986). Consequently it is difficult to conceptualize the human-ecosystem interaction process; it tends to become abstract and general, not specific and concrete. This is the case because it is seen largely as a matter of the interaction of constructed second-order entities: culture, nature, etc.

Leeds (1969) employed a strong version of cultural ecology perspective in his analysis of the impact of environmental factors on the leadership structure of the Yaruro Indians of south central Venezuela. In this group there is apparently very little formal leadership, and when leaders do appear, they often seem to be ignored or play only a minor role in the life of the people. Leeds hypothesizes that ecological, geographical, and climatological features of Yaruro life led, over the years, to a system in which leaders were not especially powerful or influential because they were simply not needed.

An example of a weak cultural ecology approach is Turnbull's analyses of the Mbuti Pygmies of the Ituri Forest of northeastern Zaire, Africa (Turnbull:1961, 1968). Turnbull observed different hunting styles among various Pygmy bands. Some bands worked in a cooperative arrangement involving many people and captured animals in large nets, while others used bows and arrows and hunted in small groups. He found that there were no apparent environmental reasons that these different hunting styles should exist. The terrain, climate, and food sources were exactly the same, and the environment did not seem to place different demands on net hunters and archer hunters. Turnbull speculated that the difference in hunting technique may have arisen because so few environmental demands were placed on the people that they had the freedom to develop individualistic styles. This example illustrates the principle that, although the environment may be an important contributor to cultural practices, its influence is not simple, and it does not generally operate in a strict, one-way, wholly causal fashion.

Peterson (1979) employed a cultural ecology approach to compare territorial adaptations among desert hunter-gatherers: the Kung and the Australians. He considered the pattern of Kung territorial organization and compared it with desert Australian patterns to elucidate the nature and significance of the similarities and differences. He found out that there are some strong similarities between the two people in terms of territorial behavior and ideology. And there are also some differences, the major one being the Australians' elaborate patrilineal religious ideology of land ownership associated with the transmission of resource rights. The reasons for this difference seemed to be that if patterns of residence and descent are related, then there may be greater stability of association between people and place in Australia for an ecological reason.

Ethnoecology centers on the description and elaboration of culturally-based

cognitions or perceptions of the natural environment (Frake:1962). It generally ignores the cause and effect relationships as are considerations of ecological change. The unit of analysis of ethnoecology is a cultural vocabulary for classifying the natural environment, with little attention given to functional interrelationships with the wider ecosystem. Considering its focus, the ethnoecology approach is clearly less ecological than is cultural ecology.

Conklin (1969) employed an ethnoecological approach to study shifting agriculture in the Philippines. He examined the ethnographic data of a specific culture (the Hanunoo) of southeastern Mindoro Island in the Philippines by focusing on the local environmental conditions and their apparent modifications, and the determination of how these conditions and modifications are culturally interpreted.

The most comprehensive treatment of the ecological approach in **systems ecology** can be seen in the work of Bennett (1976). He focused on the relationships among the physical environment (soil, climate, other species), natural resources, energy and goods, social organization (population, differentiation, interaction, power, rituals), formal controls (law, regulations), values, needs, goals, technology (tools, machines) and human biology (population, physiology, genes). In Bennett' s framework, emphasis is placed on (1) "adaptive systems" that are involved in energy exchanges with the environment, and (2) the physical environment which is viewed as a variable rather than a constant in human ecological systems.

Micklin (1984) reported that Bennett's ecological paradigm reflects a complex system from which a variety of partial relationships can be isolated. For instance, production of energy and material goods feeds directly back to physical environment, and indirectly influences this environment through social organization, technology, formal control, and symbolic culture. He finally concluded that Bennett's ecological

paradigm is the first comprehensive statement of a systems approach to anthropology, and it contains ideas and concepts relevant to ecological paradigm developed in several other disciplines.

Pandey and Khanna (1990) used a systems ecology approach to develop a structural model to examine the village ecosystem of Indian villages. They pointed out that population growth and poverty in Indian villages have led to the problems of deforestation, overgrazing, pollution, and malnutrition. They emphasized that the role of afforestation policy, the ability to purchase energy, and energy efficiency must be studied critically in developing a model for an economically and ecologically self-sustained village unit. Thus Pandey and Khanna integrated the ecological and economic variables into their model. These factors include forest biomass, litter, forest land, agricultural land, degraded land, food, capital, fuel and bricks. They concluded that the model they used can help to improve the understanding and management of village ecosystem. However, the model should not be used to deal with problems for which it was not designed and for which it lacks proper state variables.

SOCIOLOGY: The ecological approach was first introduced into the field of sociology during the early part of this century by Robert E. Park, Ernest W. Burgess, and Roderick D. Mckenzie (Poston, Frisbie, and Micklin:1984). Hawley, however, was recognized as the leader in this field due to his writings and teaching, which determined and shaped the theoretical and conceptual foundations of contemporary human ecology. Hawley (1950) argued that human ecology deals with the same central issue as general ecology. From his perspective, human ecology is seen as the study of development and change in the morphology of human communities. Organization, according to Hawley (1968), is hypothesized to arise from the interaction of population and environment. Population and environment may be viewed as either independent or dependent

variables, but the relationship between the two is mediated through organization. Gibbs and Martin (1959) argued that sustenance organization is the proper subject matter of human ecology because humans survive by collective organization in exploiting natural resources.

The term "sociological human ecology" is generally used in the field of sociology to differentiate it from human ecology in anthropology, which is sometimes referred to as cultural ecology. Hawley's conceptualization of human ecology lies in four important principles: (1) the assumption that general and human ecology address the same central problem; (2) the recognition that ecological relationships reflect both competition and interdependence; (3) the view that survival of human populations is essentially a collective accomplishment, thus directing the ecologist' s attention to populations rather than individuals; and (4) the identification of sustenance activities as the principal component of ecological organization.

In recent decades, a few theoretical orientations have dominated sociological human ecology, particularly Hawley's theory of expansion, the ecological complex (as an analytical framework), and the sustenance organization model (Micklin & Choldin:1984). Hawley's **theory of expansion** deals with the process of ecological change which stimulates system growth or cumulative change (Micklin:1984). Expansion involves growth of a dominant center of activity as well as enlargement of its scope of influence. Expansion can be seen at all levels of organization--the region, the city, and the local community. When the limits of expansion are reached, equilibrium conditions tend to be reestablished.

Hawley (1972) applied his expansion theory to urban social systems and the process of urban growth. Urbanization is viewed as an expansion process and cities are examined in terms of their role as functional units in an expanding system of ecological

relationships. He emphasized the cumulative elaboration of social organization as a means of making the urban community responsive to changing environmental conditions and requirements for system survival. These changes in social organization are evident in cultural patterns, social institutions, communication and transportation technology, the functions of government, and the spatial and temporal organization of functional activity complexes.

Influenced by Hawley, Duncan (1959) developed an alternative approach to sociological human ecology called **"The Ecological Complex"**, which consists of four interdependent categories of variables: **Population, Organization, Environment, and Technology (POET)**. The ecological complex can be regarded as a system because each component in the model is assumed to be interdependent with the other. In other words, each component in the model can serve as a dependent or independent variable. The theoretical objectives of this model are to provide a framework for describing the morphology of ecological relationships and to explain the emergence and nature of organizational structure. According to Schnore (1961b), the ecological complex is "materialistic" in that ideas and ideology are essentially excluded from its purview. It gives more emphasis to the emergent properties of populations, and makes no use of individual attitudes, motivations or opinions as explanatory factors.

The contribution of the ecological complex in sociological research has been evident. For example, Duncan's study (1969) on the problem of air pollution (smog) during the last two decades in the community of Los Angeles where the smog (E) created negative effects on the population (P) (reduced visibility, eye and respiratory tract), on the environment (damaged plants), and on technology (T) (cracked rubber, accelerated the rate of deterioration of automobile tires). In response to this problem, many organizations (O) took action, and new technologies were developed to tackle the

problem (E).

Sly (1972) employed the ecological complex framework to study the migration of black males in 253 Cotton Belt counties. He hypothesized that, "The cause of organization change (O) can be found in a population's environmental (E) and technological (T) conditions." He added, "Migration (P) is a response to changes in population organization (O)." Another study by Sly and Tayman (1977) examined an environmental model of migration based on a sample of manufacturing oriented metropolitan areas. In this case environment, rather than organization, was treated as the key variable affecting migration. Organizational and technological factors were assumed to affect the dependent variable indirectly through the environment. This study showed that a different causal ordering of the ecosystem dimensions may be obtained, depending on the nature of the analytical unit under investigation.

A revision of the ecological complex has been suggested by Micklin (1973, 1977). He reduced the number of interdependent dimensions in the complex to three: population, environment, and organization. He also incorporated symbolic factors such as social values, ideologies, customs, and traditions into the model. By incorporating the symbolic factors, the revised model of Micklin abandons the purely materialistic orientation of the ecosystem framework, but introduces a qualitative dimension of the ecological complex.

It has been summarized that a very large proportion of ecological research over the past 20 years has used one or more of the concepts embodied in the ecological complex, but very few applications have taken into account all four dimensions of the ecological complex.

The **sustenance organization model** is characterized by its concern with the organizational aspects of human populations arising from their sustenance-producing

activities. These activities are necessary for the collective existence of populations and must be adapted to the changing conditions which confront them (Piston, Frisbee, and Micklin:1984). The sustenance model can be distinguished from the ecological complex model by its principal focus on the analysis of sustenance organization, with somewhat less attention given to the other ecological complex dimensions of population, environment, and technology. And it differs from Hawley's expansion model in that it does not deal with ecological change.

Gibbs and Martin (1959) suggested that there are eight dimensions involved in sustenance organization: (1) sustenance differentiation; (2) functional interdependence between sustenance activities; (3) population members in sustenance-related pursuits; (4) bureaucratization; (5) sustenance productivity; (6) efficiency of the sustenance organization; and (7) hierarchical location. It is concluded that, since 1970, there has been extensive research conducted by using the sustenance organization approach. The number of empirical investigations is impressive. However, the sustenance organization model has not been the subject of investigations utilizing its full potential and complexity.

From another point of view, Buttel (1986) reported that rural sociology has played a pioneering role in introducing ecological variables to sociological analysis. In reviewing the development of **rural sociology** and its relationship to sociology, he discussed the applicability of an ecologically-oriented rural sociology to the understanding of socioeconomic impacts on global resources by examining the general parameters of the social ecology of Latin American agricultural development. He also suggested a new development strategy based on agro-ecological theories and concepts. This strategy is known as "farming systems research" and seeks to understand the farm as integrated systems of crops, animals, and humans, with emphasis generally given to

small holder or subfamily farms.

It can be summarized that the application of an ecological framework in various social science disciplines reviewed above have included the basic notions of organism/populations, environment and interaction which are also the central issues of this dissertation. The above review demonstrates the benefits of applying ecological approaches to the study of the relationship between humans and their environment. Although the emphasis on people and environment are not balanced in most social science disciplines reviewed, due to the researcher's academic orientation and the nature of research problems, applying ecological frameworks to social science seems to be more preferable than the single discipline approach in studying people and the environment.

This dissertation adopts an ecological perspective to study the impacts of community woodlots on local people and their communities. As discussed earlier, the expansion, ecological complex, and sustenance organization models are the three major ecological approaches in sociological human ecology. The "expansion model" focuses on ecological change and the "sustenance organization model" focuses on sustenance organization, while the major interest of the "ecological complex model" deals with the way populations with technological resources at their disposal structure their organizational response to their environment (Duncan:1959). This dissertation does not deal directly with either ecological change (as a major focus of the expansion model) or sustenance organization (as a major focus of the sustenance organization model). Rather, it focuses on what technology (T) local people (populations) and community woodlot committees (organization) use to cope with the problem of fuelwood shortage (environment) and how this technology affects such populations, communities, and village development. Duncan's ecological complex model, thus, is considered as a more appropriate analytical framework due to how it treats the four variables (population,

organization, environment, and technology) equally. In addition, it also allows us to describe the relationships among the four variables on an interdependency basis, which is somewhat similar to the "weak version" of cultural ecology which suggests that it is best to examine culture/environment relations as a network of related factors, each of which can affect another. As Rambo (1983) noted, "In applying the system model of human ecology to community forestry, we are concerned with how implementation of a forestry program is affected by social factors and how forest management affects social organization and human welfare."

The next section discusses how the four components of the ecological complex are conceptualized and treated under this investigation.

3.2 The Ecological Complex Model

3.2.1 Population

Hawley (1950, 1986) defined the term "population" by quoting Boulding (1934), "A population may be defined as an aggregate of disparate items, or individuals, each one of which conforms to a given definition, retains its identity with the passage of time, and exist only during a finite interval. An individual enters a population, or is 'born', when it first conforms to the definition which identifies the population; it leaves the population or 'die' when it ceases to conform with its definition."

The term population is applicable to a great variety of collections of things. As applied to human beings, population refers to a spatially delimited aggregate of individuals. Ryder (1964) defined population along the same line with Hawley. According to Ryder, human population can be characterized by its collective attributes, e.g., size, rates of reproduction, mortality, migration, growth, sex ratio, age distribution, and density. Berry and Kasada (1977) defined population as "any internally structured

collectivity of human beings that routinely functions as a coherent entity. Poston, Frisbie, and Micklin (1984) stated that in most ecological inquiries, population enters the model mainly from the standpoint of the unit of analysis. That is ecologists will inquire about organizational, technological, and environmental attributes of human populations but are seldom concerned with their demographic characteristics.

The definitions of population reviewed above suggest that a human population involves an aggregate of individuals in a specified setting. In this investigation, population refers to people who live in the same village where a community woodlot has been implemented. However, this dissertation does not focus on the demographic variables such as age, sex composition, and mortality. It gives more attention to income and employment generated from the community woodlots to different groups of villagers in different villages, which can be viewed as population characteristics. These variables are of interest because income and employment have been claimed as one of the major benefits from the community woodlot projects.

3.2.2 Organization

In sociological human ecology, Hawley (1971) defined organization as the "entire system of interdependence among the members of a population which enables the latter to sustain itself as a unit." Duncan (1959) viewed organization as "an adaptation to the unavoidable circumstance that individuals are interdependent and that the collectivity of individuals must cope with concrete environmental conditions--including, perhaps, competition and resistance afforded by other collectivities--with whatever technological means may be at its disposal." The two views of organization are similar in terms of the emphasis on the interdependence among individuals and their ability to organize themselves for survival. But Duncan explicitly emphasized the role of environment that

leads the individuals to form an organization and the technology used to cope with such environmental conditions.

Organization, in this dissertation, is viewed as a collective action organized in response to the physical environment. In the community woodlot context, the villagers organized themselves into community woodlot committees to manage the woodlot. Thus the community woodlot committee can be viewed as a collective organization to manage and utilize community woodlots for their own benefits in terms of fuelwood supply and village development.

The community woodlot committee: The committee is a goal-oriented, local organization responsible for managing and maintaining the community woodlot. They also help organize the villagers to participate in their community woodlot.

There are two groups of community woodlot committees dealing with two different community woodlots in this study. The component to be examined is the effectiveness of the committees in managing the benefits derived from their woodlots. A discussion follows of three organizational variables included in this.

Self-reliance of the community: This dissertation also focuses on self-reliance as an attribute of organization. If humans survive by collective organization in exploiting natural resources (Gibbs and Martin:1959), self reliance can be viewed as the ability of the organization to rely on and maintain itself. In the context of this study, community self-reliance is examined not as a factor affecting the woodlot projects but as a result of the implementation of the woodlot projects. In other words, self-reliance is viewed as being effected by the proposed technology. The focus is on how the communities can rely on themselves in terms of fuelwood supply and income from community woodlots.

Development approaches: Development approaches can be viewed as a function of village organizations such as community woodlot committees. The bottom-up

approach implies more involvement of local people in the decision-making process of the community woodlot projects, while the top-down approach tends to lessen the role of local people in decision making. Thus, development approaches are considered as a organizational variable which might affect people participation.

The two community woodlots studied were differently initiated. The first one was promoted by the Thai Government, and the approach employed was somewhat top-down. The second one was initiated by a non-government organization, and the approach used was relatively bottom-up.

People participation: People participation is also included in the organizational variables under this study, due to its crucial role in the community woodlot projects reviewed in chapter 2. People participation, in this study, covers three dimensions: who, what, and how. The "who" dimension refers to the local residents who live in the villages where community woodlots have been implemented. The "what" dimension includes:

- Participation in project decision making: adoption of the project, identification of the project site, and distribution of project benefits.
- Participation in implementation: contribution of resources--labor, materials, and cash.
- Participation in project benefits: loans from the community woodlot fund, fuelwood, building materials, etc.

The "how" dimension looks at the impetus to participate: coerced, voluntary, or being hired.

3.2.3 Technology

Technology is another component in the ecological complex model. Lenski (1970) noted that it is the prime mover in the process of social change and adaptation.

Redclift (1984) cited Descartes (1968) that technology "is the application of scientific ideas to the environment, providing us with the knowledge by which we may be able to make ourselves masters and possessors of nature." Bromley (1985) viewed technology as a combination of technique and of institutional arrangements. He described that it is when institutions combine with techniques that we finally comprehend technology. For technique without institutions is inanimate and useless. Frisbie and Clark (1979) reviewed the definitions of technology given by Lenski (1970), Sjoberg (1965), Ogburn (1955), and Duncan (1959), and summarized that the definition of technology covers three dimensions: (1) material features (tools, capital, equipment, machines); (2) information (knowledge, techniques, scientific discovery); and (3) energy. Dahlberg (1986) conceptualized technology by relating it to culture and environment. He described that "technologies are shaped by culture and environment and any particular technology must be understood in terms of its cultural history and environmental setting."

It must be noted here that community woodlots can be viewed as either environment or technology. The community woodlot is a technology in the sense that it is a kind of knowledge proposed to solve the resource problem, i.e. fuelwood shortage. But once the community woodlot has been implemented, it becomes the environment of the villages, which might positively or negatively affect the populations under investigation. However, it makes more sense to view the community woodlot as a technology rather than environment because this study focuses on the impacts of the proposed community woodlots on the environment of villages. It has been discussed that community woodlots can be designed to meet different needs of rural villagers. However, most community woodlots in most developing countries including Thailand were primarily designed to supply fuelwood to rural communities. In Thailand, *Eucalyptus camaldulensis* has been the major tree species promoted by the Royal

Forestry Department to plant in the woodlots, which responds to the need for fuelwood only. If other tree species had been planted in the woodlots, other needs such as food and fodder may have also been met. These choices of tree species create different impacts on the communities. Therefore, the design of a woodlot is, in fact, the design of technology and the impact of community woodlots is the impact of technology. The size of woodlot is also part of technology design, since the larger the woodlot, the wider the impacts it may create.

3.2.4 Environment

Hawley (1968) defined environment as "whatever is external to and potentially or actually influential on a phenomenon under investigation." Hawley (1950) classified environment into two categories, i.e., inorganic and organic. The inorganic environment includes all the mechanical and nonliving conditions that surround the organism, such as light, air pressure, humidity, temperature, minerals, topography, etc. The organic environment comprises all manifestations of life whose activities impinge upon the individual or group of individuals. For humans the organic environment is composed of the vegetation which impedes movements, animals which prey upon them and upon which they prey, domesticated plants and animals, and, most important, fellow humans.

According to Micklin (1984), the environment can be divided into four categories: natural, man-made, social, and symbolic. He emphasized that the symbolic environment is of importance primarily for ecological studies of the human species.

Poston, Frisbie, and Micklin (1984) categorized environment into physical and social environments. The former refers to factors like climate, natural resources, and topography. The latter refers to other populations and organizations which influence the populations being investigated. Unlike Poston, Frisbie, and Micklin (1984), Altman and

Chemers (1984) focused only on the physical environment and divided it into the natural environment and the built environment. Natural environment refers to geographical features, such as mountains, valleys, and oceans; environmental conditions, such as temperature and rainfall; and flora and fauna. Built environment refers to the results of people's alterations of environments such as homes, cities, communities, and farms. In some cases, the built environment includes alterations of natural environmental conditions, such as artificial rainfall or pollution of air, water, and food.

Olsen (1978) classified the environment into two types: natural environment and social environment. He emphasized that human life is totally dependent on the natural environment, but individuals or organizations are inevitably forced to interact with others in their social environment.

The above definitions show that the term "environment" can be differently defined because it has no fixed content. Environments vary in scale from relatively small places, like particular woodlots and forests, to large places, such as wilderness regions. Hawley (1968) suggested that the concept of environment must be defined anew for each different object of investigation because an environment is only an environment in relation to something that it environs.

In the context of community woodlots and rural development, the condition of forest cover is an important environmental factor that leads to promotion of community woodlot projects. Normally, villagers collect fuelwood and building materials from the natural forests and from trees on farms. However, many villages now have few trees left on farms, as trees grow much slower than they are harvested. The natural forests are also degraded due to the excessive utilization by different groups of people. In some areas, the villagers are no longer allowed to collect any forest products from natural forests due to the national conservation policy. These policies make collection of fuelwood and

building materials from the natural forests or farms around the village areas more difficult. In many countries, the governments see community woodlots as an immediate solution to the problems of shortages of fuelwood and building materials at the village level. This study considers the condition of forest cover, both natural forests and trees on farms, as a characteristic of the biophysical environment that is related to shortages of fuelwood and building materials. Forest cover is treated as the frame of the study, and is viewed as an environmental factor affecting human social systems.

3.2.5 Culture

The above discussion revealed how the ecological complex can be a useful model for studying community woodlots. However, literature reviewed in chapter 2 suggested that cultural factors also contribute to the success or failure of community woodlot projects.

Cultural factors, in many studies, have been used to explain the relationship between people and their environment (Vayda & Rappaport:1976, Peterson:1979, Ingold:1979, Ellis:1989,). Micklin (1984) stated "The concept of culture is a necessary and useful element of the ecological perspective when it is applied to human ecosystem." He suggested a revision of the ecological complex model by omitting the technological variable and adding cultural variables into the model. His cultural variables included social values, ideologies, customs and traditions (Micklin:1973, 1977).

White (1975) and Goodenough (1989) also advocated the notion of interrelationships of or interaction between cultural systems and their environment. Hutterer and Rambo (1985) indicated the importance of culture in the context of technology and suggested that cultural rules and social relationships must be considered in order to understand the formal and functional configuration of a particular

technological system.

According to Altman and Chemers (1984), culture refers to "beliefs and perceptions, values and norms, customs and behaviors of a group or society." This study emphasizes perception as a cultural variable, because people perceive their environment differently. This is because people receive information about the environment from their senses, then process and organize it in ways that are meaningful to them and to their lives. What becomes meaningful, consistent, and appropriate is heavily influenced by their cultural experiences (Altman and Chemers:1984).

Villagers seldom perceive problems in the same way as do foresters. In some countries, the government was quite concerned about fuelwood problem while farmers felt that there was little urgency in planting trees for fuelwood as it was still available in the natural forests or on farms. Generally, fuelwood shortages can be measured by studying the demand and supply of fuelwood. Villagers' perceptions of the shortage can also be measured. However, perceptions are not objective measures of the presence or absence of fuelwood but rather cultural measurement. This study deliberately introduces culture as an additional variable into the ecological complex model. In the community woodlot context, perceptions of villagers toward their natural environment, defined as forest cover, in terms of the availability of fuelwood or fuelwood shortage, and toward the need of a community woodlot in terms of the expected benefits, are important factors which might affect their participation in woodlot projects.

3.2.6 Study Model

To illustrate the variables and their interactions, a model is presented in Figures 2 & 3. The major components of the ecological complex model are viewed as interactive. Figure 2 shows population, organization, technology, and culture as components in a

social system, which have interrelationships among themselves within the natural environment. Figure 3 shows the variables being studied under each component of the model. Figure 4 illustrates why community woodlots as a proposed technology accomplish or do not accomplish the goals of rural development. Development approaches, villagers' perception toward community woodlots and fuelwood shortage, diversity of tree species, sizes of community woodlots, and community woodlot committees are considered as independent variables, whereas people participation, income and employment, and self-reliance are dependent variables. The arrows in the diagram show that different dependent variables are affected by different independent variables. For instance, people participation in a community woodlot project is seen as influenced by development approaches and villagers' perceptions toward community woodlots and availability of fuelwood in the environment. The relationships among the key variables in Figure 4 are based on the following research propositions:

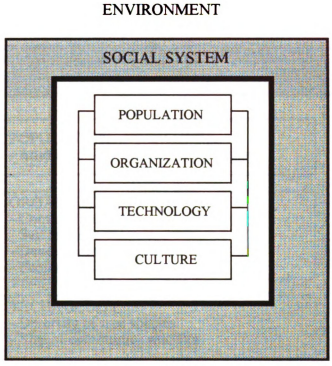


Figure 2. The Relationships among Population, Organization, Technology, Culture, and Environment Viewed as the Relationship between Social System and the Environment.

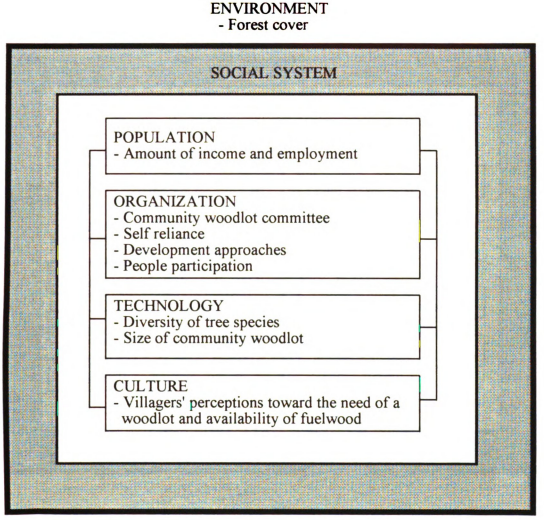


Figure 3. Description of Variables in Model Components.

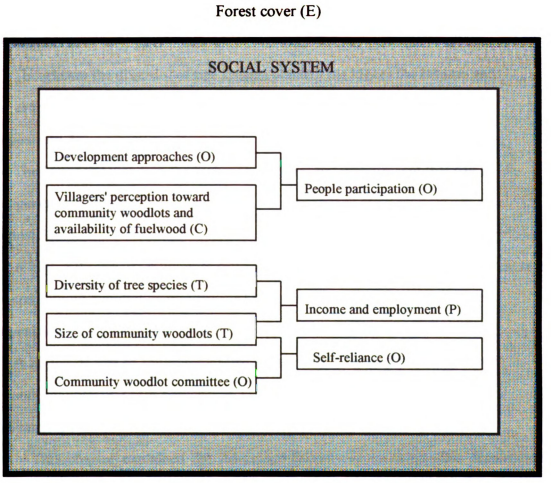


Figure 4. The Relationships among Dependent Variables and Independent Variables in Model.

Proposition 1.

- The degree of people participation in community woodlot projects will be higher if the villagers perceive fuelwood shortage as a problem, if community woodlots are needed, and if villagers are involved in making decisions to adopt the project (bottom-up approach).

Proposition 2.

- The greater the diversity of tree species planted, the higher the income and employment that can be generated.

Proposition 3.

- The larger the woodlot, the higher the income and employment that can be generated.

Proposition 4.

- A higher degree of community self-reliance will be achieved if the effectiveness of community woodlot committees is higher in terms of managing woodlots.

Proposition 5.

- A higher degree of community self-reliance will be achieved if the size of community woodlot is bigger.

3.3 Summary

This chapter explained the theoretical framework on which this dissertation is based. It began by reviewing the application of ecological approaches to study the relationships between humans and the environment in different social science disciplines. Then, the ecological complex model as applied to this study was discussed. The key variables in studying the impacts of community woodlot projects were identified and placed into the model. Finally, the research propositions, based on the key variables identified, were presented.

CHAPTER 4

RESEARCH METHODOLOGY

This chapter discusses the methodology of this research. It presents the study area selection, the method of data collecting, the sampling procedure and sample size, the method of data analysis, and the construction of questionnaires.

4.1 Selection of the Study Areas

As discussed in the review of literature, the concepts of social or community forestry in Thailand vary in space and time. Community or village woodlots are frequently referred to as forestry development projects at both the grassroots and policy levels under the social or community forestry program. To select an appropriate site for this study, it was important that community woodlot projects in the proposed study area be in place long enough to create some impacts on the community. To match the objectives of this research, the development community forests by the Royal Forest Department of Thailand seemed to be the most appropriate type of community woodlots for this study because these woodlots are primarily planned for promoting fuelwood and generating income for rural residents, unlike the traditional community forests which solely aim at the natural conservation. In other words, **community woodlots in this study are the plantations not the natural forests.** In addition, because community woodlots in Thailand are operated in many different ways, with different concepts, and by different organizations, a case study of a single community woodlot would not be a good representative to generalize how community woodlots help achieve rural development goals.

To distinguish what is general from what is specific to a single community, a comparison of two different community woodlots was conducted. Two community woodlots proposed and implemented by two different agencies with different major

objectives and different approaches were selected for a comparative purpose. Both villages are located in the same province, but different districts, in Northeastern Thailand.

The first community woodlot named Kok Peeba, located at Lao sub-district, Kosumphisai district, Maha Sarakham Province, has the following characteristics:

- the community woodlot was a demonstration project implemented in 1982 by the Royal Forest Department with funding from USAID to promote fuelwood production as a component of Renewable Nonconventional Energy Projects;
- *Eucalyptus camaldulensis* was the only tree species planted;
- the community woodlot officially belongs to two villages, but the benefits are shared among four villages;
- the public land used for the community woodlot is large (approximately 800 rai or 128 hectares).

The second community woodlot is located at Ban Don Bark, Srisuk sub-district, Kantarawichai district, Maha Sarakham province and has the following characteristics:

- the community woodlot project was initiated in 1986 by the Population and Community Development Association (PDA), a non-government organization, as part of its community development program;
- there are more tree species than in the first community woodlot. The trees planted are *Eucalyptus, Acacia auriculiformis, Leucaena leucocephala*, and *Cassia siamea* (Khilek);
- the woodlot belongs to only one village;
- the public land used for the community woodlot is relatively small (approximately 55 rai or 8.8 hectares).

The different characteristics of these two community woodlots made it possible to

examine the differences of both the social and physical factors in terms of people participation, development approaches, woodlot management, diversity of tree species, woodlot size and their affects on the accomplishment of community woodlots and of rural development goals.

4.2 Method of Data Collection

Considering the fact that the two selected community woodlots have been implemented for several years, some studies and research have already been conducted by various agencies. Data on the project background of both community woodlots are already available in the research reports written by the Royal Forest Department, Chulalongkorn University Social Research Institute, and the Research and Development Institute of Khon Kaen University. These research reports were used as secondary data after verification. Data derived from this secondary source, however, were verified by cross-checking with field data.

Due to the amount of work and time constraints, the community-based approach or anthropological participant observation were considered not appropriate for collecting primary data for this comparative study. A formal survey of households coupled with an in-depth interview of the community woodlot committee and local leaders were conducted because it took less time, especially when more villages were studied. However, observations on the use of fuelwood and other forest products from community woodlots and activities related to village woodlots were also made during the 1-2 month stay in the villages. In addition, an investigation on the physical characteristic of the community woodlots such as conditions of trees and soil, agroforestry practices, and maintenance of woodlot, was also performed.

In Thailand, household heads can be men or women. Generally, the oldest male in

the family is considered the household head. Women are considered household heads if they are divorced, their husbands passed away, or their husbands went away for employment. The respondents were randomly sampled from the list of household heads. First, the household heads were classified into three different economic strata. Then 15 per cent of the total households from each economic stratum were randomly selected. Both male and female household heads were qualified as interviewees in this survey if they were informative about their woodlot. Initially, the household heads were asked whether they would be able to answer the questions concerning their community woodlot and the interview was performed only if they said yes. In most cases, the spouses of male household heads also helped answer the questions if they were together at the time of interview. The female respondents were selected as samples in two occasions: (1) when the women themselves were household heads, and (2) when their husbands were absent. It happened that quite a few male household heads were absent during the survey. Thus, their wives were asked whether they would be able to answer the questions in relation to their community woodlot. If their wives responded that they were, they were interviewed instead of their husbands. For in-depth interviews, all members of the community woodlot committees were interviewed individually or collectively. Informal discussions under the form of conversation with small groups of villagers and community woodlot committee members were also made whenever possible.

4.3 Data Collecting Procedure

The data collecting procedure is summarized as follows:

1. Meetings were made with resource persons involved in the field of social forestry in Thailand. These resource persons worked at the Food and Agriculture Organization, Bangkok office (FAO), Royal Forest Department (RFD), Population and

Community Development Association (PDA), Chulalongkorn, Kasetsart, and Khon Kaen universities. The purpose of these meetings was to find out the current situation of social forestry in Thailand and also to determine the study area for this research. The original research plan was to conduct a case study of one community woodlot. Having talked with the resource persons, the original plan was changed to a comparative study of two community woodlots. This idea was based on the fact that social forestry projects (preferably called community forestry in Thailand) are so fashionable that many organizations (both governmental and nongovernmental) are now working on social forestry-related projects with different approaches. Once the decision to do a comparative study of two community woodlots had been made, the next step was to select the study areas (criteria for selecting the study area has already been discussed earlier in this chapter).

2. Literature was reviewed related to the selected community woodlot projects. These secondary data were derived from Chulalongkorn University Social Research Institute (CUSRI), Research and Development Institute (RDI) of Khon Kaen University, and Population and Community Development Association (PDA). In 1980, CUSRI conducted a regional baseline survey, mainly on socio-economic aspects of the sampled villages, for a project on Renewable Nonconventional Energy sponsored by USAID through the National Energy Administration (NEA) of Thailand. Kok Peeba public land of Lao sub-district, Kosumphisai district, Maha Sarakham province was one of the public lands selected as pilot projects for community woodlots. The Kok Peeba community woodlot has been claimed as the most financially successful community woodlot. A report on the historical background of the Kok Peeba community woodlot and socio-economic data of the villages involved in this woodlot is available at CUSRI and was partly used for this study. In 1989, RDI was hired by PDA to conduct an evaluation of

community woodlot projects implemented in their responsible areas covering Buri Ram, Khon Kaen, and Maha Sarakham provinces. The Nong E-Jone community woodlot of Ban Don Bark, Srisuk sub-district, Kantarawichai district, Maha Sarakham province was one of the nine villages sampled for this project evaluation from the total of 33 villages. The evaluation report provided information on how Nong E-Jone woodlot was established, general characteristics of the village, the community woodlot committee, and the perceived impacts of the woodlot. This report was derived from PDA main office in Bangkok.

3. Interviews were conducted of both the forestry officials of RFD and PDA who are responsible for the selected community woodlot projects and the village headmen of the villages studied. Two visits were made to both Bangkok and local offices of the RFD and PDA to get some ideas about the background information of the two community woodlots studied and to find out if they still have any on-going activities in those woodlots. It was found out at this stage that after the implementation of projects both the RFD and PDA had turned over their responsibilities to the community woodlot committees and that their staff occasionally visited the community woodlots. Staff of the PDA were able to visit their woodlot more frequently than of the RFD because the PDA has more staff working at field level and their woodlot projects are relatively new, thus they still need monitoring. In contrast, the RFD has only one district forestry officer who is responsible for the whole district, and Kok Peeba is already a mature woodlot. Meetings with the village headmen and some key informants were also made to inform them of the purpose of the visits and the objectives of this research. Some preliminary data of the villages were also collected at this time.

4. Construction of questionnaire. The questionnaire for household survey, in fact, was formulated little by little from the very beginning of the research process. Some

questions were added or eliminated after some preliminary data had been collected (the topics covered in the questionnaire are presented later in this chapter). Comments on the first draft of questionnaire were also made by an American survey expert who was working in Thailand at that time.

5. Pretest and correction of the questionnaire. The pretest of the questionnaire was conducted in both community woodlot projects. Two villagers in each village were interviewed by using the draft questionnaire. In total, ten villagers were interviewed for the pretest, eight villagers in Kok Peeba and two villagers in Nong E-Jone woodlot projects. The pretest was completed in January 1991. Only minor changes were made after the pretest.

6. Determining sampling method and sample size. After conversations with the village headman and other community woodlot committees had been made in all five villages, it was decided that proportionate stratified random sampling would be used to ensure the representativeness of samples drawn from the different economic strata. Then the sample size was determined (see details in the next section).

7. Primary data by household survey was collected in April 1991. Ban Don Bark, Kantarawichai district, was the first village to be surveyed. Surveys of the other four villages in Kosumphisai district were completed later.

8. In-depth interviews of community woodlot committee members were also conducted in April 1991 while doing the household survey. There was no fix schedule for the interview of community woodlot committees. The interviews were done whenever the opportunity arose. Visits to both community woodlots to investigate the physical condition (soil, undergrowth, and *Eucalyptus* mushroom) of the woodlots were also made at this time.

9. Verification of the data collected from different sources. After completing the

household survey, the data collected from villages were compared with the data derived from other sources. Only little inconsistency of data on demographics (numbers of households) and the establishment of community woodlots was found.

After the household survey had been completed, three more visits were made to the villages and to both community woodlots to collect additional data on the management of income from the last sale of trees, and on the collection of fuelwood from the woodlot. The purpose of later visits was also to follow up the woodlot activities. The last visit was made in October 1991.

4.4 Sampling Procedure and Sample Size

The sampling procedure was designed to cover the whole range of target groups in the selected villages as one of the major objectives of this study is to investigate the impacts of woodlots on households and the community as a whole. An approach called "Wealth Ranking Technique" was employed. This technique was developed by Gradin (1988) to categorize villagers into different economic strata by using the local concept of wealth. The key informants were asked to classify villagers into different economic strata. Gradin (1988) noted that:

> "Wealth ranking is a community-based activity. The households ranked should be members of the same community, whether it is defined, for example, as a village, a neighborhood, a ward or a group ranch. They are people who live near each other, help each other, attend each others' ceremonies and so on. As a result of close interaction (and gossiping) they know each other well."

However, this study did not follow every step of wealth ranking technique described by Gradin because some villages studied are relatively large, making it impossible for the key informants to rank all households in order. Thus they were asked to group the households into three different economic strata based on their own local concept of wealth. First, the lists of households of the five villages studied were derived

from the district offices. Then the names of household head in each list, from the first to the last, were referred to while doing economic classification with the village headmen and some key informants. The classification method was simple. One by one, every name of the household head in the list was mentioned, and then the village headman and key informants discussed in what appropriate economic strata the name referred to should be placed. Most of the time, they had no difficulty in placing the names of villagers into a certain economic strata. In a few cases they had different opinions on what economic strata should be the most appropriate for the name mentioned. When this happened, they discussed and gave reasons why they thought the name referred to should be place in such economic strata and finally reached the consensus. Village headmen and key informants of Ban Yang Sinchai and Ban Nong Had were asked to classify their villagers together because these two villages are neighbors and they used the same wealth criteria for the classification. The same thing was done for Ban Don Gloy 6 and Ban Don Gloy 17 which are neighboring villages, but located about 5 kilometers from Ban Yang Sinchai and Ban Nong Had. Ban Don Bark, which is located in a different district, was the last village to do economic classification.

It appeared that the criteria used for wealth classification relied on the size of land owned, income, and number of buffaloes owned. The villagers who owned more buffaloes were perceived as richer farmers. The quality of the land is not decisive. The villagers who owned less farmland might not be considered poor farmers, if they have other sources of income. There were a few individual exceptions who have an extra source of income (the school masters, the owners of the village shop). The information given by the key informants was then checked and sometimes corrected with the individual interviewees concerning the size of farmland owned and the existence of extra income. However, no attempt was made to define with precision the income of the

interviewees. In summary, the size of farmland owned, income, and the number of buffaloes were the criteria used in classifying the villagers into different economic strata.

It was found that the sizes of farmland owned used as criteria for wealth vary from village to village. In Ban Yang Sinchai and Ban Nong Had, better-off villagers are determined as having 30-50 rai (4.8-8 hectares) of farmland while the medium-farm and small-farm farmers own 6-29 (0.96-4.64 hectares) and less than 5 rai or 0.8 hectares (including the landless) of farmland respectively. In Ban Don Bark, villagers who own more than 30 rai (4.8 hectares) of farmland are considered better off farmers whereas those who own 17-20 rai (2.72-3.2 hectares) of farmland are perceived as medium-farm farmers. Villagers who own less than 7 rai (1.12 hectares) of farmland and the landless are said to be small farmers. In Ban Don Gloy 6 and Ban Don Gloy 17, richer farmers are expected to own at least 70 rai (11.2 hectares) of rice farmland if they do not have other upland crops cultivation or at least 50 rai (8 hectares) of rice farmland if they have some additional land for upland crops cultivation. Medium-farm farmers own between 30 to 50 rai (4.8 to 8 hectares) of rice fields. Small-farm farmers are either landless or own less than 20 rai (3.2 rai) of rice fields.

The landless were not placed in a separate category because there are very few landless farmers (less than 5%) in most villages studied, except for Ban Don Gloy 6 which has about 11 per cent. A small percentage of the landless would yield a very small sample size and it might not be meaningful for a statistical test. Thus, the landless were grouped together with the small farmers for sampling and data analysis. The analysis of data does not take into account the differences in the sizes of land owned that are used as criteria for wealth ranking in different villages because this method emphasizes the local concept of wealth, and the criteria used by local people in different villages might be different.

As mentioned, the benefits from Kok Peeba woodlot are shared among four villages, namely Ban Yang Sinchai, Ban Nong Hard, and Ban Don Gloy 6 and 17. But Nong E-Jone woodlot belongs to only one village, Ban Don Bark. The formal surveys of households, thus, were conducted in five villages. Table 4 shows the data on the total numbers of households as told by the village headmen.

Table 4. Total Numbers of Households Classified by Villages.

Villages	No. of Households
Ban Yang Sinchai	84
Ban Nong Hard	50
Ban Don Gloy 6	87
Ban Don Gloy 17	173
Ban Don Bark	110
Total	504

Data in Table 4 are slightly different from the data collected in 1990 in the National Survey of Villages by the Department of Community Development, Ministry of Interior. However, the total number of households told by the village headmen was used as a sampling frame for this study because these data are more current. The following statistical equation was employed to obtain a sample size (n).

$$n = \frac{Npq}{(N-1)D+pq}$$

where

$$q = 1-p$$

$$D = \frac{B^2}{4}$$

N = population
n = sample size
p = the population parameter for the binomial
B = acceptable bound of error for the parameter

This equation can be adopted for the survey situation in which population variance is unknown. This has been noted:

> "In a practical situation we do not know p. An approximate sample size can be found by replacing p with an estimated value. Frequently, such an estimate can be obtained from similar past surveys. However, if no such prior information is available, we can substitute p = .5 into the equation to obtain a conservative sample size (one that is likely to be larger than required)."(Scheaffer, Mendenhall, and Ott:1986)

The total number of households in the five villages studied is 504. The acceptable bound of error for the parameter is set at .1 or 10 % for this sampling because if the acceptable bound of error is set at lower than 10%, the sample size will be too large for this dissertation to handle due to time and budget limitations.

In the above equation we have N = 504, B = .1, p = .5, and q = .5

So that we have

$$n = \frac{504 * .5(1-.5)}{\frac{(504-1)(.1^2)}{4} + .5(1-.5)}$$

$$= 83.5821$$

The sample size derived from the above equation is approximately 84. Referring to the statement made by Scheaffer, Mendenhall, and Ott (1986) presented earlier, the sample size (84) derived from the equation above is considered a conservative sample size but likely to be larger than required. Thus it was not necessary to use that number. Because there are five villages involved in this study, the samples calculated should be

drawn from all five villages. To ensure the representativeness of each village, a certain percentage of samples must be drawn from each village. The calculations showed that a 15 per cent sample size drawn from each village would yield a total sample size of 79 which is very close to the sample size calculated. This sample size (79) was considered sufficient for the total population of 504 because, as already mentioned, the sample size of 84 is likely to be larger than required. Another reason for taking a 15 per cent sample was that a greater percentage sample, say 20 per cent, would not make a great difference in the size of sample drawn from a small sampling unit. For example, the total number of large-farm farmers in Ban Don Gloy 6 amounts to only six people as perceived by the key informants. Taking those six people as a sampling unit, both 15 and 20 per cent would yield only one sample. On the other hand, a 20 per cent sample size would have given a bigger number of interviewees when dealing with a large sampling unit, as is the case with medium-farm farmers, and more time and money would have been required for this larger sample size. Table 5 shows a 15 per cent sample size of the total households in each village.

Table 5. Total Number of Households in the 5 Villages Studied and their 15 % Sample Size.

Villages	Total Households	Sample Size (15%)
Ban Yang Sinchai	84	13
Ban Nong Had	50	9
Ban Don Gloy 6	87	13
Ban Don Gloy 17	173	26
Ban Don Bark	110	18
Total	504	79

A full list of household heads' names from both the village headmen and the district office was used to classify households into each economic stratum by having discussions with key informants. Then 15 per cent of the total households from each economic stratum were randomly selected. This sampling procedure is known as a stratified random sampling or a stratified proportionate random sampling because the samples are proportionate to size of sampling units, or economic strata in this case. Table 6 shows the numbers of sampled respondents classified according to their economic status.

Table 6. Samples Classified by Economic Strata.

Villages	no. of large farmers interviewed	no. of medium farmers interviewed	no. of small farmers interviewed	Total
Ban Yang Sinchai	2	8	3	13
Ban Nong Had	2	4	3	9
Ban Don Gloy 6	2	10	1	13
Ban Don Gloy 17	5	15	6	26
Ban Don Bark	3	10	5	18
Total	14	47	18	79

The interviews of about three to four households took about one day. It took about 25 days to complete the interviews of 79 households. In-depth interviews of community woodlot committee members were also conducted whenever the opportunity allowed. These interviews were conducted before, during, or after the household survey. The interview schedule of the community woodlot committee was open to indefinite length, since the questions asked were open-ended.

Nevertheless, it was found that the sample size of 15 per cent was not appropriate for every economic stratum because some sampling units or economic strata were too small. The result was too small a sample size. For instance, 15 per cent of small farmers in Ban Don Gloy 6 yielded only one sample, which was considered not very

representative for that economic stratum. To make the data more reliable and statistically more significant, a disproportionate random sampling was conducted to lessen the risk of too small a sample size of some economic strata. It was determined that a minimum of five samples from each economic stratum would assure the representativeness of each economic stratum due to the following reasons:

a) to make possible an analysis of association with discrete variables by using 2 by 2 tables. It is suggested that the expected frequencies in a cell should not be less than five so that a better estimate of the true alpha levels can be made (Bohrnstedt & Knoke:1988).

b) in Ban Don Gloy 6, there are in total five villagers in the category of large farmer as determined by the key informants so that five samples is the maximum for this category.

The total sample size (N) became 100, after the sample size has been adjusted. The followings table shows an adjusted sample size by economic strata using the stratified disproportionate random sampling procedure.

Table 7. An Adjusted Samples and their Percentages Classified by Economic Strata.

Villages	no. of large farmers	no. of medium farmers	no. of small farmers	Total (N)
Yang Sinchai	10 (11.90%)	57 (67.90%)	17 (20.20%)	84 (100.00%)
Samples	5 (50.00%)	8 (15.00%)	6 (35.00%)	S = 19 (22.62%)
Nong Had	10 (20.00%)	30 (60.00%)	10 (20.00%)	50 (100.00%)
Samples	5 (50.00%)	5 (15.00%)	5 (50.00%)	S = 15 (30.00%)
Don Gloy 6	5 (5.70%)	70 (80.50%)	12 (13.80%)	87 (100.00%)
Samples	5 (100.00%)	10 (15.00%)	5 (42.00%)	S = 20 (17.40%)
Don Gloy 17	28 (16.20%)	105 (60.70%)	40 (23.10%)	173 (100.00%)
Samples	5 (17.85%)	15 (15.00%)	6 (15.00%)	S = 20 (18.20%)
Total samples for Kok Pee-Ba woodlot	20 (25.00%)	38 (47.50%)	22 (27.50%)	S1 = 80 (100.00%)
Don Bark	15 (13.60%)	66 (60.00%)	29 (26.40%)	110 (100.00%)
Samples	5 (33.33%)	10 (15.00%)	5 (17.00%)	S = 20 (18.20%) [3]
Total samples for Nong E- Jone woodlot	5 (25.00%)	10 (50.00%)	5 (25.00%)	S2 = 20 (100.00%)
Total samples for both woodlots	25	48	27	S = 100

4.5 The Questionnaire

Two types of questionnaire were prepared for this study. First, a structured questionnaire was used for household survey. This questionnaire covers the following topics:

1. Respondent's personal data;

2. Migration history of respondent's family;

3. Land use and landholding;

4. Livestock production;

5. Benefits derived from the woodlot;

6. Household's energy consumption;

7. Respondent's attitude towards trees and community woodlot.

Second, an open-ended questionnaire was used for in-depth interview of community woodlot committees. Questions asked are classified under the following topics:

1. Planning and preimplementation phase of community woodlot project;

2. Implementation and management of community woodlot;

3. Harvest of community woodlot;

4. Attitudes toward community woodlot, fuelwood shortage, and rural development.

The household survey using the structured questionnaire provided data which focused on household energy consumption, especially fuelwood, household participation in the community woodlot project, benefits derived from the community woodlot, and opinions toward the community woodlot. The in-depth interview of community woodlot committee members and local leaders, by using open-ended questions as a guideline, provided data on village development processes especially the community woodlot project, which focused on its planning, implementation, management, supervision, distribution of benefits, and constraints. Data from both sources, i.e. households and community woodlot committee members, complemented each other. Table 8 shows how variables in the research propositions were measured:

Table 8. Variables and Measurement in Research Propositions

VARIABLES	MEASUREMENT
Participation (by local residents)	- Participation in decision making to adopt (by local residents) the woodlot project (being consulted individually by village development committees and/or woodlot project officials or through meetings before project implementation). - Participation in implementation (contribute resources, labor and material, being a member of community woodlot committee). - Participation in benefits (fuelwood, building materials, loans, etc.).
Participants' perceptions	- Availability of fuelwood. - Need of a community woodlot.
Development approaches	- Top-down or bottom-up (initiation of the project, involvement of people in decision making to adopt the project). - Intensity or frequency of support, supervision, and monitoring of agencies who proposed the woodlot project.
Community woodlot committee	- Ability to solve conflicts (conflicts can be settled by the community woodlot committees without referring to the higher authority). - Management of woodlot (satisfaction of villagers with general performances of community woodlot committees and with the distribution of benefits from the woodlot).
Self-reliance	- Villages' dependency on financial support from the government (sources of financial support for village development after the woodlot had been implemented). - Villages' dependency on fuel supply from the community woodlot (percentage of villagers who rely on the community woodlot as their single source of fuelwood).
Income	- Cash earned from selling trees from the community woodlot.
Employment	- Being hired to work in the community woodlot.
Diversity of tree species	- Single species or multi-species.

4.6 Analysis of Data

The populations of the villages studied are considered as units of analysis, and five units are taken into account, though only two community woodlots are involved. Two types of analysis of data were made. First, a descriptive analysis on how villagers in different economic strata differently or similarly benefited from the community woodlot projects was made. Second, a test of relationships between variables in the research propositions was performed and compared among five villages to investigate how different villages interact with community woodlots. The results of the test are then discussed in the context of the ecological complex model.

Considering the objectives of the research and the data collecting technique which employed both conventional household survey and in-depth interviews of community woodlot committees, both quantitative and qualitative methods of data analysis are applied. Chi-square, a quantitative method to test a statistical significant relationship between variables, is utilized where possible, since most of the variables studied are discrete in nature. As for the relationships between variables that cannot be answered by a chi-square test, the qualitative data is employed in the analysis. Firstly, how similarly or differently the villagers from different economic strata of each village benefit from the woodlot project is described by using the percentages as a comparison. Then a Chi-square test is performed by using a Statistical Package for Social Sciences (SPSS), which focuses on the relationships between variables hypothesized in the research propositions. Next they are compared across populations--i.e. the five villages under investigation. Babbie (1990) indicated that, in disproportionate stratified random sampling, the researcher needs not worry about the differential sampling, as long as he or she analyzes the two area samples separately or comparatively. This means that weighting stratum means is not required, although the samples were drawn by using a disproportionate

stratified random sampling method. Some other reasons that make weighting unnecessary for an analysis of data in this study include:

1. The variables to be tested are discrete. Weighting sample means of nominal or discrete variables will not give a meaningful interpretation.

2. The comparison between or among stratified groups are to be made on the percentage basis. The relationship between variables will be tested by using Chi-square, then will be compared across populations.

Data derived from in-depth interviews are to be used to explain the relationship between variables analyzed by using a Chi-square test, which leads to the explanation of interactions between or among variables.

CHAPTER 5

BACKGROUND OF THE PROJECTS AND SOCIO-ECONOMIC CONDITIONS OF THE VILLAGES STUDIED

This chapter begins by presenting general characteristics of the study areas at the provincial level, followed by a description of Kosumphisai district and the historical background of Kok Peeba community woodlot, then of Kantarawichai district and the historical background of Nong E-Jone community woodlot. Then it presents personal data of the respondents and socio-economic conditions of the five villages studied.

5.1 General Characteristics of the Study Areas

Thailand consists of four regions, i.e., Central, North, South, and Northeast, with a total area of 513,115 square kilometers. Maha Sarakham province is one of the seventeen provinces that make up the Northeast, known as Isan, having a total area of 168,854 square kilometers. It is located about 475 kilometers from Bangkok by road. The province has an area of 3,307,302 rai or 5,291.68 square kilometers, and is administratively divided into 11 Amphoes (districts), 114 Tambons (sub-districts), and 1,474 villages. It is one of the poorest provinces in the poorest region of the country. In 1986, 35.8% of the population in rural areas of Thailand, but 48.2% of the population in the Northeast, were living below the poverty line (The 1990 TDRI Year-End Conference, PDA report). Listed clockwise, provinces bordering on Maha Sarakham are Khon Kaen and Kalasin on the North, Kalasin and Roi-et on the East, Surin and Burirum on the South and Burirum and Khon Kaen on the west.

At the end of 1987, a total of 866,519 persons with 436,550 males and 429,969 females were registered at the Local Administration Department, Ministry of Interior, in the province. The number of males and females were 50.38 and 49.62 percent of the total population respectively.

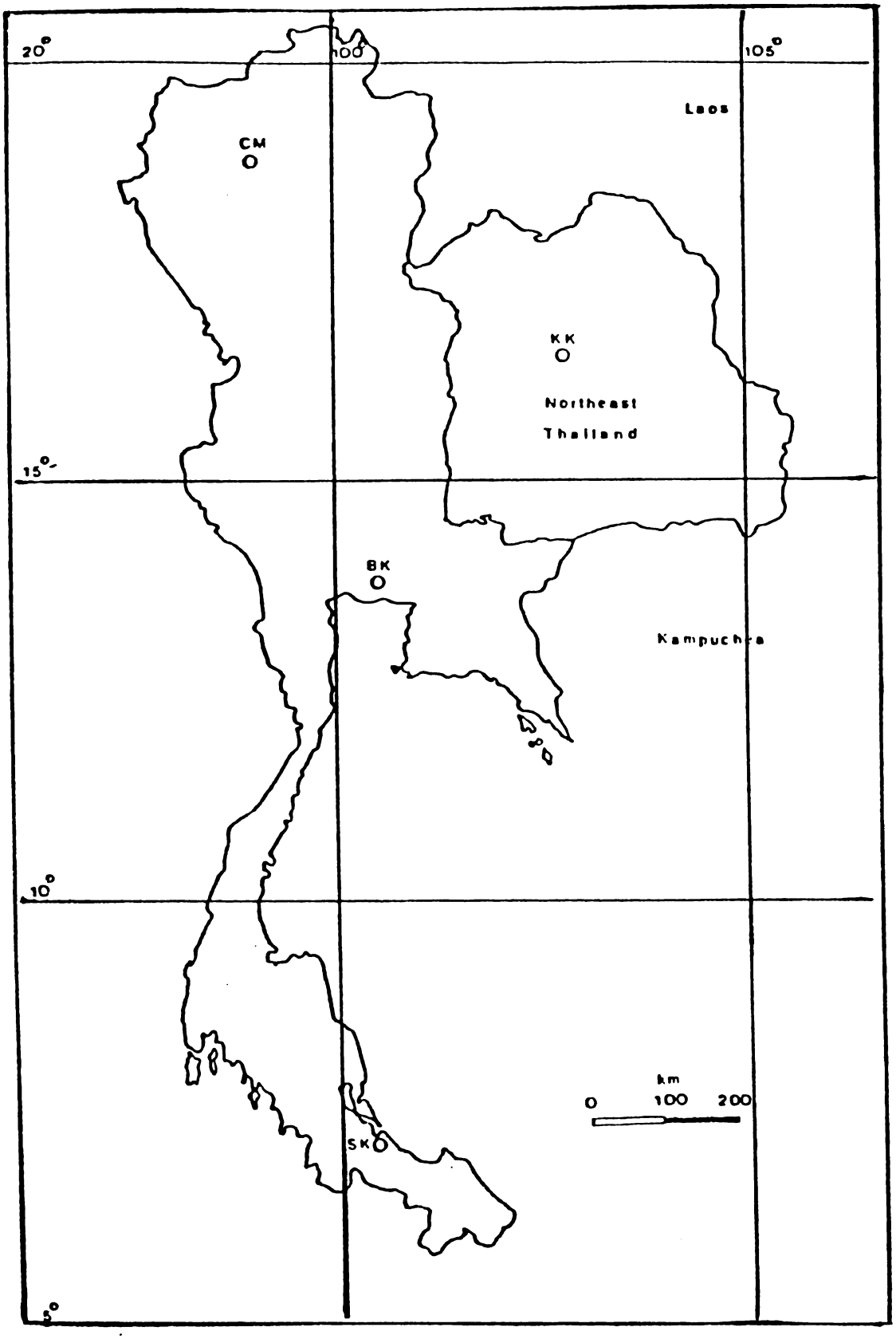


Figure 5. Map of Thailand Showing the Northeast Region.

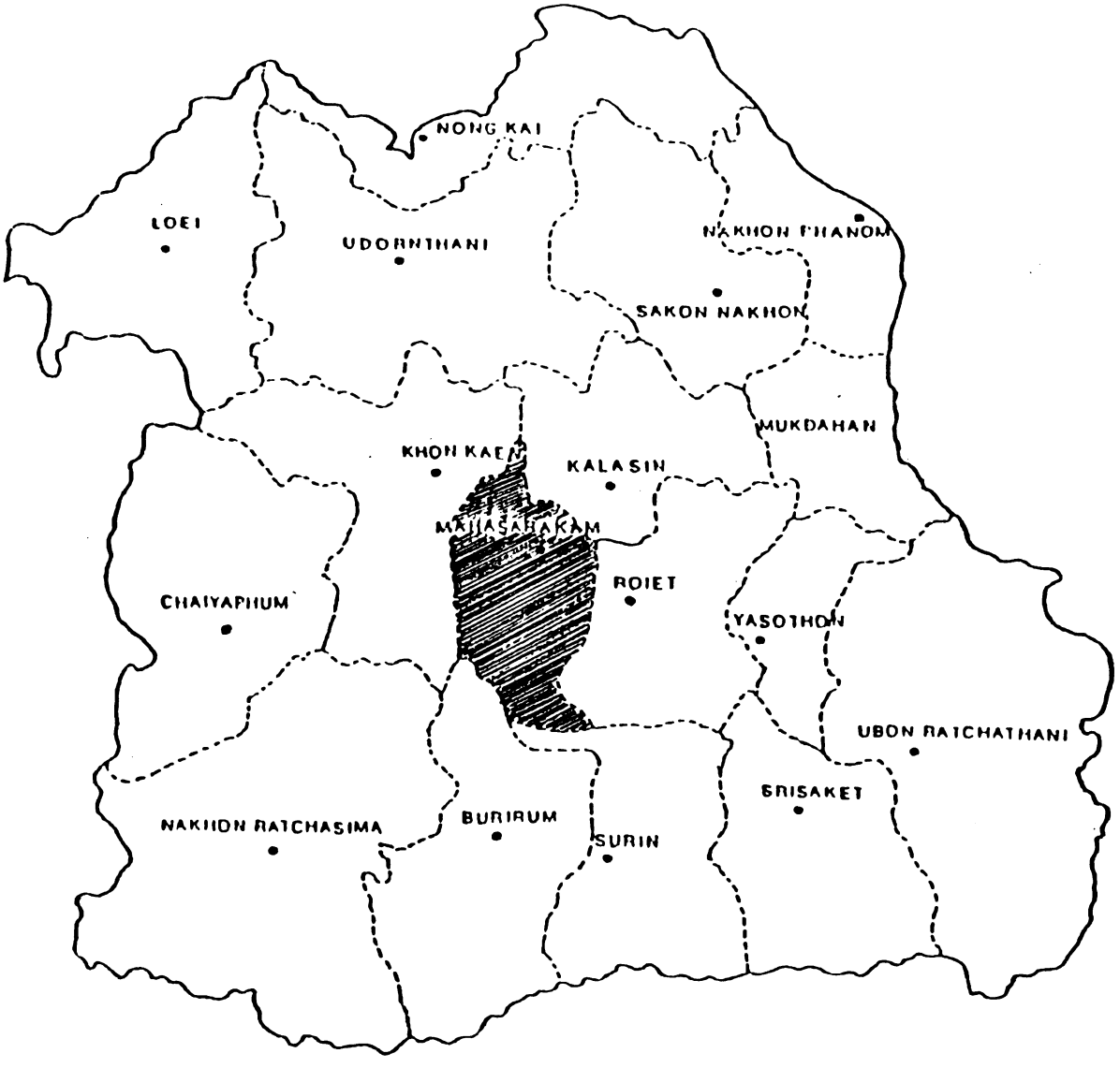


Figure 6. Map Showing Maha Sarakham Province.

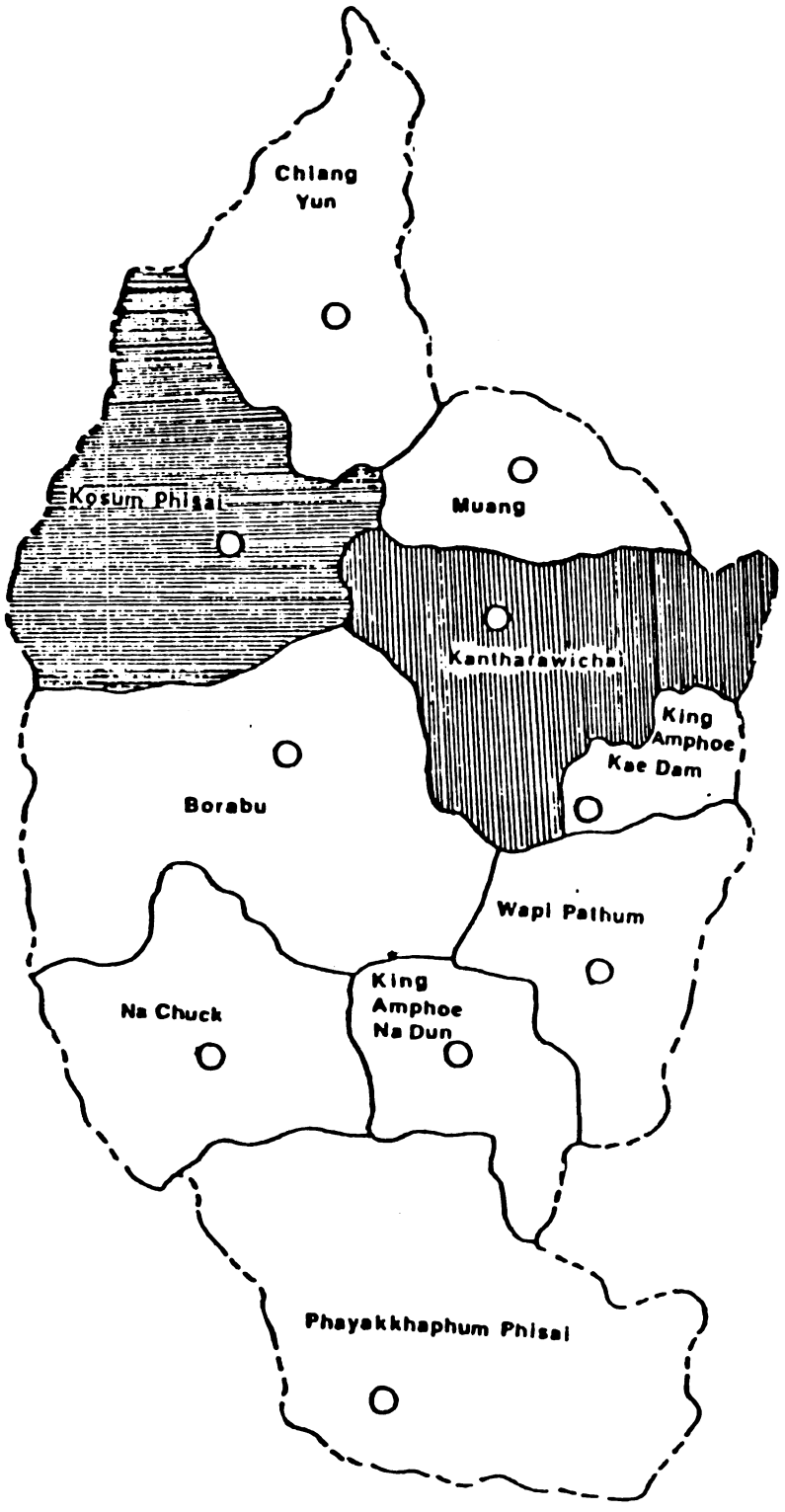


Figure 7. Map Showing Kosum Phisai and Kantarawichai Districts.

The important occupations of the people in Maha Sarakham are glutinous rice growing, planting kenaf and cassava, livestock raising and fishery, but the crops yields are very low because of the infertile soil and water shortage. The other marginal occupations of the population are trade, agroindustry and waged labor.

Geographical Location: The location of Maha Sarakham province is between latitudes 15 24' and 16 39'N, longitudes 102 50' and 103 31'E, on the Korat Plateau in the Northeast of Thailand, and is about 130-230 meters above mean sea level. Kosumphisai and Muang districts are drained by the Chi River in the north, the Plub Pla River in the south, the Choo River in the west, and the Tua River in the east. These rivers are branches of the Mun River which runs through the North of Surin province. The topographical features of Maha Sarakham province can be classified into 3 major categories:

a) Plain areas. These are located along the Chi river in the northern part of Muang and Kosumphisai districts, and the area of Thung Kula Ronghai in the southern part of the province.

b) Undulating plain areas, found in the Northern part of Phayakkhaphum Phisai district extending to the eastern part of Muang district.

c) Undulating plain and tilted undulating land, found in the North and the West of the province. This type of land accounts for 50 per cent of the total land area of the province.

Climate: The climate of Maha Sarakham is classified as tropical savanna type, according to the Koppen's Climatic Classification. There are three seasons, the rainy season which lasts approximately from May to November, the cold season which lasts from November to February, and the dry season which lasts from February to April. The hot season is very hot whereas the cold season can be rather cold. The data on

temperature from 1951 to 1975 indicated that Maha Sarakham has an average temperature of 27.1 C. (Land Development Department: 1982). The annual average number of rainy days is around 83 (National Statistics Office: 1982). The following table shows the monthly distributions of rainfall, temperature, and relative humidity of Maha Sarakham province.

Table 9. Monthly Climatic Data of Maha Sarakham Province (1977-1981).

Month	Rainfall, mm	Temperature, C			Humidity %
		Mean	Max	Min	
January	1.30	23.6	34.0	12.9	63.54
February	4.52	26.2	37.5	14.1	61.88
March	31.04	30.3	39.0	18.0	59.18
April	73.14	30.4	40.0	20.8	66.24
May	200.04	29.3	37.7	21.7	75.02
June	196.80	28.9	35.5	22.7	79.68
July	134.72	28.3	35.2	22.5	78.31
August	191.20	27.9	34.6	26.3	79.82
September	268.92	27.4	33.7	21.8	82.60
October	84.70	26.6	33.4	18.5	75.54
November	8.54	24.4	32.7	14.4	71.66
December	1.36	22.6	33.2	11.3	66.92

Source : Royal Forest Department, The Village Woodlot: Its Implementation in Thailand. 1984.

Table 9 shows that the average annual rainfall is 1,196.28 mm, which is considered as medium rainfall among the provinces in the northeast. However, water shortages can be serious for agriculture at the beginning of the rainy season and for drinking in the dry season due to the unpredictability of rainfall and sedimentation in most canals and waterways.

Water Resources: There are three major sources of water in Maha Sarakham province:

a) Rain water, which is considered the most important source of water.

b) Surface water. Maha Sarakham has water catchments which provide water to many important rivers and canals, namely the Chi, Pong, Plub Pla, Tua, Choo, and Siew rivers.

c) Underground water. This source of water is normally obtained by digging deep wells. The quality and quantity of underground water depend on the type of underground rock and the depth of wells.

Some small water reservoirs, canals and swamps, which supply water to a few percent of the agricultural area, cannot supply enough water year round.

Forest Resources: The type of natural forest in Maha Sarakham is classified as dry dipterocarp forest, the dominant tree species of which are *Shorea obtusa Wall, S. siamensis Miq., Dipterocarpus tuberculatus Roxb, Dipterocarpus obtusifolius Teijsm, and Xylia xylocarpa Taub.* The Royal Forest Department (Forestry Statistics:1990) indicated that the national forest reserves of Maha Sarakham covered 407 square kilometers, or 7.69 percent of the total area of the province. The total forest area of the province gradually declined from 263 square kilometers or 4.97 percent in 1976 to 49 square kilometers or 0.92 percent in 1989. Table 9 shows the forest area in the northeastern region of Thailand from 1976 to 1989.

Table 10 clearly shows that Maha Sarakham has the smallest area of both national forest reserves and other forest land compared to other provinces in the northeast. A study (Land Development Division:1982) indicated that two major causes of the decrease in forest land of Maha Sarakham province were the population pressure and the conversion of subsistence agriculture to commercial agriculture which led the villagers to encroach the forests for more agricultural land.

Table 10. National Forest Reserves and Forest Areas of Provinces in the Northeastern Region of Thailand from 1976 to 1989.

Provinces	Total Area (Sq.kms)	National Forest Reserves	Total Area (Sq.kms/%) 1976	1989
Kalasin	6,946.746	1,831	1,659(23.88)	637(9.17)
Khon Kaen	10,885.991	2,716	1,829(16.80)	917(8.43)
Chaiyaphum	12,778.287	3,304	4,555(35.65)	3,146(24.62)
Nong Khai	7,332.280	3,339	1,653(22.54)	540(7.37)
Nakorn Phanom	5,512.669	2,733	2,995(54.33)	640(11.62)
Mukdahan	4,339.830	1,073	-	1,544(35.59)
Maha Sarakham	5,291.683	407	263(4.97)	49(0.92)
Udon Thani	15,589.388	7,220	4,420(28.35)	2,395(15.36)
Nakorn Ratchasima	20,493.964	7,783	4,477(21.84)	2,577(12.57)
Buri Ram	10,321.885	2,800	1,489(14.42)	596(5.77)
Roi Et	8,299.449	767	638(7.69)	222(2.68)
Loei	11,424.612	6,963	5,132(44.92)	3,264(28.57)
Surin	8,124.056	1,784	961(11.83)	338(4.16)
Si Sa Ket	8,839.976	2,039	1,487(16.82)	786(8.89)
Sakon Nakorn	9,605.764	2,723	2,889(30.07)	1,568(16.33)
Ubon Ratchathani	18,906.089	6,509	6,285(33.24)	3,887(20.56)
Yasothon	4,161.664	1,140	762(18.31)	480(11.52)

Source : Forestry Statistics 1990, Forest Statistics Sub-division, Planning Division, Royal Forest Department.

5.2 Kosumphisai District and Kok Peeba Community Woodlot

Kosumphisai district, one of the two sites studied in Maha Sarakham province, has a total area of 916.351 square kilometers and is located about 28 kilometers west of Maha Sarakham town. The district boundaries of Kosumphisai are as follows:

North - Chiang Yun and Kantarawichai districts, Maha Sarakham province;

East - Kantarawichai and Muang districts, Maha Sarakham province;

South - Borabu district, Maha Sarakham province, and Ban Phai district, Khon Kaen province;

West - Muang district, Khon Kaen province.

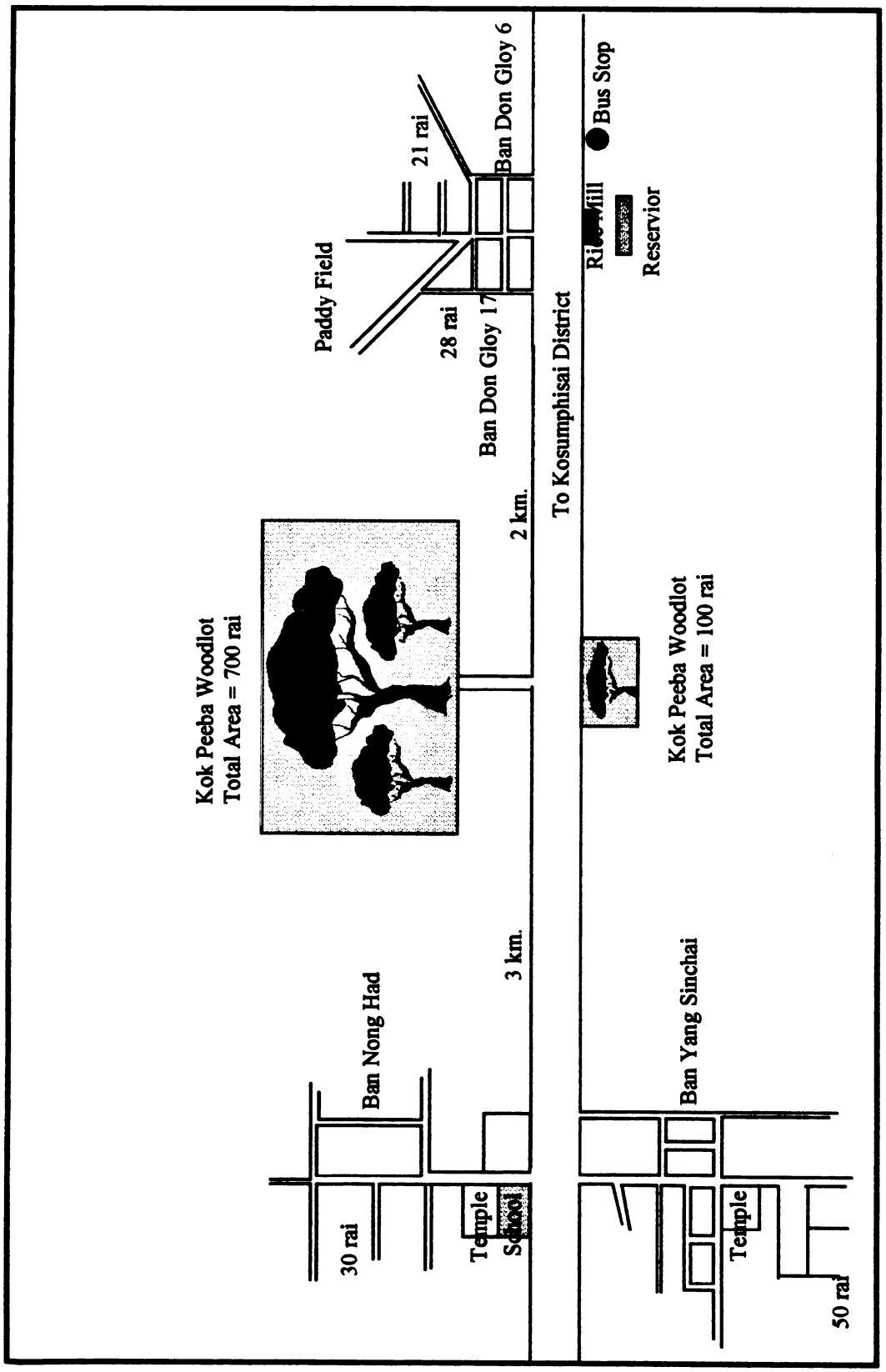


Figure 8. Map Showing Distance from the 4 Villages which Share Benefits from Kok Peeba Woodlot.

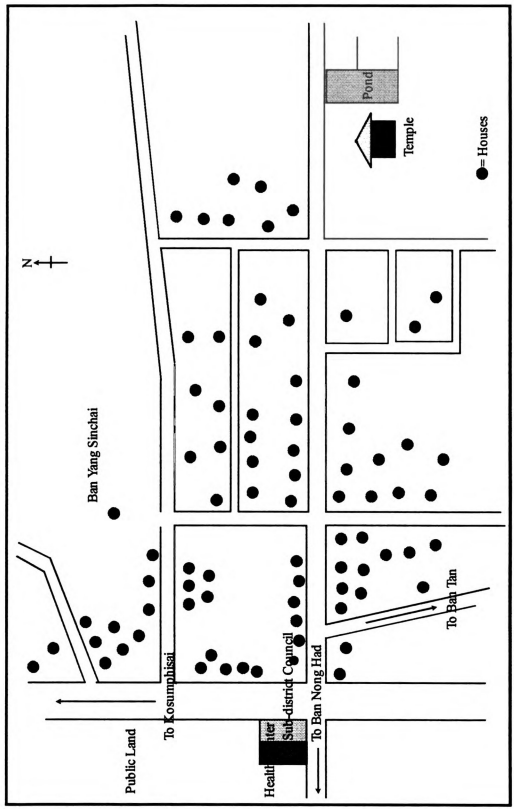


Figure 9. Map of Ban Yang Sinchai.

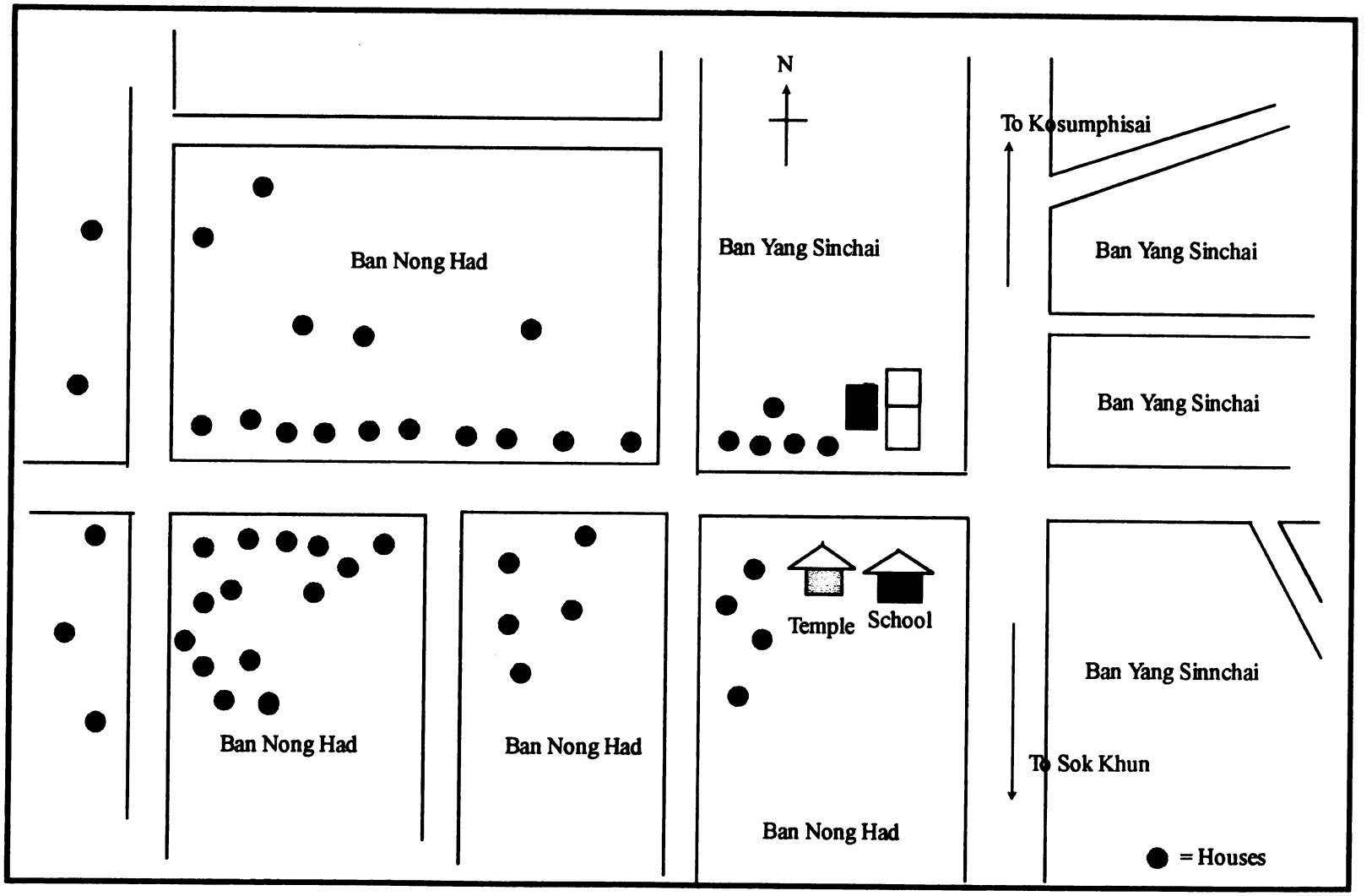


Figure 10. Map of Ban Nong Had.

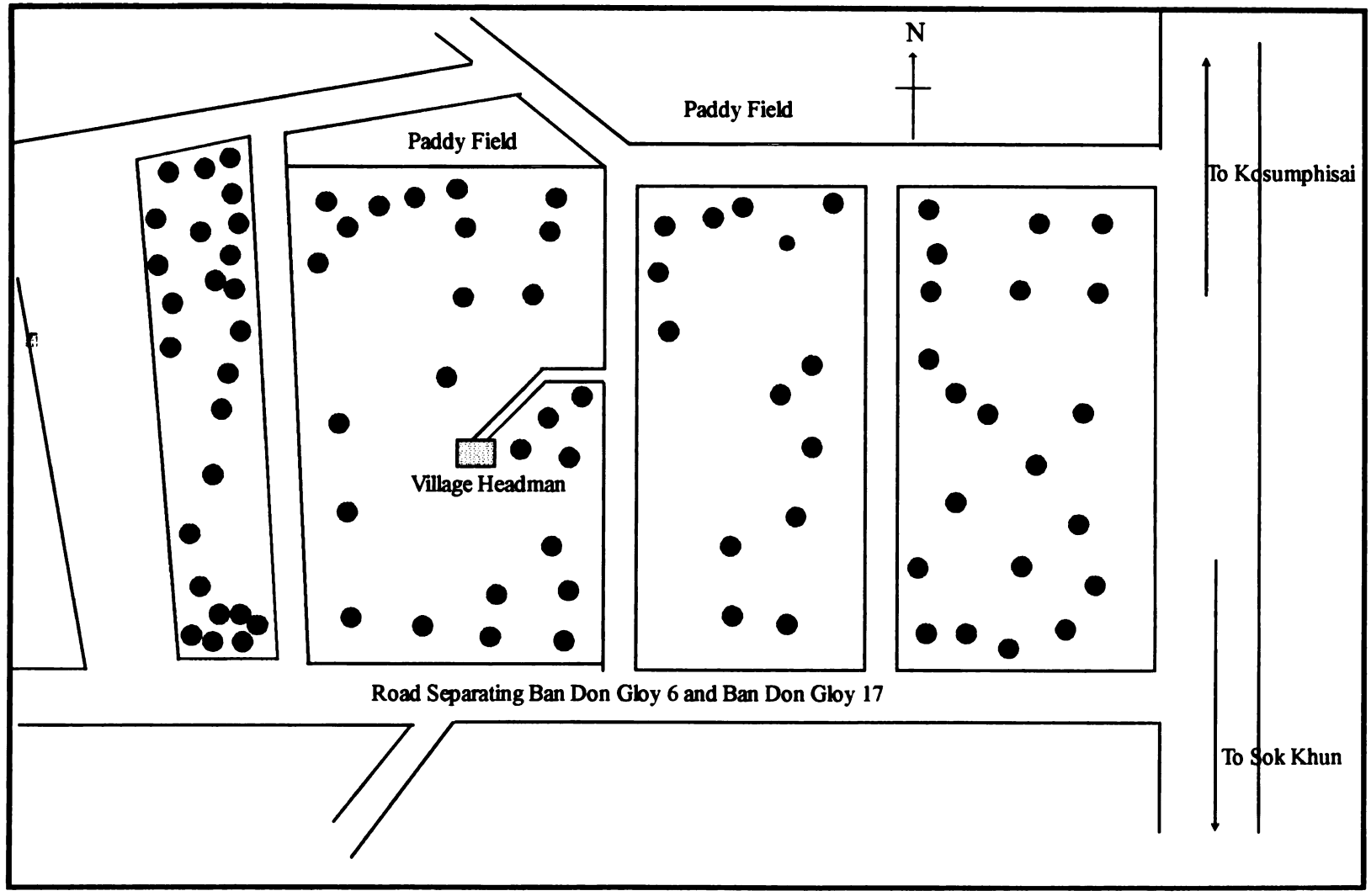
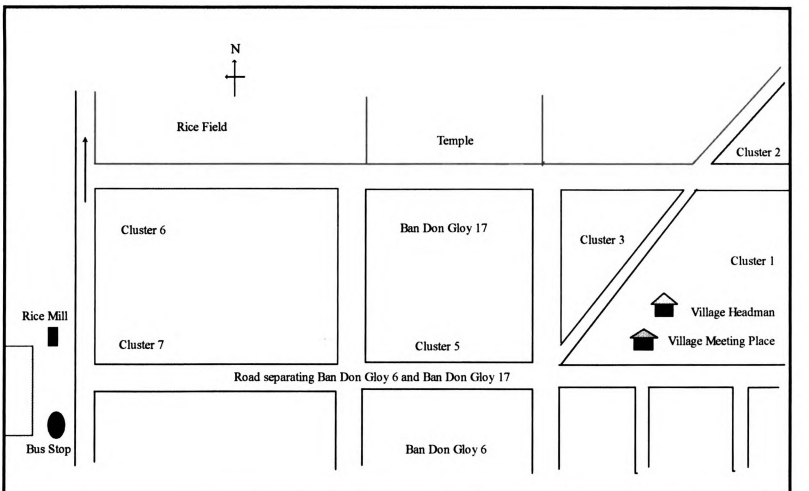


Figure 11. Map of Ban Don Gloy 6.



Fifure 12. Map of Ban Don Gloy 17.

The district has a total population of 101,619, of which 51,192 are males, 50,427 are females. It is divided into 14 sub-districts which consists of 177 villages and 19,666 households. The inhabitants' major occupations are rice farming and cassava cultivation. The district has two national forest reserves: Wang Dang and Wang Kung national forest reserves covering an area of 76,250 rai, and Gud Rung national forest reserves covering an area of 4,375 rai, if only the part that belongs to Kosumphisai district is considered. The natural forest in Kosumphisai district no longer exists due to the extensive forest encroachment for cassava cultivation. This happened long time ago and was caused by the rapid increase of population and the decrease in land holding size of individual families.

Lao sub-district where Kok Peeba community woodlot is situated is one of these 14 sub-districts. Lao sub-district was officially established in 1915 and now has a total area of 77 square kilometers. It is bounded in the north by Hua Kwang sub-district, in the south by Nong Mek sub-district, in the east by Kang Kae sub-district, and in the west by Wang Yao sub-district. As mentioned, there are four villages sharing benefits from the Kok Peeba community woodlot, two of which are situated in Lao sub-district and the other two in Hua Kwang sub-district. The two villages of Lao sub-district are Ban Yang Sinchai and Ban Nong Had located seven kilometers from the market-town of Kosumphisai. The other two villages of Hua Kwang sub-district are Ban Don Gloy 6 and Ban Don Gloy 17, located only two km. from the market town of Kosumphisai.

5.2.1 Historical Background

Kok Peeba community woodlot is located about four to five km. from Kosumphisai market along the road from Kosumphisai district of Maha Sarakham province to Ban Phai district of Khon Kaen province. The woodlot was promoted and

established by the Thai Government under the responsibility of the Royal Forest Department (RFD), and the National Energy Administration (NEA). It was incorporated with and funded by USAID to promote fuelwood production as a component of the Renewable Nonconventional Energy Project in Thailand.

The concept of community woodlots emerged from the government's concerns over the decrease of national forest cover and the increasing demand of fuelwood production in the rural sector. The government implemented such community woodlots to cope with the anticipated problem of fuelwood scarcity in the very near future. The idea of this project was to plant fast-growing trees with a maximum of a five year cutting cycle on land determined by a baseline survey. The villagers were to be responsible for the woodlots in terms of preparing land, planting, maintenance, and distributing benefits, with supervision and technical support from the concerned government agencies. The objective was to promote sense of belongings among the villagers, so that they would take good care of their own community woodlots for their benefits.

The project was part of a regional level project which had the following objectives:

a. To provide a sustained supply of wood fuel for both woodlot owners and non-woodlot owners.

b. To lessen the pressure resulting from the cutting of trees in the natural forests and illicit cutting of trees on public lands in general.

c. To create employment and increase income for rural families.

d. To develop techniques to be used as an important first step toward a countrywide scheme of community woodlot projects.

e. To stimulate interest in tree farming by demonstrating the benefits derived from such development. (National Energy Administration, The village woodlot: its

mplementation in Thailand. Bangkok, Thailand. 1984)

The target of this project was to plant trees on 6,000 rai (960 hectares) of public, school, and temple land in the northeastern region of Thailand between 1981 and 1984. Criteria for site selection included the size of public land available, readiness of the community, economic condition, and demand or scarcity of fuelwood. However, not all criteria were given equal attention in practice. The size of public land proved, in fact, to be the dominant factor (Phutaraporn:1983). The Kok Peeba community woodlot was one of the many sites identified as having large public land and fuelwood shortage problems in the national baseline survey on rural energy conducted by Chulalongkorn University Social Research Institute (CUSRI). Other sites identified were in Si Sa Ket, Roi-et, and Yasothon provinces, also in the northeast of Thailand.

In 1982, Mr. Dee Dankamsarn, village headman of Ban Yang Sinchai and also head of Lao sub-district, was contacted by the assistant forestry officer of Kosumphisai district to select a piece of public land in the village for planting fast growing trees. At that time, he and his villagers had no knowledge about community woodlots. However, the village did have some 800 rai (128 hectares) of public land located at the border between Lao and Hua Kuang sub-districts. This public land officially belonged to Ban Yang Sinchai and Ban Nong Had of Lao sub-district, but was mainly exploited by villagers from Ban Don Gloy of Hua Kuang sub-district for grazing cattle and growing cassava. Mr. Dee and the village development committees of Ban Yang Sinchai and Ban Nong Had decided to adopt the proposed community woodlot project, with the idea of getting the public land back from the villagers of Ban Don Gloy. Later, the district forestry officer came to discuss the situation with Mr. Dee and village development committees, and agreed that USAID funds through the RFD would provide seedlings, financial and technical supports.

It was decided by the RFD that *Eucalyptus camaldulensis* would be planted by hiring local people. The plan was to plant *Eucalyptus camaldulensis* with 2 x 4 meter spacing on 150, 150, and 100 rai in 1982, 1983, and 1984 respectively. The RFD provided financial support to the Kok Peeba community woodlot only from 1982 to 1984, after that, the community woodlot committee, who had in the meanwhile gained some experience, fully managed their own woodlot financially, but they still received advice from the RFD from time to time.

Phutaraporn (1983) reported that although there was a coordinated effort among the governor of Maha Sarakham province, provincial land department, and Lao sub-district council during the implementation phase, the project staff did not coordinate with the government officials at the district level. This caused the project staff to decide to select the Kok Peeba public land without knowing the existing problems. In addition, direct contact with local villagers was almost neglected. Consequently, most villagers did not understand the objectives of the project. They also did not believe in the potential success of the project and thought that the woodlot belonged to the Royal Forest Department instead of the villagers themselves. Some leaders took advantage of the lack of direct contact between the project staff and the villagers by hiring only their relatives to work in the project, which caused the villagers to resent the project.

Similar to most government officials, the project staff of the Kok Peeba community woodlot thought that any problems concerning the woodlots could be solved by enforcing the law. They hardly thought about other solutions. The figure shows the coordination among various government agencies at different levels. The solid lines in Figure 13 shows the existence of coordination, while the broken lines indicate the absence of coordination.

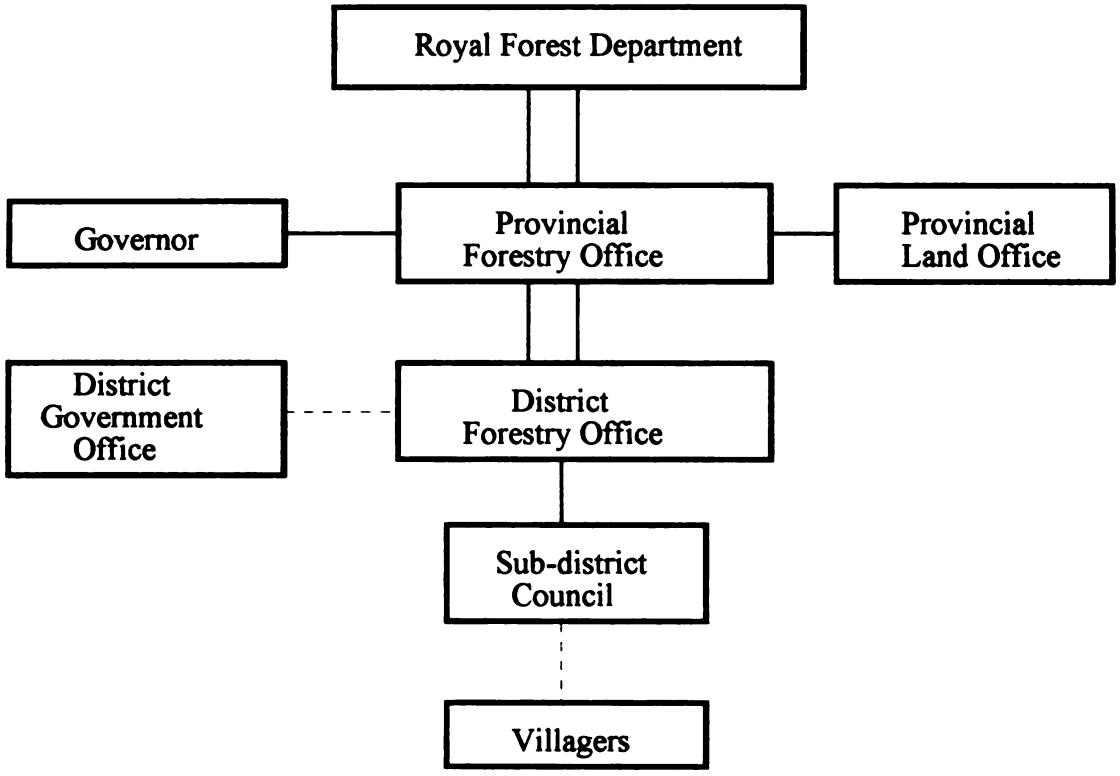


Figure 13. Coordination among Various Government Agencies Concerning the Kok Peeba Community Woodlot at Different Levels.

5.2.2 Implementation and Management

Implementation of the community woodlot resulted in conflicts among the villages which share the benefits. Phutaraporn (1983) identified three major factors which led to conflicts among villages. First, Kok Peeba public land was used for grazing animals by many villages before the woodlot was implemented. The conversion of this public land from grazing area to community woodlot had affected the villagers who grazed animals there. Second, Kok Peeba public land was used and occupied by villagers from Ban Don Gloy which is closer to this public land than are Ban Yang Sinchai and Ban Nong Had who have the rights over it. Some villagers from Ban Don Gloy, who were forced to move out of this land, not only strongly disagreed with the community woodlot project but also resisted and destroyed seedlings in the woodlot. Finally, problems of land use conflicts between the Lao sub-district council and Ban Don Gloy had existed even before the community woodlot project was proposed. Lao sub-district council had been trying to drive away the villagers of Ban Don Gloy who had settled on Kok Peeba public land, but had never been successfully able to do so. Therefore, the project was a very good opportunity for Ban Yang Sinchai and Ban Nong Had inhabitants to drive away villagers of Ban Don Gloy from Kok Peeba public land. Although Phutaraporn (1983) reported that most villagers felt the shortage of fuelwood in the surrounding areas, it is clear to this point that fuelwood shortage was not a major reason to adopt the project. And it appears that the objective of the Royal Forest Department to promote community woodlot project, and the objective of Lao sub-district in getting back the Kok Peeba public land have been met by implementing the project. However, there was serious difficulties in implementing the project at the very beginning. One problem was that some villagers of Ban Don Gloy purposely grazed their animals in the woodlot. As a result, the seedlings planted were destroyed by the animals.

Nevertheless, conflicts among villagers from different villages gradually declined due to the techniques used to manage and distribute the benefits from the woodlot, as will be presented.

In keeping with the plan of RFD, only 150 rai of Kok Peeba public land were first planted in 1982. Before the trees were planted, a temporary community woodlot committee was formed, comprised of 11 members, with the social researchers and forestry officers who were working in the project at that time serving as advisors. Mr. Dee Dankamsarn, the village headman of Ban Yang Sinchai, became its chairman and has retained the function ever since. Other members consisting of the village headman of Ban Nong Had and other local leaders were directly elected by the villagers. This committee was called "the tree planting committee" and was closely supervised by the project staff of RFD. Later on, the woodlot committee decided to form a more permanent one. At that point, the members were reduced from 11 to 6, and was called "the woodlot maintenance committee". No villagers from Ban Don Gloy participated in this first tree planting stage, only villagers from Ban Yang Sinchai and Ban Nong Had being hired. They were paid 30 baht a day for land clearing and 1 baht for planting each tree (.50 baht for digging a hole with 1 cubic foot dimension and another .50 baht for planting). By using 2 x 4 meter spacing, they were able to plant 200 *Eucalyptus* seedlings in one rai, for a total of about 30,000 seedlings planted in 150 rai. Thaiutsa et al. (1983) reported that soil chemical properties of the planting site in Maha Sarakham were comprised of the following:

pH	4.7
O.M.	0.94 %
P	15.00 ppm
K	33.00 ppm

Ca	89.00 ppm
Mg	46.00 ppm

The growth rate of *Eucalyptus* planted in Kok Peeba was 3.88 meters/year. The survival rate was 90 per cent. However, in the first year, the rate of seedling survival was quite low because villagers had no experience and the trees were planted in the dry season (April and May). Moreover, seedlings were uprooted by some villagers of Ban Don Gloy. Consequently, it was necessary to replant the trees several times.

To lessen the conflicts with Ban Don Gloy, the community woodlot committee, which originally comprised only villagers from Ban Yang Sinchai and Ban Nong Had, decided to have some representatives from Ban Don Gloy. These representatives helped make the villagers from Ban Don Gloy understand the objectives of the woodlot project better and encourage them to participate in replanting of trees. In addition, the community woodlot committee, under close supervision of the project staff, also allowed villagers from Ban Yang Sinchai, Ban Nong Had, and Ban Don Gloy to grow cassava in the woodlot. Each village was allocated 50 rai for growing cassava. The woodlot committee members of each village were responsible for selecting the households that wanted to grow cassava in the woodlot. Priority was given to the landless and small farmers. In Ban Yang Sinchai and Ban Nong Had, the committee themselves selected the villagers. In Ban Don Gloy, households were selected by a raffle. The households selected were allocated a three rai plot to grow cassava in between the rows of trees, with an obligation to take care of the tree seedlings. However, this was practiced only in the first few years of tree planting because the yield of cassava declined after the trees grew larger.

The second batch of planting was done in 1983 on a 130 rai surface and not 150 rai as initially planned. The RFD supplied seedlings which came from Si Sa Ket

province. Villagers were paid 30 baht a day and were also allowed to grow cassava between the rows of *Eucalyptus* trees in the woodlot as done in the previous year. The trees planted that year grew quite well due to good rain. However, some of the seedlings were again destroyed by villagers from Ban Don Gloy. Another 100 rai of *Eucalyptus* were planted in 1984 using the same method of planting by hiring villagers. But only 28 rai survived due to severe drought and destruction of seedlings. This was the last year when the Kok Peeba community woodlot was to be financially supported by USAID. No further planting was done in 1985 and 1986, due to the termination of the outside grant. During the period when no more planting took place and when villagers had to wait until *Eucalyptus* were mature enough to be harvested, the community woodlot committees reported that they were somewhat worried about the outcome of the project, because it was quite a new experience for them to plant *Eucalyptus* trees. They were skeptical of the benefits promised by the RFD and they did not know at that time how to manage the woodlot and its products. The first harvest of *Eucalyptus* trees took place in 1987 with the trees planted in 1982. Having no idea how to sell the trees, the community woodlot committee was contacted by a middleman who bought *Eucalyptus* poles and sold them to a major pulp mill in Khon Kaen province. The committee sold 150 rai of *Eucalyptus* for 210,000 baht for the first harvest. A village revolving fund then was established and spent to plant more trees. Since 1987, the community woodlot committee has been able to sell *Eucalyptus* trees from the woodlot every year. Up to 1991, they have harvested and sold their trees on six occasions. Additional areas of 50, 70 and 50 rai were planted in 1987, 1988 and 1989 respectively. The money used to make these plantings was earned by selling the trees in the community woodlot.

5.3 Kantarawichai District and Nong E-Jone Community Woodlot

The second community woodlot, "Nong E-Jone", is also in Maha Sarakham province, but in another district called Kantarawichai. The district covers an area of 412 square kilometers and is situated about 18 kilometers north of Maha Sarakham town. The following are boundaries of the district:

North - Yang Talat and Kamalasai districts, Kalasin province;

South - Muang district, Maha Sarakham province;

East - Kamalasai, Kalasin province;

West - Kosumphisai and Chiang Yun districts, Maha Sarakham province.

Kantarawichai has a population of 72,753, of which 36,567 are males and 36,186 are females. It is divided into 10 sub-districts which comprise 131 villages. Don Bark village, where Nong E-Jone community woodlot is located, is in Srisuk, one of the 10 sub-districts in Kantarawichai. The topography of Kantarawichai is generally undulating land, sloping down from the North to the South. Its climate is similar to that of other provinces in northeast Thailand. Ninety eight percent of the inhabitants are rice farmers, though some cultivate upland crops as cash crops. Kantarawichai district, similar to most provinces in the northeast, has water shortages for both agriculture and drinking, due to the unfavorable rainfall and inadequate reservoirs. There are no national forest reserves in this district.

5.3.1 Historical Background

Nong E-Jone community woodlot is located 500 meters south of Ban Don Bark (Srisuk sub-district, Kantarawichai district, Maha Sarakham province). The woodlot was established quite differently than that of Kok Peeba. It was initiated by the Population and Community Development Association (PDA), a Thai nongovernment organization.

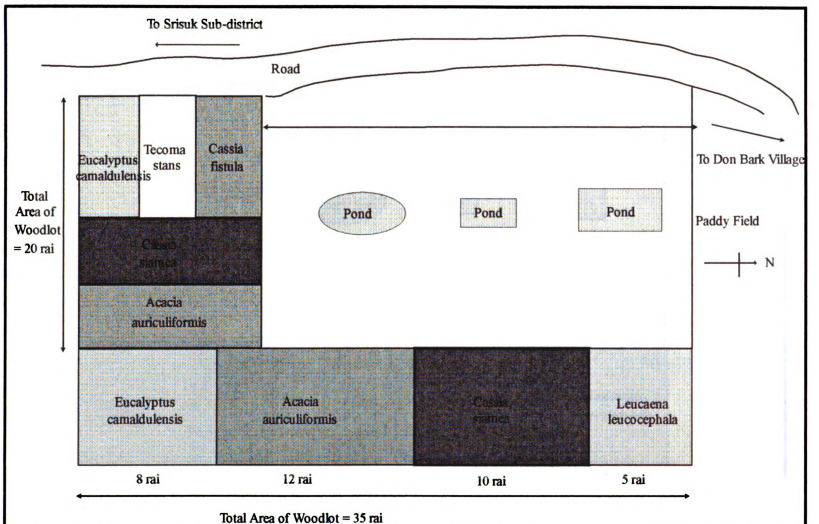


Figure 14. Map Showing Nong E-Jone Public Land of Don Bark Village where Two Village Woodlots are Located.

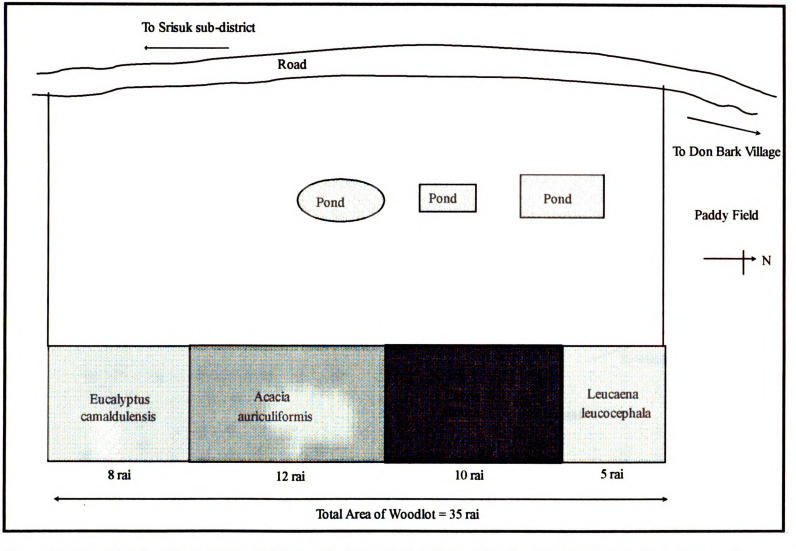


Figure 15. Map Showing Nong E-Jone Public Land of Don Bark Village After the 2nd Woodlot has been Removed.

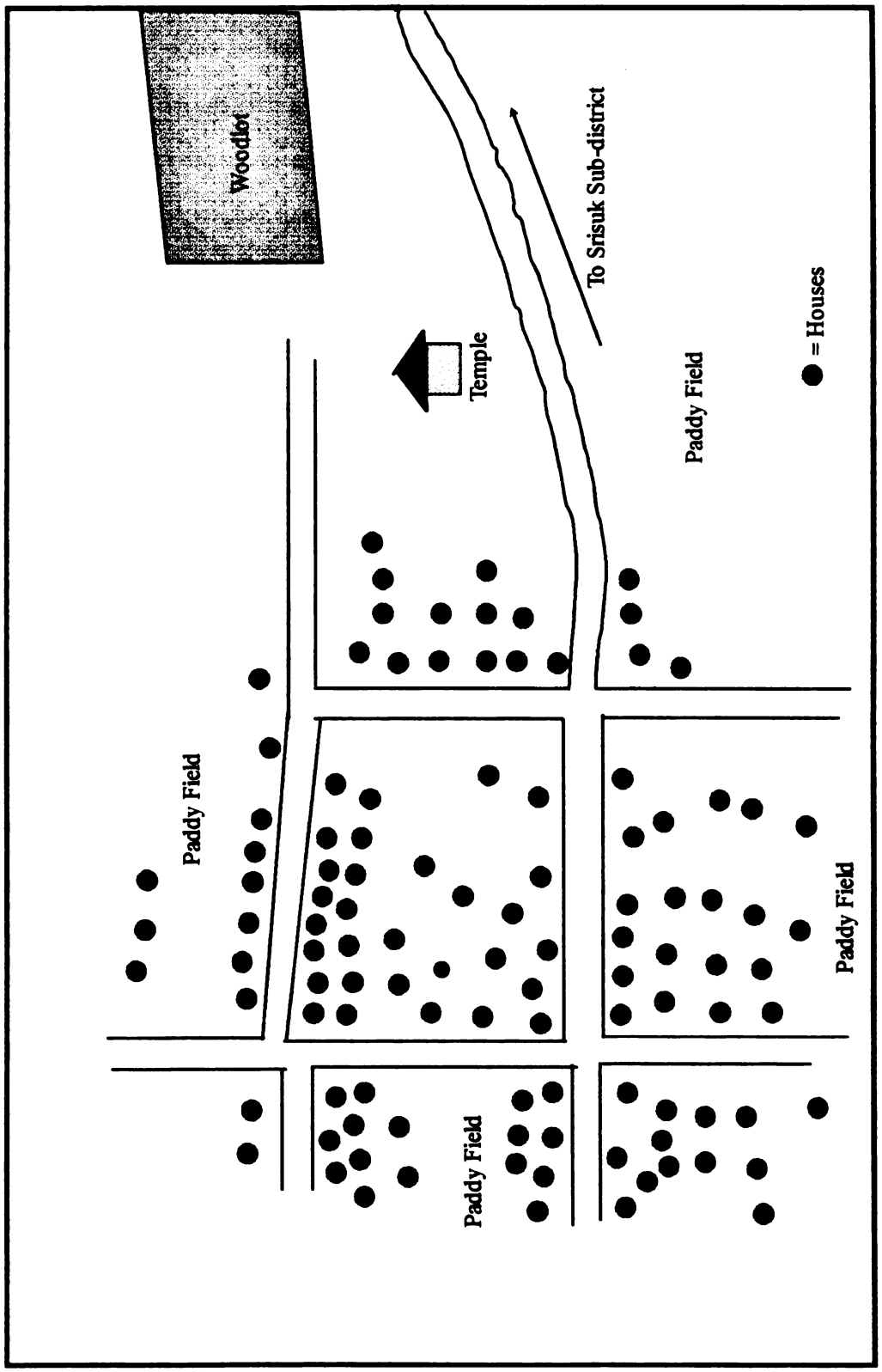


Figure 16. Map Of Bam Don Bark.

PDA was developed from the Office of Community Family Planning founded in May 1974 to implement family planning programs insisting on people participation. Currently, PDA's activities include public health services, improving the municipality's environment, improving drinking and domestic use water resources, and improving agricultural production systems, and social welfare. The headquarters of the PDA are located in Bangkok but it also has thirteen centers in the central, north, and northeast regions of Thailand. The Community-Based Integrated Rural Development Center (CBIRD), situated approximately four kilometers outside the provincial capital of Maha Sarakham, is one among thirteen throughout the country. CBIRD Maha Sarakham represents the efforts of PDA to expand its services beyond its original family planning program to include the development of the rural poor. It is now undertaking a wide range of development activities including community afforestation. Realizing that rural people have the potential to plant trees on degraded land to improve the physical environment of rural villages, PDA promotes planting fast growing, hardwood and fruit trees in public places within the villages, on private land and in community woodlots adjacent to the village. CBIRD teaches the villagers techniques of propagation, transplanting, grafting, and maintenance of trees. By encouraging the villagers to plant "economic forests" with a mixture of trees, it is anticipated that many of the minor forest products and wildlife will reappear. Most community woodlots promoted by PDA are relatively small as compared to those promoted by RFD, and are funded by the Local Development Assistance Program (LDAP), the German Government, and the United Nations. The major objective of the PDA in promoting community woodlots is to encourage reforestation by rural people and to reduce deforestation of local forests. Choices of tree species and management of benefits from woodlots are based on the villagers' own decisions. This means that villagers decide which species of trees to plant and for what purposes. There

were a total of 33 community woodlots implemented in the Northeast of Thailand in 1988. Of these 33 community woodlots, 8 are in Khon Kaen, 14 in Maha Sarakham, and 11 in Burirum provinces.

In 1987, Mr. Thongsuk Pongsongkram, an employee of CBIRD Maha Sarakham Center, brought the idea of the community woodlot to the Srisuk sub-district council, and asked if there was any public land available in Srisuk sub-district for planting trees. He talked to Mr. Suk Neungpho, the village headman of Ban Don Bark, and found that the public land locally called 'Nong E-Jone', once a forested land, might be appropriate to establish a community woodlot. Nong E-Jone public land covers an area of 82 rai approximately, 27 of which are swampy, and was used for grazing at that time. Mr. Thongsuk justified the proposed community woodlot project by reasoning that there was no forested land in Don Bark village. If the villagers adopted this project, the community woodlot would be a future source of fuelwood and construction materials. Being interested in the proposed project himself, Mr. Suk organized a meeting with his villagers and found that most villagers agreed with the proposed community woodlot project because they were satisfied with the conditions offered by the PDA. The villagers had only to provide labor and poles for making fences around the woodlot, and the PDA was to provide seedlings, equipment, and technical support. Although some villagers disagreed with the proposed project because they were afraid of losing grazing area, they eventually had to follow the majority's consensus. The decision-making process took less than a month.

5.3.2 Implementation and Management

Once the project had been adopted in principle, Mr. Suk immediately began to form a community woodlot committee to help coordinate villagers and PDA staff. Unlike

Kok Peeba community woodlot where the committees were elected by the villagers, the members of the community woodlot committee were appointed by Mr. Suk. Because some members of the first committee did not cooperate well, the village headman dissolved it and set up a new committee made up of some members from the former committee who were still willing to work and new ones. Later, dates for planting and fencing were set. The tree species to be planted offered by the PDA were *Eucalyptus camaldulensis, Acacia auriculiformis, Leucaena leucocephala*, and *Cassia siamea.* Initially, most villagers agreed with all tree species offered, except *Eucalyptus* because they had heard about the negative impacts of *Eucalyptus* on the environment. However, once they learned that *Eucalyptus* was a fast-growing tree and could be sold for cash, the villagers decided to give it a try. Although the villagers were free to select the tree species themselves, not all tree species preferred could be provided due to the limits on the numbers of tree species offered by the PDA.

It was decided that only 35 rai of Nong E-Jone public land would be used for their first woodlot to plant these four tree species. The area of 35 rai was divided into four plots for the planting of *Eucalyptus camaldulensis, Acacia auriculiformis, Leucaena leucocephala*, and *Cassia siamea.* Each household was required to contribute one labor unit and provide 4 poles for making fences. This woodlot was implemented in June, 1987, because it was the rainy season. The lot was planted in one day using 3 x 3 meter spacing, as was suggested by Mr. Thongsuk. Fencing took two 2 days to construct. Maintenance of the community woodlot was voluntarily done twice a year by representatives of all households. The villagers also practiced agroforestry by growing jasmine rice between rows of trees in the woodlot in the first year. The opportunity for growing rice in the woodlot was open to everybody, but only four villagers attempted to do so, and the yield was not very high. However, they were able to grow rice in the

woodlot only in the first year when the trees were still young. Later, they changed to grow grasses in the woodlot where the trees, especially *Leucaena leucocepphala,* were not very well growing. Seeds of Lucy grass were provided by the Grasses Improvement Station in Chiang Yuen district, Kalasin province. The villagers normally do not let their cattle graze in the woodlot, but they the grass in the woodlot and use it to feed their cattle elsewhere.

In the rainy season of 1988, the second woodlot was implemented because the villagers had noticed that the trees planted in the first woodlot were growing quite well and some of Nong E-Jone public land was still unused. Another 25 rai plot of Nong E-Jone public land was used for the second community woodlot. The adoption and tree planting procedures were quite similar to those of the first woodlot, but some tree species planted were different. The did not plant *Leucaena Leucocephala* and *Cassia siamea* in the second woodlot because they were not growing well in the first one. *Eucalyptus camaldulensis, Acacia auriculiformis, Azadirachta indica* (Sadao or Neem), *Tecoma stans*, and *Cassia fistula* were the species planted in the second woodlot. Unfortunately, the trees planted in the second woodlot did not grow as well as those in the first one. However, villagers were able to collect some food from this woodlot. The trees were clear cut by the villagers in December 1991 due to a proposed development project. This project was initiated by a development program called "Isan Khiaw", or "Greening the Northeast", and was undertaken by the military who proposed to construct a reservoir on public land, part of which was once the area of the second community woodlot. The village headman and the villagers felt that the reservoir could be a very important source of water for their village. They also thought that they had already quite enough trees in the first community woodlot. As a result, they decided to adopt this reservoir construction project. After the villagers had cut down all trees in this woodlot, the soil

was found to be too wet to excavate. Accordingly, work was stopped and was to be resumed in the dry season, in April 1991. While this dissertation is being written (July 1993), the villagers are still waiting for the project staff to come back and construct a reservoir as promised. As a matter of fact, the Isan Khiaw project has been altogether given up by the military and the villagers are left with less forest and no reservoir.

Soil Condition and Seedlings Survival: An evaluation study of the Nong E-Jone community woodlot conducted in 1988 by the Research and Development Institute (RDI), Khon Kaen University, indicated that the soil in the Nong E-Jone community woodlot has the following chemical properties:

Organic matter	0.489 %
pH	4.74
Nitrogen	0.023 %
Phosphorus	2.175 ugP/g
Potassium	9.00 ugK/g

Table 11 shows the number of each tree species planted and the survival rate in the first woodlot of 35 rai.

Table 11. Tree Species Planted and Survival Rate in the First Woodlot of Nong E-Jone.

Tree species	No. of trees planted	No.of trees survived	Survival rate (%)
Eucalyptus camaldulensis	2,000	1,344	67.20
Acacia auriculiformis	2,000	1,107	55.35
Leucaena leucocephala	100	91	91.00
Cassia siamea	2,000	1,493	74.65

5.4 Socio-economic Conditions of the Five Villages Studied

Data on general characteristics and socio-economic conditions of the villages studied are presented below. These data are based on both the national survey of villages conducted in 1990 by the Community Development Department, Ministry of Interior, and the data collected during the fieldwork of this research. To make it easier to understand and for the comparing purposes, data are not presented separately village by village. Instead each set of data of the five villages is presented together.

Population

Ban Don Gloy 17 and Ban Don Gloy 6 have the highest population density as compared to the other three villages. As a matter of fact, these two villages used to be the same village bur due to population growth, the village was administratively divided into Ban Don Gloy 6 and 17 in 1988. The division of the village caused no expansion of the village area. Instead, it was divided by using a road between the two villages as a boundary. Among the five villages studied, Ban Don Gloy 6 has the smallest family size (4.3 members per family). Ban Don Gloy 17 and Ban Don Gloy 6 have the highest population density (30.53 and 18.90 persons respectively per rai or .16 hectare) due to the fact that these two villages have smaller village areas as compared to the other three villages (Table 13). And the land is so limited that the village areas of these two villages can no longer be expanded. Population growth and density was very probably the reason why the people of these villages encroached the Kok Peeba public land of Lao district for both agriculture and resettlement.

Table 12. The Total Number of Inhabitants in the Villages Studied Classified by Sex.

Total Population	VILLAGES Yang Sinchai %(N)	NongHad % (N)	DonGloy6 % (N)	DonGloy17 % (N)	DonBark % (N)
Male	47.7(219)	50.0(132)	48.1(191)	49.5(423)	47.9(297)
Female	52.3(240)	50.0(132)	51.9(206)	50.5(432)	52.1(323)
Total	100.0(459)	100.0(264)	100.0(397)	100.0(855)	100.0(620)

Table 13. Village Areas, Population Density, and Family Sizes of the Five Villages Studied.

Villages	Village Areas (rai)	Pop. Density (person/rai)	Family Size (persons)
Yang Sinchai	50	9.18	5.40
Nong Had	30	8.80	5.50
Don Gloy 6	21	18.90	4.30
Don Gloy 17	28	30.53	5.60
Don Bark	50	12.40	5.60

Table 14 shows that more than 55 per cent of the respondents in the villages surveyed, except Ban Nong Had, are householdheads, both male and female. The majority of the respondents in Ban Nong Had (53.3%) are wives of the householdheads. However, there were more female than male respondents in this study. In every village surveyed, except Ban Don Bark, more than 50 per cent of the respondents were women (Table 15). Most female respondents interviewed were wives of the householdheads, although some were householdheads themselves (Table 14). The female respondents identified as householdheads were either widowed or divorced. The female respondents including household heads and wives were able to answer the questions concerning the community woodlots because most of them took part in the community woodlot

activities as well. Table 16 shows the marital status of respondents. Most are married and living together.

Table 14. Respondents Classified by Household Status.

Status in Household	VILLAGES				
	Yang Sinchai %(N)	NongHad % (N)	DonGloy6 % (N)	DonGloy17 % (N)	DonBark % (N)
Male HH. Head	42.1(8)	26.7(4)	45.0(9)	46.1(12)	60.0(12)
Female HH. Head	21.1(4)	20.0(3)	10.0(2)	23.1(6)	10.0(2)
Wives	31.6(6)	53.3(8)	30.0(6)	23.1(6)	30.0(6)
Sons/daughters	5.3(1)	-	15.0(3)	7.7(2)	-
Total	100.0(19)	100.0(15)	100.0(20)	100.0(26)	100.0(20)

Table 15. Respondents Classified by Gender.

Respondents' Gender	VILLAGES				
	Yang Sinchai %(N)	NongHad % (N)	DonGloy6 % (N)	DonGloy17 % (N)	DonBark % (N)
Male	42.1(8)	26.7(4)	45.0(9)	46.2(12)	65.0(13)
Female	57.9(11)	73.3(11)	55.0(11)	53.8(14)	35.0(7)
Total	100.0(19)	100.0(15)	100.0(20)	100.0(26)	100.0(20)

Table 17 shows that the ages of most respondents in Ban Nong Had, Ban Don Gloy 6, and Ban Don Bark range from 41 to 50. The age of most respondents in Ban Yang Sinchai and Ban Don Gloy 17 fall between 31 to 40, and 51 to 60, respectively.

Table 16. Respondents Classified by Marital Status.

Marital Status	VILLAGES				
	Yang Sinchai %(N)	NongHad % (N)	DonGloy6 % (N)	DonGloy17 % (N)	DonBark % (N)
1. Single	5.3(1)	-	-	3.8(1)	3.8(1)
2. Married and living together	73.7(14)	66.7(10)	85.0(17)	76.9(20)	80.0(16)
3. Married and spouse working off-site	-	-	-	-	5.0(1)
4. Married but staying separately (without legal divorce)	-	-	5.0(1)	-	-
5. Widowed	21.1(4)	33.3(5)	10.0(2)	19.2(5)	10.0(2)
Total	100.0(19)	100.0(15)	100.0(20)	100.0(26)	100.0(20)

Table 17. Respondents Classified by Age Groups.

Respondents' Age Groups	VILLAGES				
	Yang Sinchai %(N)	NongHad % (N)	DonGloy6 % (N)	DonGloy17 % (N)	DonBark % (N)
< 20	-	-	-	3.8(1)	-
21 - 30	5.3(1)	-	5.0(1)	-	15.0(3)
31 - 40	36.8(7)	6.7(1)	35.0(7)	19.2(5)	15.0(3)
41 - 50	15.8(3)	46.7(7)	35.0(7)	23.1(6)	30.0(6)
51 - 60	15.8(3)	33.3(5)	5.0(1)	30.8(8)	25.0(5)
61 - 70	26.3(5)	13.3(2)	20.0(4)	19.2(5)	5.0(1)
71 - 80	-	-	-	3.8(1)	10.0(2)
Total	100.0(19)	100.0(15)	100.0(20)	100.0(26)	100.0(20)

Education Level

Among the 100 respondents interviewed, more than 80 per cent of the respondents in every village finished grade 4, which once was the compulsory education level for everybody in Thailand. The new educational system requires students to finish

grade 6 as a minimum. Only four respondents had never been to school. There is only one respondent, from Ban Don Gloy 6, who went to university and received a B.A. degree and is now teaching at the village school (Table 18).

Table 18. Respondents Classified by Educational Levels.

Educational Level	VILLAGES				
	Yang Sinchai %(N)	NongHad % (N)	DonGloy6 % (N)	DonGloy17 % (N)	DonBark % (N)
No schooling	5.3(1)	6.7(1)	-	-	10.0(2)
Below grade 4	-	-	-	3.8(1)	-
Grade 4	89.5(17)	93.3(14)	85.0(17)	80.8(21)	85.0(17)
Grade 5-7	-	-	5.0(1)	7.7(2)	5.0(1)
Grade 8-10	5.3(1)	-	5.0(1)	3.8(1)	-
Occupational school	-	-	-	3.8(1)	-
University	-	-	5 .0(1)	-	-
Total	100.0(19)	100.0(15)	100.0(20)	100.0(26)	100.0(20)

Occupation

More than 80 per cent of the respondents in every village are engaged in agriculture, mainly rice farming. (Table 19) Glutinous rice is the most important subsistence crop. Except for Ban Don Bark, which does not have any upland areas, the villagers of the other four villages also grow upland crops, i.e. cassava which is the most important cash crop. The respondents not working are those who are too old to work in the farm (66-78 years old) and normally help looking after the children at home. One 50 year-old respondent in Ban Nong Had reported that she was not able to work in the farm because she had to look after her grandson.

Table 19. Respondents Classified by Occupations.

Occupations	VILLAGES				
	Yang Sinchai %(N)	NongHad % (N)	DonGloy6 % (N)	DonGloy17 % (N)	DonBark % (N)
Agriculture	84.2(16)	80.0(12)	90.0(18)	73.1(19)	80.0(16)
Gov't services	-	-	5.0(1)	3.8(1)	-
Waged labor	15.8(3)	13.3(2)	-	23.1(6)	5.0(1)
Not working	-	6.7(1)	5.0(1)	-	15.0(3)
Total	100.0(19)	100.0(15)	100.0(20)	100.0(26)	100.0(20)

Land Ownership and Land Holding

The size of land owned by the individual respondents ranges from zero to more than 80 rai. The wide range of the size of land owned may be the result of the sampling method employed in this study. As already mentioned in the previous chapter, the key informants were asked to classify the villagers into three economic strata, i.e., large-farm, medium-farm, and small-farm. Among other criteria, the size of land owned was one of the most important factors used in assigning the villagers into different economic groups. The better-off farmers are considered as owning more land than do the poor. However, the ranges of the size of land owned by the better-off or large-farm farmers are not the same in every village because the availability of the land resource varies. In Table 18 it is obvious that the ranges of the largest size of land owned by the respondents varies from village to village. In Ban Don Bark, the largest size of land owned by the large-farm farmers falls between 41 -50 rai, whereas the large-farm farmers in Ban Don Gloy 6 and 17 own more than 80 rai. This result is the average size of land owned in each village which appears in Table 21 and shows that Ban Don Bark has the smallest average (12.30 rai) while Ban Nong Had has the largest average size of land owned (30.27 rai). More interestingly, when using land ownership documents as criteria, the landless in Ban Don Bark make up to 40 per cent of the respondents interviewed, the highest among the five

villages studied. Among the eight landless farmers, only two proved to be really landless. Another six owned no land, but worked in their parents' farm and shared the agricultural produce with their brothers and sisters. These people were not considered landless by the key informants because most of them have already been given a piece of land from their parents, but the ownership is not yet been legal. For such cases, they might have been put in either the group of small-farm or medium-farm farmers depending on how much land they were to receive. It is found that the landless who are considered really poor are those who earn their living by working as waged laborers or those who have to rent land.

The size of land owned and the size of land holdings in each village can be seen in Tables 20 and 21. The size of land holding is the size of land the villagers are really working on or using, regardless of their ownership. It includes the land owned, the land rented, and the land used free of charge, but excludes the land rented out. There are fewer cases of respondents who have zero landholding in Table 21 than of the landless shown in every village in Table 20, except in Ban Nong Had which remains the same. The reason might be that some of the landless rented some land. For example, the respondents of Ban Don Gloy 6 who own more than 80 rai rented out some of the land they own. As a result, nobody in Ban Don Gloy 6 holds more than 80 rai of land in Table 21, while it appears in Table 20 that two respondents own more than 80 rai of land. Table 22 gives some information regarding land used for agriculture, and shows that, except for Ban Don Gloy 6, the average sizes of land holding are larger than the average sizes of land owned. This implies that some of the respondents, if not working on someone else's land free of charge, tend to rent more land, either because they are landless or because the land they own is too small to feed their families.

The survey found that more than 90 per cent of the respondents who own both farmland and upland have the type of land document called N.S.3, which gives them the

rights over their land. This type of document gives villagers the rights to transfer their land with a restriction on transfer from 5-10 years. It is also acceptable as collateral. The maximum period of legal protection is one year, and the period of right for preemption is five years for this kind of document. This type of document is considered quite secure as compared to other types of documents. It is only second to the document called N.S.4, which is considered the best type of land ownership document.

Table 20. Respondents Classified by the Size of Land Owned.

Size of Land Owned (rai)	VILLAGES				
	Yang Sinchai %(N)	NongHad % (N)	DonGloy6 % (N)	DonGloy17 % (N)	DonBark % (N)
Landless	36.8(7)	6.7(1)	30.0(6)	19.2(5)	40.0(8)
1 - 5	-	6.7(1)	-	15.4(4)	-
6 - 10	15.8(3)	6.7(1)	20.0(4)	7.7(2)	-
11 - 20	0.5(2)	20.0(3)	15.0(3)	15.4(4)	45.0(9)
21 - 30	15.8(3)	13.3(2)	5.0(1)	7.7(2)	5.0(1)
31 - 40	5.3(1)	13.3(2)	5.0(1)	11.5(3)	5.0(1)
41 - 50	-	20.0(3)	5.0(1)	-	5.0(1)
51 - 60	-	6.7(1)	10.0(2)	7.7(2)	-
61 - 70	10.5(2)	6.7(1)	-	7.7(2)	-
71 - 80	5.3(1)	-	-	-	-
> 80	-	-	10.0(2)	7.7(2)	-
Total	100.0(19)	100.0(15)	100.0(20)	100.0(26)	100.0(20)

Table 21. Respondents Classified by Total Land Holding.

Total Land Holding (rai)	VILLAGES Yang Sinchai %(N)	NongHad % (N)	DonGloy6 % (N)	DonGloy17 % (N)	DonBark % (N)
0	26.3(5)	6.7(1)	20.0(4)	7.7(2)	10.0(2)
1 - 5	-	6.7(1)	-	3.8(1)	-
6 - 10	5.8(3)	6.7(1)	10.0(2)	19.2(5)	10.0(2)
11 - 20	15.8(3)	13.3(2)	20.0(4)	26.9(7)	60.0(12)
21 - 30	10.5(2)	13.3(2)	25.0(5)	7.7(2)	10.0(2)
31 - 40	10.5(2)	20.0(3)	10.0(2)	11.5(3)	5.0(1)
41 - 50	-	20.0(3)	5.0(1)	3.8(1)	5.0(1)
51 - 60	-	6.7(1)	10.0(2)	7.7(2)	-
61 - 70	10.5(2)	6.7(1)	-	7.7(2)	-
71 - 80	5.3(1)	-	-	-	-
> 80	5.3(1)	-	-	3.8(1)	-
Total	100.0(19)	100.0(15)	100.0(20)	100.0(26)	100.0(20)

Table 22. The Sizes of Land Owned and of Land Holding by Average.

Size of Land by Average (rai)	VILLAGE Yang Sinchai (rai)	NongHad (rai)	DonGloy6 (rai)	DonGloy17 (rai)	DonBark (rai)
Land owned	19.58	30.27	24.35	25.35	12.30
Land holding	25.53	31.80	21.00	27.04	16.85

Livestock

More than 50 per cent of the households interviewed own at least one buffalo. The largest numbers of buffaloes owned are found in Ban Don Gloy 17 and Ban Nong Had, which are 9 and 7 respectively. Buffaloes are mainly used as draught labor on the farm. Less than 45 per cent of the respondents in every village, except for Ban Nong Had, own cows. The purpose of raising cows is mainly for trade. Very few respondents raise hogs, and only in Ban Yang Sinchai and Ban Don Gloy 17.

Migration

When asked about migration, most respondents said they had never migrated anywhere for a job (Table 23). None of the respondents in Ban Yang Sinchai ever migrated for employment outside the village. However, the percentage of migration for outside employment is relatively high in Ban Don Bark (45 %). The migration found in every village was seasonal, and the main purpose of migration was for employment. It might be possible that the high rate of migration in Ban Don Bark was due to the limitation of land. Ban Don Bark not only has the smallest average size of land owned and of land holding as compared to the other four villages, but also has no upland at all. This means that the villagers in Ban Don Bark rely solely on rice farming, mainly for household consumption, whereas villagers in the other four villages can have their supplementary income from upland crop, i.e. cassava. It is found that one respondent in Ban Don Bark and two respondents in Ban Don Gloy 17 have been to middle-east countries for employment.

Table 23. Migration Classified by Villages.

Migration	VILLAGES				
	Yang Sinchai %(N)	NongHad % (N)	DonGloy6 % (N)	DonGloy17 % (N)	DonBark % (N)
Yes	-	6.7(1)	10.0(2)	19.2(5)	45.0(9)
No	100.0(19)	93.3(14)	90.0(18)	80.8(21)	55.0(11)
Total	100.0(19)	100.0(15)	100.0(20)	100.0(26)	100.0(20)

5.5 Summary

The two community woodlots studied are located in the same province, Maha Sarakham, in northeast Thailand, but were initiated by different agencies in different years. The first community woodlot, Kok Peeba, covers an area of 800 rai, was proposed by the Royal Forest Department (RFD) through USAID funding in 1982, with the major

objectives of supplying fuelwood to and of generating income for the project beneficiaries. The decision to adopt the project was done between the RFD staff and the Lao sub-district council with no direct involvement of local villagers. The project was originally planned to benefit only two villages, i.e., Ban Yang Sinchai and Ban Nong Had. Due to conflicts in the use of Kok Peeba public land, Ban Don Gloy 6 and Ban Don Gloy 17 were also allowed to join the project. The RFD provided free *Eucalyptus* seedlings and hired local villagers to work for the project. A community woodlot committee was formed under a supervision of the RFD staff. These committees were directly elected by the villagers. After the project had been implemented, the RFD staff transferred their responsibility to the community woodlot committee, which later played a key role in managing the woodlot both physically and financially, under occasional supervision of the RFD staff.

The second community woodlot, Nong E-Jone, covers an area of 35 rai, and was initiated in 1987 by the Population and Community Development Association (PDA), a Thai non-government organization. The main objectives of the project were to encourage tree planting to improve the physical environment of rural villages and to reduce deforestation of local forests. In the Nong E-Jone community woodlot project, the villagers of Ban Don Bark were directly involved in the decision to adopt the project and to select the tree species to be planted, which included *Eucalyptus camaldulensis, Acacia auriculiformis, Leucaena leucocephala,* and *Cassia siamea.* The community woodlot committee members were not elected, but were appointed by the village headman.

Both Kok Peeba and Nong E-Jone woodlots were introduced to the communities by outside agencies. However, the objectives and approaches employed in the two projects were different. The historical background of both community woodlots has described how the two woodlots were initiated and implemented. The reason to adopt the

Kok Peeba community woodlot by the Lao sub-district council, in fact, was to drive away the villagers of Ban Don Gloy from Kok Peeba public land, whereas the decision to adopt the Nong E-Jone community woodlot was based on the villagers' awareness of forest resource problems. As for people participation in the projects, the villagers in Nong E-Jone project were involved in the decision making process to adopt the woodlot and in the selection of tree species, while the villagers in Kok Peeba were not. However, people participation in Kok Peeba woodlot did occur through meetings with the woodlot committee members in the later stage of the project to discuss how project activities should be implemented and how benefits should be distributed. It was found that the villagers in Nong E-Jone project were not hired to work in all project activities with their woodlot committee members, while the villagers in Kok Peeba project were paid for most woodlot activities they participated in. It is clear at this point that the two woodlots have some differences in the process of project formulation and implementation. This raises the question of whether the benefits to villages differ under the two different approaches employed in Kok Peeba and Nong E-Jone, as will be discussed in Chapter 6.

This chapter has also presented a picture of the study areas by describing the general characteristics and socio-economic conditions of the areas studied at the provincial, district, and village levels. In general, there is no significant difference in geographical and demographic characteristics among the five villages studied, although the first four villages (which share Kok Peeba community woodlot) and the fifth village (which owns Nong E-Jone community woodlot) are situated in different districts. The field survey also indicates that the populations under study are quite homogenous in terms of educational background and occupation. The security of land rights over their farmland is also quite similar among the five villages.

The next chapter describes the roles of community woodlot committees and the dimensions of people participation in both woodlots studied. It then discusses the relationships between variables in the propositions. Finally, it presents other impacts of the community woodlots on both the rural villagers and the physical environment.

CHAPTER 6

ANALYSIS OF DATA

This chapter describes the roles of community woodlot committees and gives a detailed analysis of how the community woodlots benefited the populations in the villages studied. A presentation of how the villagers in different economic strata benefit from the two community woodlots is made village by village, starting with Ban Yang Sinchai, continuing with Ban Nong Had, Ban Don Gloy 6, Ban Don Gloy 17, and finishing with Ban Don Bark. Afterward the relationships between variables in the research propositions presented in Chapter 3 are discussed. Finally, a discussion on the similarities and differences of impacts resulting from the two different community woodlots studied is presented.

6.1 Kok Peeba Community Woodlot

6.1.1 The Role of Kok Peeba Community Woodlot Committee

The committee of the Kok Peeba community woodlot is comprised of six official members. Three out of six members (one being a village headman) are from Ban Yang Sinchai, the other three (one being a village headman of Ban Nong Had) are from Ban Nong Had. In addition to the six official members of Kok Peeba community woodlot committee, there are three more representatives from Ban Yang Sinchai, two from Ban Nong had, four from Ban Don Gloy 6, and three from Ban Don Gloy 17, for a total of 18 members. The village headmen of Ban Don Gloy 6 and Ban Don Gloy 17 are also in the group of representatives. All 18 committee members are either formal leaders or the most respected persons in the villages.

The groups of representatives from each village may be called sub-committees. The sub-committees are required to participate in the meetings with the official committee and to adopt the same principles or rules in managing the woodlot. These

committee meet regularly every 2-3 months. Normally, the committee are responsible for all kinds of woodlot activities as well as for deciding on how to distribute the benefits. However, they do listen to the voices of their villagers.

Although all committee were elected by the villagers and work on a voluntary basis, they receive wages for their labor. Every time the committee worked in the woodlot, they get paid at the same rate as the villagers (30 baht per day). Not all woodlot committee members work at the same time. There has been a rotation of representatives from all 4 villages to work in the woodlot. Nor do they work all year round. The major responsibilities of the committees are as follows:

(1) Maintenance of woodlot

The committee have a duty to investigate the physical conditions of the woodlot from time to time. For example, they have to see which plots need thinning or weeding, and decide when to hire the villagers to work. If there is little work, the committee members might do it themselves. The committee members also have to prevent the trees from being cut down without permission. They have further responsibility in that they have to report the chairman any problem they come to know about

(2) Selection of villagers

The woodlot committee determine what woodlot activities are required and when they should be performed. They then determine how many villagers need be hired to work in the woodlot each time. Next, the sub-committees of each village inform their villagers about the activities that need be done and the number of workers needed. Normally, priority of employment is given to the poor villagers in each village.

(3) Training

The community woodlot committee members represent the villagers in training about forestry-related subjects provided by the provincial or district forestry office.

When the representatives who attended the training return to the village, they are supposed to share the knowledge learned from the training with the villagers. However, it was found that this does not frequently occur.

(4) Coordinating with the government agencies

The committee, especially the six official ones, coordinate from time to time with the government agencies concerning the community woodlot project. For example, in 1987 when the funding from USAID was terminated, the committee requested the district forestry officer to get them more seedlings from other places by using the money obtained from selling trees in the woodlot. Many times, the district forestry officer coordinated with the woodlot committee to prepare for the visit of foreigners to the woodlot. However, the contact between the district forestry officer and the woodlot committees has been less frequent since the project was implemented.

(5) Distribution of benefits

One of the major responsibilities of the community woodlot committee is to determine how the benefits should be distributed among the villagers. The tangible benefits of the community woodlot include cash income, employment, fuelwood, building materials and mushrooms. The income from the woodlot does not go directly to the villagers, but belongs to the communities under the management of the community woodlot committees. The other benefits go directly to the villagers. Before the first tree harvest, the community woodlot committee never considered the commercial benefits of the woodlot. They only wondered how they should distribute the fuelwood benefits to villagers, as the main objective of having the woodlot was to provide fuelwood to their villages. Ban Don Gloy proposed that the trees in the woodlot be harvested and used solely for fuelwood. This idea was not accepted because cash income from selling *Eucalyptus* trees turned out to be the major benefit from the woodlot, not fuelwood as

they had expected. So the community woodlot committee decided to sell the trees to middlemen, and the villagers were allowed to collect only the unwanted parts of trees for fuelwood.

It was agreed by the committee and villagers that the total income derived from selling *Eucalyptus* trees each year was to be divided into three major funds for different purposes: **a community woodlot maintenance fund, a sub-district council development fund, and a community woodlot revolving fund**. The community woodlot maintenance and sub-district development funds are run by the committee of Ban Yang Sinchai, the village in which Mr. Dee Dankamsan, the chairman of the community woodlot committee, lives. The **community woodlot maintenance fund** has been mainly used on buying *Eucalyptus* seedlings and for maintaining the woodlot. Since the discontinuance of USAID funding in 1984, the community woodlot committee have continued the woodlot activities by reserving part of the income from selling *Eucalyptus* poles to maintain the woodlot. This fund has been used to hire villagers to plant more trees and to do weeding, and to hire the community woodlot committees to take care of the woodlot. In 1989, the community woodlot maintenance fund was also spent on planting a natural forest 12 rai in size on the occasion of the birthday of the King's mother. Since 1987, The **sub-district council development** fund has been strictly spent on maintaining a meeting center located in Ban Yang Sinchai. This meeting center is where the village headmen of Lao sub-district council meet to discuss the issues related to village development and meet the villagers.

The **community woodlot revolving fund** is divided among the four villages: Ban Yang Sinchai, Ban Nong Had, Ban Don Gloy 6, and Ban Don Gloy 17. It is independently managed by each village on the basis of the consensus between the members of the community woodlot committee, who have responsibility at the village

level, and the villagers. So far, the community woodlot revolving funds have been spent on activities such as improving village infrastructure (road, fences, temple), lending money to villagers at low interest rates for agricultural and health purposes, and buying fertilizer and water jars in order to sell them to villagers at prices lower than that of the market. However, the income from selling *Eucalyptus* trees each year is not equally divided among the three funds. The committee considers how much money is needed for each activity every year and then allocates the money according to the needs for each activity. Normally the community woodlot revolving fund is equally sub-divided among Ban Yang Sinchai, Ban Nong Had, and Ban Don Gloy. When Ban Don Gloy, was administratively divided into two villages in 1988, namely Ban Don Gloy 6 and Ban Don Gloy 17, the community woodlot revolving fund for Ban Don Gloy was again equally sub-divided into two village development funds. And Ban Don Gloy 6 and Ban Don Gloy 17 have independently managed their own community woodlot revolving fund since.

The community woodlot committee provided 6,000 baht from the total income generated in 1989 to buy file cabinets for the district forestry office, and 30,000 baht from the total income of 1991 to improve the flag pole and to restore the landscape of the district office. Table 24 gives details on how the income from selling *Eucalyptus* trees has been allocated and spent among the villages.

Table 24. Areas Planted and Harvested, Income Earned, and Management of Benefits in the Kok Peeba Community Woodlot from 1982-1991.

Years planted	Area (rai)	Years harvested	Income (baht)	Villages & benefits (baht)	Management of benefits
1982	50	1987	210,000	-Yang Sinchai 50,000	-Fertilizer sold to villagers at low price.
				-Nong Had 50,000	- Ibid.
				-Don Gloy 50,000	-Construction of temple.
				-Tambon council 20,000	-Improvement of meeting center.
				-Woodlot fund 40,000	- Buying seedlings and hiring villagers to plant and prune trees.
1983	130	1988	260,000	-Yang Sinchai 55,000	- Providing loans to villagers with 2% interest rate/month. The interest rate was exempted on loans for construction of latrine and water jar.
				-Nong Had 55,000	- Ibid.
				-Don Gloy 6 27,500	- Fertilizer sold to villagers at low price.
				-Don Gloy 17 27,500	- Ibid.
				-Tambon council 20,000	
				-Woodlot fund 75,000	-Wages for planting and thinning trees.

Table 24 (cont'd).

Years planted	Area (rai)	Years harvested	Income (baht)	Villages & benefits (baht)	Management of benefits
1984	100	1989	80,000	-Yang Sinchai 20,000 - Nong Had 20,000 - Don Gloy 6 10,000 - Don Gloy 17 10,000 -Tambon council 10,000 -Woodlot fund 10,000	-Village running water. - Village running water. - Fertilizer for villagers at lower price. - Fertilizer for villagers at lower price.
END OF USAID FUND					
1985	No planting				
1986	No planting				
1987	50	-	-	-	-
1988	70	-	-	-	-
1989	50	-	-	-	-
	-	-	260,000	-Yang Sinchai 64,667	- Providing loans to villagers with 2% interest rate/month. The interest rate was exempted on loans for construction of latrine and water jars.
	(2nd generation of plot planted in 1982 sold for 150 rai)				

Table 24 (cont'd).

Years planted	Area (rai)	Years harvested	Income (baht)	Villages & benefits (baht)	Management of benefits
				-Nong Had 64,667	- Same as Yang Sinchai
				-Don Gloy 6 32,333	- 20,000 baht for improvement of village road, buying water jars and fertilizer for villagers at low prices.
				-Don Gloy 17 32,333	- Providing loans to villagers with 10% interest rate/year, buying additional fertilizer for every household.
				-Tambon council 20,000	
				-Woodlot fund 40,000	- 30,000 baht to plant natural forest for 12 rai on the occasion of birthday of the King's mother.
				-Additional uses 6,000	- Purchase of file cabinets for district forestry office
1990	no planting				

Table 24 (cont'd).

Years planted	Area (rai)	Years harvested	Income (baht)	Villages & benefits (baht)	Management of benefits
1991	(2nd generation of plot planted in 1983 sold for 130 rai		200,000 40,000	-Yang Sinchai	-Adding to the existing community woodlot revolving fund.
				-Nong Had 40,000	- Ibid.
				-Don Gloy 6 20,000	- Not decided yet.
				-Don Gloy 17 20,000	-Improvement of village road with 50% contribution from villagers.
				-Tambon council 20,000	
				-Woodlot fund 30,000	
				-Additional uses 30,000	-Providing 30,000 baht for improvement of flag pole and land scaping for the district office.
1991	(2nd generation of plot planted in 1984 sold for 100 rai)		100,000	-Yang Sinchai 30,000	
				-Nong Had 30,000	
				-Don Gloy 6 15,000	
				-Don Gloy 17 15,000	
				-Tambon Council 10,000	

Employment is considered as another benefit from the community woodlot. The committee members and the villagers in the Kok Peeba community woodlot project were paid for their labor for activities such as planting, thinning, and weeding. The wage rate per day ranged from 30 to 40 baht. The committee members were also paid for taking care of the woodlot. The eighteen committee members rotate for the supervision of the woodlot. This might be why some villagers complained that the committees got more employment than the villagers. The committee also make decisions on who is to be hired to work in the woodlot. Normally, the quota of villagers to be hired is set for each village by the committees, and the sub-committees of each village inform their villagers of the decision.

It is reported that priority for employment was given to the poor villagers. However, some villagers complained that some committee members tend to hire only their relatives. Data on who was employed and in what activities are not available since the committees did not keep records. Thus, it is not possible to conclude to what extent widespread employment has been generated by the woodlot.

As for the benefit in terms of fuelwood, villagers normally are allowed to collect fuelwood in the community woodlot on two occasions. The first instance is after *Eucalyptus* trees have been sold and harvested by the middleman. The 3-inch top diameter, the standard set by the paper making company, is located. Then the stem is cut 2.5 meters above the 3" diameter. This is the merchantable volume. From this, the upper end stems are cut off and are either given or sold to villagers for fuelwood. The other instance is when villagers are allowed to collect fuelwood when the coppice shoots of *Eucalyptus* need thinning. Normally, the villagers keep only 2-3 coppice shoots and later cut the rest for fuelwood or for other uses. It must be noted that fuelwood collection in the woodlot can happen as little as once a year or can occur many times in the same year, depending on how frequent the trees are sold and how frequent the thinning of branches is performed. The agreements made between the community woodlot committee and the middleman vary every year, because the committee does not sell the trees to the same

middleman every year. That is why some years the villagers had to buy fuelwood, and some years received for free. Normally, the community woodlot committee will sell the trees to the middleman who gives them the best price. Thus the price of *Eucalyptus* obtained by the community woodlot committee will be higher from the middleman who wants to keep half of the upper end stems of *Eucalyptus* to sell to the villagers as fuelwood than the price offered by another one who will give fuelwood to the villagers. It is reported that people from other villages and Kosumphisai town occasionally came to buy fuelwood from the woodlot.

The villagers did not get much benefit in terms of building materials because all the trees in the woodlot were sold for cash income. What they were allowed to collect, the branches of *Eucalyptus* trees, are good only for making fences around the houses. It is the rule that the villagers cannot cut any branches of trees in Kok Peeba community woodlot unless they have received permission to do so. This rule applies to all four villages which share the woodlot. When the committee think that the trees are big enough to be lopped, all villagers are informed. Normally, each household will send one representative, a man or a woman, to help work in the woodlot, and their work is closely supervised by the community woodlot committee. The branches are then distributed among the villagers. The smaller ones are normally used for fuelwood, while the bigger ones are used for building materials. The woodlot committee occasionally gave permission to cut big trees for development activities. For example, Ban Tan village was given some trees for building materials for the village development. Ban Don Gloy was also allowed to cut some trees in the woodlot to make building materials to improve the temple. The woodlot has also benefited the local government. The district government officials sometimes asked for *Eucalyptus* poles from the woodlot committee when they needed building materials for district development activities. The woodlot committee reported that they were willing to contribute building materials or cash from the woodlot as long as it is for development.

Food is another benefit from the Kok Peeba community woodlot. The only kind of food from the Kok Peeba community woodlot has been the so called *Eucalyptus* mushroom. The respondents reported that this kind of mushroom was not available until they had the woodlot. The mushroom only grows in the woodlot in the rainy season,

which is why it is called *Eucalyptus* mushroom. Most villagers found this kind of mushroom an excellent food.

6.1.2 People Participation in Kok Peeba Community Woodlot

(1) Participation in decision making

The Kok Peeba community woodlot was initiated by the Royal Forest Department and only a few local leaders from Ban Yang Sinchai and Ban Nong Had were involved in the decision making process to adopt the project. The decision making was made strictly by the Lao sub-district council and village development committees of Ban Yang Sinchai and Ban Nong Had through meetings with forestry officers. In other words, the villagers of Ban Yang Sinchai, and Ban Nong Had were not consulted, and the community woodlot committee were elected only after the decision to adopt the project had been made. The villagers of Ban Don Gloy 6, and Ban Don Gloy 17 were not consulted at all because these two villages do not have any legal rights over Kok Peeba public land. As a result, most villagers did not understand the objectives of the project. In addition, some members of the village development committee, who had direct contact with the forestry officers, not only did not understand the objectives of the project, but also were not sure about the rights of the villagers to harvest the trees after the community woodlot had been implemented.

(2) Participation in project implementation

Participation, however, did occur when implementing the project. From the author's experience working with development agencies in Thailand, free labor is preferred in rural development projects because many people perceive it as the villagers' contribution to the projects. In this case, however, the RFD agreed with the village development committee that the paid labor approach would be used. People participation in implementing the project therefore was in the form of paid labor. Initially, the tree planting committee seemed to play a major role at this stage because they selected the villagers to be hired to plant the trees. This had led to the problem of unfairly selecting villagers to be hired as indicated by some of the respondents who were not hired. Those who were hired were closely supervised by the committee and project staff in planting trees.

A baseline survey of the Kok Peeba project, conducted by CUSRI (Phutaraporn:1983), indicated that the villagers tended to wait for assistance from the government, rather than to help themselves. Although the villagers realized that a fuelwood shortage problem might occur in the near future, they were not very willing to participate without compensation at the beginning of the project. The chairman of the community woodlot committee also reported that he was not sure whether the free labor approach would be possible for the project. However, free labor participation did occur once in May 1991. At that time, there was a contest to select the most beautiful village in Kosumphisai district. Ban Yang Sinchai was representing Lao sub-district for the contest. To help develop and beautify Ban Yang Sinchai, some building materials were needed. Volunteers were available because it was the tradition that the villagers must help in their village development activities.

The community woodlot committee asked the villagers in all four villages to help lop the branches of Eucalyptus. The bigger branches were given to Ban Yang Sinchai for making fences, while the villagers collected the smaller twigs for fuelwood. Most villagers cooperated very well in the activity. Each village helped work in the woodlot for two days. This seems to suggest that free labor participation, in fact, is possible under certain conditions. Nevertheless, the villagers currently are still hired to lop branches of trees and weed the woodlot from time to time, because the paid labor approach has been used since the beginning of the project. It is reported that not every villager wants to work in the project because they can get other jobs with higher wages in the area.

(3) Participation in benefits

Ideally, every villager is eligible to receive benefits from their community woodlot on the same basis. However, not all villagers received benefits from the community woodlot for several reasons. Some villagers did not get loan, fuelwood, or building materials because they did not want them. Some villagers asked for loans, but received none. Some villagers got fuelwood for free, but some had to pay for it. Details on participation in benefits is presented in the next section.

6.1.3 The Benefits of Kok Peeba Community Woodlot to Local Villagers in the 4 Villages Studied

(1) Loans

In the first year (1987), the sub-committee of Ban Yang Sinchai decided to spend the money earned from the woodlot to buy fertilizer from the state's central market for agriculture, whose prices are lower than the prices in the general market. The committee resold the fertilizers to the villagers with little profit. The profit made from the sales went back to the community woodlot revolving fund.

In 1988, after the trees of the second plot of woodlot had been sold, the committee were not able to buy cheap fertilizer from the market as they had done the previous year, so they decided to loan the community woodlot revolving fund to needy villagers. The major purpose of providing loans was for agriculture. The interest rate was two per cent/month for those who used the loan for household consumption and for buying fertilizer from the market, but two and one half per cent/month for those who got the loan for commercial investment. Those who used the loan for building latrines and for making water jars were not charged interest because the committees considered latrines and large water jars necessary for villager health. Normally, the loan was given up to 2,000 baht per household for a year, but the committee could agree to loan more than 2,000 baht, if necessary.

In 1989, the community woodlot revolving fund was spent to provide the village with tap water. This was combined with money received by Ban Yang Sinchai from the government for a village tap water project. The villagers also had to make some contributions to this project, especially for those who wanted the pipeline installed into their house. Besides the regular loan, Ban Yang Sinchai also provides emergency loans for the maximum of 30,000 baht for a one month period with 2 per cent interest rate. So far the community woodlot revolving fund of Ban Yang Sinchai has been mainly used as loans for the villagers.

In Ban Yang Sinchai, more than 80 per cent of the villagers across every economic stratum have received loans from the community woodlot revolving fund (Table 25). The purposes of such loans have been for household expenses, buying fertilizer, and for education. However, no respondents reported getting cheap fertilizer

directly from the community woodlot committee.

Table 25. Benefits from the Community Woodlot Revolving Fund Classified by Economic Status Across Villages.

Economic Status	Benefits* % (N)				
	1	2	3	4	5
Large Farmers					
Ban Yang Sinchai	80.0(4)	-	-	-	20.0(1)
Ban Nong Had	60.0(3)	-	40.0(2)	-	-
Ban Don Gloy 6	20.0(1)	60.0(3)	20.0(1)	-	-
Ban Don Gloy 17	-	60.0(3)	40.0(2)	-	-
Medium Farmers					
Ban Yang Sinchai	87.5(7)	-	-	-	12.5(1)
Ban Nong Had	60.0(3)	20.0(1)	-	-	20.0(1)
Ban Don Gloy 6	-	50.0(5)	-	50.0(5)	-
Ban Don Gloy 17	13.3(2)	26.7(4)	53.3(8)	-	6.7(1)
Small Farmers					
Ban Yang Sinchai	83.3(5)	-	-	-	16.7(1)
Ban Nong Had	60.0(3)	40.0(2)	-	-	-
Ban Don Gloy 6	60.0(3)	20.0(1)	20.0(1)	-	-
Ban Don Gloy 17	50.0(3)	16.7(1)	16.7(1)	-	16.7(1)

* 1 = Loan 2 = Fertilizer 3 = Loan + fertilizer
4 = Fertilizer + water jar 5 = Never

Due to the fact that Ban Yang Sinchai and Ban Nong Had are very close neighbors, the sub-committees of Ban Nong Had managed their community woodlot revolving fund similarly to Ban Yang Sinchai. The village development fund has been spent on fertilizer, loans for villagers, and village tap water with the same criteria used in Ban Yang Sinchai. It was found that about 60 per cent of the villagers interviewed in every economic class received loans from the community woodlot revolving fund (Table 25). A few respondents reported that they had never received loans, only fertilizer. One respondent in the medium-farm category reported that he had received nothing.

The sub-committee of Ban Don Gloy 6 managed the community woodlot revolving fund differently than did Ban Yang Sinchai and Ban Nong Had. In 1987, when the committees of Ban Don Gloy 6 first received their share of the community woodlot revolving fund from Ban Yang Sinchai and Ban Nong Had, Ban Don Gloy 6 and Ban Don Gloy 17 were still just one administrative unit. The committee spent all the community woodlot revolving fund to finish constructing a village temple shared between Ban Don Gloy 6 and Ban Don Gloy 17. In 1988, when Ban Don Gloy 6 was administratively divided into Ban Don Gloy 6 and Ban Don Gloy 17, the share of the community woodlot revolving fund was equally divided for both villages.

Due to the principle agreed upon by the committee members from all the villages which share the Kok Peeba community woodlot, that the community woodlot revolving fund must be spent on the basis of revolving fund, in 1988 and 1989 the committee of Ban Don Gloy 6 spent this fund to buy cheap fertilizer. It was then sold to the villagers for little profit, as in Ban Yang Sinchai and Ban Nong Had. Besides selling cheap fertilizer to the villagers, in 1990 the committee spent part of the community woodlot revolving fund to buy water jars which were sold the villagers for less than the market price. (The cost of a water jar was 500 baht and the committee sold it to their villagers for 550 baht.) Forty-seven households requested water jars.

The sub-committees also spent part of the community woodlot revolving fund to improve the village road. The villagers whose houses are close to the road had to contribute some money to improve the village road as well.

At the time the survey was conducted, some of the respondents reported that they had received loans from the community woodlot revolving fund. However, it was found that the purpose of the loans was somewhat different from that of Ban Yang Sinchai and Ban Nong Had. Unlike Ban Yang Sinchai and Ban Nong Had, the sub-committee of Ban Don Gloy 6 provided loans because they had been unable to buy fertilizer from the government, so they decided to let the villagers buy fertilizer directly from the market. Table 24 shows that 20 and 60 per cent of the respondents in the large-farm and small-farm categories got this type of loan to buy fertilizer themselves. About 20, 50, and 60 per cent of the respondents in the small-farm, medium-farm, and large-farm categories bought fertilizer from the committee. Fifty per cent of the respondents in the medium-

farm category bought both fertilizer and water jars from the committee.

After being separated from Ban Don Gloy 6 in 1988, Ban Don Gloy 17 formed their own community woodlot sub-committee and began to manage their community woodlot revolving fund independently. However, there was no big difference in the management of the village development fund between Ban Don Gloy 6 and Ban Don Gloy 17. The only difference was that Ban Don Gloy 17, in 1990, provided loans to the villagers with 10 per cent interest rate per year. The way in which the loan was provided in Ban Don Gloy 17 was also different from Ban Yang Sinchai and Ban Nong Had. The committees of Ban Don Gloy 17 did not provide loans upon request. According to the village headman and a key informant who was responsible for the community woodlot revolving fund, the village development fund was equally divided by the total numbers of clusters of households. Then the sub-fund was again divided by the numbers of households in each cluster. Thus, every household could receive a loan, if they wanted to. Some of the respondents mentioned that they did not really need it, but they did not want to lose the opportunity. However, data in Table 24 shows that 50 per cent of the respondents in the small-farm category did receive loans, while 60 per cent of the respondents in the large-farm category got only fertilizer, not loans.

(2) Fuelwood

The survey shows that fuelwood has been the only source of energy for cooking for most respondents (more than 70 per cent) in Ban Yang Sinchai. Nobody uses charcoal alone for cooking. About 26.3 per cent of the respondents reported that they used both fuelwood and charcoal, but more fuelwood than charcoal. Nobody reported having ever bought fuelwood. Homestead area and farmland have been the major sources of fuelwood for most respondents in Ban Yang Sinchai. Only 21.1 per cent of the respondents reported that their major source of fuelwood is the Kok Peeba community woodlot.

Table 26 shows the benefits from the community woodlot in terms of fuelwood. The data indicate that more than 60 per cent of the villagers in every economic class of

Ban Yang Sinchai collected fuelwood from the community woodlot. How often fuelwood was collected and the amount of fuelwood collected varied from household to household. Some reported that they had collected fuelwood from the woodlot only once since the woodlot was implemented, while others reported that they collected fuelwood from the woodlot every year or every time they were allowed to do so by the community woodlot committees.

Data on the amount of fuelwood collected each year were not available. However, some respondents were able to estimate how long the fuelwood collected each year lasted. For small families, the fuelwood collected from the woodlot each year could last for a year. For large families, the fuelwood collected normally lasts less than a year. However, this depends on the amount of fuelwood collected because there is no limit for fuelwood collection for each household. The interviews show that more than 60 per cent of the respondents in the medium-farm and small-farm categories perceive fuelwood from the community woodlot as a big help for solving the fuelwood shortage problem, while most respondents in the large-farmer category think that it does not help very much. This is due to the fact that the large farmers do not consider the community woodlot a major source of fuelwood as fuelwood is still available on their own land.

Similar to Ban Yang Sinchai, fuelwood is the only major source of energy for cooking for most respondents in Ban Nong Had. Only one respondent reported that he used charcoal alone. There was also only one respondent who bought fuelwood from other villagers to make charcoal. Other respondents never bought fuelwood. Unlike Ban Yang Sinchai, most villagers in Ban Nong Had reported that they had never collected fuelwood from the Kok Peeba community woodlot. The reasons given by the respondents are either that the woodlot is too far from their village or that they still have fuelwood available on their own farmland. The three respondents (one in each economic

class) who reported that they collected fuelwood from the woodlot, only did it once. Of those three, two felt that fuelwood from the Kok Peeba woodlot helped solve their fuelwood problem to some extent, while the third thought it helped a lot.

Only 40 per cent of the respondents interviewed in Ban Don Gloy 6 reported using fuelwood alone for cooking. The majority of respondents (55 per cent) reported using both fuelwood and charcoal for cooking, with more fuelwood than charcoal being used. One respondent used charcoal and gas as a major source of energy for cooking. About 70 per cent of all respondents collected fuelwood from their own farmland and homestead area. More villagers in Ban Don Gloy 6 collected fuelwood from the Kok Peeba community woodlot than in Ban Yang Sinchai and Ban Nong Had. However, about 60 per cent of the respondents reported that they also bought fuelwood from the community woodlot. The cost of fuelwood bought from the community woodlot varied with the size of fuelwood. Normally, the villagers paid 5 to 10 baht for a small push-cart load.

Table 26 indicates that most respondents, especially in the medium-farm and small-farm categories, collect fuelwood from the Kok Peeba community woodlot. About 40 and 50 per cent of the respondents in the medium-farm and small-farm categories respectively collected fuelwood from the Kok Peeba community woodlot every year. Data show that about 50 to 60 per cent of the respondents in both medium-farm and small-farm categories perceived the Kok Peeba community woodlot as another important source of fuelwood for their household uses.

Table 26. Collection of Fuelwood from the Community Woodlot Classified by Economic Status Across Villages.

Economic Status	Collection of Fuelwood		
	Yes	No	Total
Large Farmers			
Ban Yang Sinchai	100.0(5)	-	100.0(5)
Ban Nong Had	20.0(1)	80.0(4)	100.0(5)
Ban Don Gloy 6	60.0(3)	40.0(2)	100.0(5)
Ban Don Gloy 17	80.0(4)	20.0(1)	100.0(5)
Medium Farmers			
Ban Yang Sinchai	62.5(5)	37.5(3)	100.0(8)
Ban Nong Had	20.0(1)	80.0(4)	100.0(5)
Ban Don Gloy 6	100.0(10)	-	100.0(10)
Ban Don Gloy 17	100.0(5)	-	100.0(5)
Small Farmers			
Ban Yang Sinchai	83.5(5)	16.7(1)	100.0(6)
Ban Nong Had	20.0(1)	80.0(4)	100.0(5)
Ban Don Gloy 6	80.0(4)	20.0(1)	100.0(5)
Ban Don Gloy 17	100.0(6)	-	100.0(6)

Similar to the other villages studied, the majority of respondents in Ban Don Gloy 17 used fuelwood for cooking. Although 57.7 per cent of the respondents reported that they used both fuelwood and charcoal, fuelwood is their primary source of energy. About 53.8 per cent of the respondents collected fuelwood mainly from their own farmlands, and 30.8 per cent collected fuelwood mainly from land owned by others. Only 7.7 per cent of the respondents said that they mainly collected fuelwood from the community woodlot. However, almost every respondent interviewed had collected fuelwood from the Kok Peeba community woodlot (Table 26). About 80 per cent of the respondents reported that they had to buy fuelwood from the community woodlot at same cost as in Ban Don Gloy 6. It was found that most large-farm farmers (80 per cent) perceived the community woodlot as helping the fuelwood shortage problem a lot, while most respondents in the small and medium-farm categories, 83.3 and 53.3 per cent

respectively, thought that the woodlot only helped a little bit.

(3) Other Benefits

In addition to loans and fuelwood, other benefits from the Kok Peeba woodlot are building materials, food, growing cassava in the woodlot during the initial years, and grass for cattle. Table 27 shows that in Ban Yang Sinchai more than 50 per cent of the respondents in every economic class collected both mushrooms and building materials from the woodlot.

As for the opportunity to practice agroforestry (growing cassava) in the community woodlot, it was found that only three respondents in Ban Yang Sinchai were doing so. All three respondents fall into the category of medium-farm farmers.

Though most respondents in Ban Nong Had did not collect fuelwood from the Kok Peeba community woodlot, they did collect mushrooms and branches of trees for building materials. Two of the five respondents in the large-farmer category reported that they grazed their cattle in the woodlot (Table 27). Only one respondent, in the small-farm category, grew cassava in the community woodlot.

Besides fuelwood, most respondents in every economic class in Ban Don Gloy 6 reported that they also received other kinds of benefits from the community woodlot, especially the *Eucalyptus* mushroom. Some of the respondents also grazed their cattle in the woodlot (Table 27). In Ban Don Gloy 6, only five respondents reported that they once grew cassava in the woodlot. Four out of five respondents are in the medium-farm category (about 40 per cent of the total respondents in this class), while one is in the small-farm category (about 20 per cent of the total respondents in the small-farm category).

Most respondents in Ban Don Gloy 17 also collected mushrooms from the Kok Peeba community woodlot. Besides collecting mushrooms, more than 60 per cent of

respondents in the medium-farm and small-farm categories also grazed their cattle in the woodlot (Table 27). Nobody reported obtaining building materials from the woodlot. As compared to other villages, the villagers in Ban Don Gloy 17 who were growing cassava in the woodlot were found in every economic classes. The survey found that the majority of respondents (> 80 per cent) in the small-farm category used to practice cassava growing in the community woodlot, while a small percentage of large-farm respondents used to do so.

Table 27. Benefits Derived from the Community Woodlot Besides Fuelwood Classified by Economic Status Across Villages.

Economic Status	Benefits* % (N)				
	1	2	3	4	5
Large Farmers					
Ban Yang Sinchai	-	20.0(1)	20.0(1)	-	60.0(3)
Ban Nong Had	-	40.0(2)	-	40.0(2)	20.0(1)
Ban Don Gloy 6	-	80.0(4)	-	-	20.0(1)
Ban Don Gloy 17	40.0(2)	60.0(3)	-	-	-
Medium Farmers					
Ban Yang Sinchai	12.5(1)	-	-	-	87.5(7)
Ban Nong Had	40.0(2)	20.0(1)	20.0(1)	-	20.0(1)
Ban Don Gloy 6	10.0(1)	50.0(5)	-	-	40.0(4)
Ban Don Gloy 17	6.7(1)	33.3(5)	-	-	60.0(9)
Small Farmers					
Ban Yang Sinchai	-	50.0(3)	-	-	50.0(3)
Ban Nong Had	20.0(1)	60.0(3)	-	-	20.0(1)
Ban Don Gloy 6	-	60.0(3)	-	20.0(1)	20.0(1)
Ban Don Gloy 17	16.7(1)	16.7(1)	-	-	66.7(4)

* 1 = Nothing 2 = Fruit/food 3 = Building materials
4 = Grazing cattle 5 = More than one benefit

6.1.4 Summary

The Kok Peeba community woodlot has yielded a number of benefits. The major benefits are fuelwood and cash income from selling Eucalyptus trees. The villagers also received benefits in terms of building materials, food, and grass for cattle. The income from Kok Peeba community woodlot has been managed in such a way that all villagers can benefit in terms of village infrastructure and loans, regardless their economic status. All villagers can request loans from the village revolving fund through the woodlot committee who carefully consider all requests. Except for Ban Nong Had, most respondents, especially in the medium-farm and small farm categories, collected fuelwood from the community woodlot. But the amount of fuelwood collected varied from household to household and from village to village.

Although the majority of villagers were not involved in the decision making process to start the woodlot, the project seems to continue smoothly due to good woodlot management by the committee. Phutaraporn (1983) suggested that the success of the Kok Peeba project would depend on the effectiveness of community woodlot committee, because the villagers at the time the woodlot was being initiated were not ready yet to provide free labor to the project, though they realized that the problem of fuelwood shortage would soon occur. One major reason given by Phutaraporn was that most villagers at that time were not familiar with the participatory kind of assistance. They tended to wait for full assistance from the government only. This study confirms that the committee of the Kok Peeba community woodlot must be credited for their role in maintaining the woodlot, selecting the villagers to work in the woodlot, coordinating with government agencies, attending forestry-related training, and distributing the benefits, all of which brought about positive changes to the villages.

6.2 Nong E-Jone Community Woodlot

6.2.1 The Role of Nong E-Jone Community Woodlot Committee

The structure of the community woodlot committee of Nong E-Jone is relatively simple. The committee is comprised of 11 members with the village headman as chairman. Two formal assistants of the village headman are also members of the committee. The rest were appointed by the village headman because they were diligent and were willing to cooperate with the project. Most members live in the same vicinity as the village headman, which makes it very easy to call a meeting.

There are four major responsibilities of the woodlot committee.

(1) Maintain the woodlot

The committee must go to the woodlot from time to time to see if anything has gone wrong. For example, the fences around the woodlot must be well maintained to prevent the seedlings from being destroyed by cattle. There is no fixed schedule for the committee to look after the woodlot. One committee member has a house close to the woodlot, so he tends to investigate the woodlot more often than the others. Unlike Kok Peeba project, there is no agreement that the committee members of the Nong E-Jone community woodlot will be paid for their labor. Thus they work voluntarily for the project. However, the villagers agreed to give 1,000 baht, subtracted from the total income from selling the *Eucalyptus* trees, to the committee, because the villagers felt that the committee members are devoted to their work.

(2) Inform villagers

The committee has a duty to inform their villagers when and how to participate in the woodlot activities. They have to lead and participate in all kinds of woodlot activities, such as planting trees and thinning and weeding the woodlot. This is one of the major responsibilities of the committee.

(3) Training

Another task of the community woodlot committee is to attend forestry related training provided by either the provincial or the district forestry office. The committee members who attend the training have to pass on the knowledge learned to the villagers. However, very little training has been provided so far.

(4) Distribution of benefits

The benefits from Nong E-Jone woodlot include cash income, fuelwood, building materials, and food. Apart from *Eucalyptus*, no other tree species have been sold. By December 1991, the *Eucalyptus* trees had been harvested only once. In April 1990, the community woodlot committee sold the trees to a middleman for 11,000 baht. The middleman sold these *Eucalyptus* trees to a pulp and paper mill in Khon Kaen province (the same company to which the *Eucalyptus* trees from Kok Peeba were sold). Mr. Thongsuk suggested that the money from selling *Eucalyptus* should become a village revolving fund offering loans to villagers with a two percent interest rate per month. Therefore, 10,000 baht were used as suggested and another 1,000 baht were spent for the expenses of the committee responsible for maintaining the woodlot.

The woodlot committee allowed the villagers to collect fuelwood from the woodlot when the *Eucalyptus* trees had just been harvested, when the coppice shoots of *Eucalyptus* needed thinning and when maintenance work of the woodlot was done. The villagers also collected twigs of *Acacia auriculiformis*, and *Leucaena leucocephala* for fuelwood. Leaves of *Cassia siamea* are popular for food among the villagers. It is reported that villagers from the villages nearby also came to collect the leaves of *Cassia siamea* in the Nong E-Jone community woodlot for household consumption as well as for sale. Villagers were also able to collect the so called *Eucalyptus* mushrooms to eat during the rainy season. This species of mushroom first appeared with the planting of the

woodlot.

6.2.2 People Participation in Nong E-Jone Community Woodlot

(1) Participation in decision making

In contrast to the Kok Peeba community woodlot, the villagers of Ban Don Bark were directly involved in the decision making process to adopt Nong E-Jone community woodlot. They were consulted many times through village meetings held by the village development committee and a representative from the PDA. Though there were arguments in the meetings between the villagers who agreed and disagreed with the project, the majority of villagers decided to adopt the project. In addition, the villagers were also consulted for the selection of tree species to be planted in the woodlot.

(2) Participation in project implementation

The villagers of Ban Don Bark were not paid for working in Nong E-Jone woodlot. They contributed not only their labor in planting trees and in making fences around the woodlot, but also building materials (i.e. small poles for making fences). In addition, the villagers voluntarily helped thin and weed the woodlot whenever asked to do so by the woodlot committee. The form of people participation in implementing the Nong E-Jone community woodlot was thus very different from Kok Peeba community woodlot.

(3) Participation in benefits

The villagers of Ban Don Bark began to reap the benefits from the Nong E-Jone community woodlot a few years after it had been implemented. The kinds of benefits from Nong E-Jone are not very much different from the Kok Peeba community woodlots, except for the magnitude of benefits due to the difference in size of the two woodlots. The next section describes how the villagers of Ban Don Bark participated in each kind of benefit from Nong E-Jone community woodlot.

6.2.3 The Benefits of the Nong E-Jone Community Woodlot to the Villagers of Ban Don Bark

(1) Loans

Nong E-Jone is a younger woodlot than Kok Peeba. As a result, the benefits in terms of income have not been very evident. In 1990 Ban Don Bark villagers received their first income, 11,000 baht, from selling *Eucalyptus* trees. When the survey was conducted in April 1991, no more harvests had been done. After subtracting 1,000 baht for hiring the committee responsible for managing the woodlot, the rest of the income was set up as a village revolving fund. The survey shows that only one respondent, in the medium-farm category, got a loan (Table 28). Due to the small amount of income, the community woodlot revolving fund has not been used for other activities such as road improvement, or providing cheap fertilizer and water jars, as was done in the Kok Peeba woodlot.

Table 28. Benefits from the Community Woodlot Revolving Fund Classified by Economic Status, Ban Don Bark

Benefits from Woodlot Fund	Economic Status		
	Large %(N)	Medium %(N)	Small %(N)
Loan	-	10.0(1)	-
No loan	100.0(5)	90.0(9)	100.0(5)
Total	100.0(5)	100.0(10)	100.0(5)

(2) Fuelwood

Similar to the other four villages studied, fuelwood is the major source of energy used for cooking by most villagers in Ban Don Bark. No respondent reported buying fuelwood. About 80 per cent of the respondents mainly collected fuel from their own farmland, while another 20 per cent mainly collected fuelwood from the land owned by others. Most respondents also collected fuelwood from the Nong E-Jone community

woodlot, but the fuelwood collected did not help much (Table 29). About 50 per cent of the respondents reported that the fuelwood they collected from the woodlot lasted less than a month. The villagers are allowed to collect fuelwood whenever the community woodlot committee feels that the woodlot needs thinning, and after the trees have been harvested for sale.

Concerning four tree species planted in the Nong E-Jone woodlot, the villagers primarily collected *Eucalyptus camaldulensis* and *Acacia auriculiformis* for fuelwood, because they sold *Eucalyptus* trees and had to do some thinning after the trees regenerated, and although *Acacia auriculiformis* have never been sold, they are branchy and need thinning as well. No respondent was found buying fuelwood or making charcoal in Ban Don Bark.

Table 29. Collection of Fuelwood from the Community Woodlot, Classified by Economic Status, Ban Don Bark.

Collection of Fuelwood	Economic Status		
	Large %(N)	Medium %(N)	Small %(N)
Yes	80.0(4)	80.0(8)	100.0(5)
No	20.0(1)	20.0(2)	-
Total	100.0(5)	100.0(10)	100.0(5)

(3) Other Benefits

Besides fuelwood, other benefits from Nong E-Jone woodlot woodlot include leaves of *Cassia siamea* and *Eucalyptus* mushrooms for food, and grass for cattle. Leaves of *Cassia siamea*, locally called Kee Lek, are popular among Thai people for cooking a kind of curry. The villagers of Ban Don Bark also enjoy eating these leaves. Some villagers also grow these trees in their homestead area. Similar to the Kok Peeba community woodlot, most respondents in Ban Don Bark reported that they found the

Eucalyptus mushroom just after the implementation of Nong E-Jone woodlot, and that they like to eat it. Unlike the Kok Peeba woodlot, the villagers of Ban Don Bark did not graze their cattle in the woodlot because the woodlot is fenced. Some villagers grew grass in the woodlot where *Leucaena leucocephala* were planted, though it did not grow well. The grass was harvested and fed to the cattle. Table 30 shows that most respondents in the large-farm and medium-farm categories derive benefits other than fuelwood such as mushrooms, leaves of *Cassia siamea*, or grass for their cattle. Nevertheless, only 20 and 40 per cent of the respondents in the large-farm and medium-farm categories received all three benefits. Only 40 per cent of the respondents in the small-farm category receive such benefits besides fuelwood. In other words, the majority of the respondents in the small-farm category (60 per cent) receive no benefits other than fuelwood, though everyone in the village is allowed to grow grass, collect mushroom, and leaves of *Cassia siamea*.

Table 30. Benefits Derived from Community Woodlot Besides Fuelwood Classified by Economic Status, Ban Don Bark.

Benefits from the Woodlot	Economic Status		
	Large %(N)	Medium %(N)	Small %(N)
No	-	20.0(2)	60.0(3)
Mushroom/food	20.0(1)	10.0(1)	-
Grass for cattle	60.0(3)	30.0(3)	20.0(1)
Mushroom/food/grass	20.0(1)	40.0(4)	20.0(1)
Total	100.0(5)	100.0(10)	100.0(5)

Another benefit of the Nong E-Jone woodlot witnessed by the author is the use of the woodlot for playing games and resting. A number of children of Ban Don Bark were seen playing games in the *Acacia auriculiformis* woodlot while letting their buffaloes eat

grass outside the woodlot. It is cooler in this woodlot than in the *Eucalyptus* woodlot because *Acacia auriculiformis* have more branches and leaves than *Eucalyptus*. This aesthetic value should not be overlooked as a benefit. Some villagers expressed a love for their woodlot because it looks beautiful.

In summary, the Nong E-Jone community woodlot project has provided the villagers quite a few benefits. Although the benefits of income and fuelwood are relatively small compared to the Kok Peeba woodlot, the villagers of Ban Don Bark stated that they are satisfied with their woodlot. Although Nong E-Jone woodlot was not a self-initiated project, the village headman had no problem in getting villagers involved in every stage of the project. The reason for this success might be that the PDA staff had clearly informed the villagers about the nature of project, and about the importance of trees to the environment before implementing the project. As a result, the villagers understood how the project would benefit their village and why they should participate in it.

6.3 The Relationships between Variables in Research Propositions

The discussion of the four research propositions will be presented one by one, based on both quantitative and qualitative data. Chi-square tests of relationships between variables is made where applicable.

Proposition 1: The degree of people participation in community woodlot projects will be higher if the villagers perceive fuelwood shortage as a problem, if community woodlots are needed, and if villagers are involved in making decision to adopt the project.

Table 31 shows that the percentages of people participation in the four villages which share the same woodlot were different, though the same approach was applied.

The percentages of people who participated in Ban Yang Sinchai, Ban Nong Had, Ban Don Gloy 6, and Ban Don Gloy 17 varied from 45 to 94.7 per cent. Although, the percentage of people participation in Ban Don Bark was higher than in Ban Nong Had, Ban Don Gloy 6, and Ban Don Gloy 17, the data from Ban Yang Sinchai and Ban Don Bark do not support the proposition that people participation is higher if the villagers were involved in the decision process of community woodlot projects. The degrees of people participation in both villages were almost equal (94.7 per cent in Ban Yang Sinchai and 95 per cent in Ban Don Bark), though different development approaches were applied

Table 31. People Participation in Community Woodlot Activities by Villages.

Participation	Villages				
	Yang Sinchai %(N)	NongHad % (N)	DonGloy6 % (N)	DonGloy17 % (N)	DonBark % (N)
Yes	94.7(18)	60.0(9)	45.0(9)	50.0(13)	95.0(19)
No	5.3(1)	40.0(6)	55.0(11)	50.0(13)	5.0(1)
Total	100.0(19)	100.0(15)	100.0(20)	100.0(26)	100.0(20)

It is not possible to draw a conclusion on the relationship between people participation and development approaches without considering how people participation was formed in each village. In the Kok Peeba community woodlot, it was predetermined by the Royal Forest Department that villagers be hired to clear land and to plant trees in the proposed community woodlot. Initially only the villagers in Ban Yang Sinchai and Ban Nong Had were hired because these two villages officially possess Kok Peeba public land. The *Eucalyptus* seedlings were partly destroyed by the villagers of Ban Don Gloy because they were driven away from the Kok Peeba public land. To lessen the conflicts on the use of Kok Peeba public land, the villagers from Ban Don Gloy 6 and 17 were

also hired to replant trees later in the same year. It can be seen that people participation in all four villages which share the Kok Peeba community woodlot consisted of hiring people as the first step. The villagers were hired to lop the branches of trees planted in the earlier years. In the following years, they were hired to plant more trees in the woodlot. Most activities in the woodlot were accomplished by hiring either the community woodlot committee members or the villagers.

In contrast to Kok Peeba, people participation in the Nong E-Jone community woodlot was unpaid. The villagers of Ban Don Bark were willing to plant trees without getting any wages. They also helped lop the tree branches in the woodlot whenever requested to do so by the community woodlot committee. People participation includes participating in decisions to adopt the project, selecting tree species, planting trees, maintaining the woodlot, and being on a committee. However, most villagers who reported participating in the community woodlot project referred to activities such as tree planting and maintaining the woodlot (Table 32).

Table 32 shows that the villagers participated differently in the woodlot projects. Some people participated either in planting trees or maintaining the woodlot (lopping of branches), and some did both. For the villagers who share the Kok Peeba woodlot, their participation mostly depended on whether they were hired to plant trees or to lop the branches. The committee initially worked without being paid, but later on it was agreed by most villagers that they should get a small wage as a reward for their dedication. But for the villagers in Ban Don Bark, their participation is entirely unpaid. This is clear in Table 33 which indicates the reasons why people decided to participate in the project. Most villagers in Ban Yang Sinchai (72.2 per cent), Ban Nong Had (88.9 per cent), and Ban Don Gloy 17 (61.5 per cent) reported that the major reason for their participation was the wages they earned, whereas the future benefits in terms of fuelwood and

construction materials from the Nong E-Jone woodlot was an incentive for participation of most villagers of Ban Don Bark. A number of respondents reported that they participated because it is a rule or requirement that every household must contribute labor when requested. This kind of rule has been used from the very beginning of the Nong E-Jone community woodlot, but was only occasionally used in Kok Peeba woodlot. Normally, most villagers are quite willing to participate upon request of the community woodlot committee, except when the villagers are short of labor.

The previous discussion leads to a conclusion that people participation, in fact, is not necessarily affected by development approaches. No matter if the villagers were involved in the decision making process or not, people participation in project implementation can be motivated. The issue seems to be the incentives for participation. As in the case of Kok Peeba woodlot, hired labor has been used as an incentive for people participation in various woodlot activities, while in the case of Nong E-Jone woodlot an awareness of forest resource degradation caused villagers to participate in the project. Although, Agyemang (1984) argued that the involvement of villagers in the decision-making process is important for active participation, which will lead to a success of project, this study demonstrates that people participation in the later stages of project can be mobilized regardless of villagers' involvement in the decision making process.

Table 32. Types of Participation in Community Woodlot by Villages.

Types of Participation	Villages				
	Yang Sinchai %(N)	NongHad % (N)	DonGloy6 % (N)	DonGloy17 % (N)	DonBark %(N)
1. Planting trees	33.3(6)	55.6(5)	11.1(1)	30.8(4)	5.3(1)
2. Maintaining the woodlot	16.7(3)	22.2(2)	55.5(5)	30.8(4)	21.0(4)
3. Both 1 & 2	38.9(7)	-	11.1(1)	38.4(5)	73.7(14)
4. More than 2 activities	11.1(2)	22.2(2)	22.2(2)	-	-
Total	100.0(18)	100.0(9)	100.0(9)	100.0(13)	100.0(19)

Table 33. Reasons for Participating in Community Woodlot by Villages.

Reasons	Villages				
	Yang Sinchai %(N)	NongHad % (N)	DonGloy6 % (N)	DonGloy17 % (N)	DonBark %(N)
1. Were hired to plant trees in the woodlot	72.2(13)	88.9(8)	22.2(2)	61.5(8)	-
2. It is a rule	22.2(4)	11.1(1)	44.4(4)	36.8(3)	36.8(7)
3. Have land close to woodlot	5.6(1)	-	22.2(2)	-	-
4. Being village headman	-	-	11.1(1)	-	-
5. Expected benefits	-	-	-	15.4(2)	63.2(12)
Total	100.0(18)	100.0(9)	100.0(9)	100.0(13)	100.0(19)

Table 34 shows the villagers' perceptions toward fuelwood shortage. More than 50 per cent of villagers in all villages studied, except Ban Nong Had, perceived fuelwood shortage as a serious problem. The percentages of villagers who perceived fuelwood as a serious problem are highest in Ban Don Gloy 17 and Ban Don Gloy 6 because these two villages have more population and less farmland as sources of fuelwood. Approximately 60.0 per cent of villagers in Ban Nong Had felt that the problem of fuelwood shortage

was not so serious because fuelwood is still available on their farmland.

Table 34. Villagers' Perception Towards Fuelwood Shortage.

Villagers' Perception	Villages				
	Yang Sinchai %(N)	NongHad % (N)	DonGloy6 % (N)	DonGloy17 % (N)	DonBark %(N)
1.Serious problem	57.9(11)	33.3(5)	75.0(15)	76.9(20)	55.0(11)
2.Some problem	42.1(8)	60.0(9)	20.0(4)	23.1(6)	40.0(8)
3.No problem	-	6.7(1)	5.0(1)	-	5.0(1)
Total	100.0(19)	100.0(15)	100.0(20)	100.0(26)	100.0(20)

A statistical test was performed to examine the relationship between people participation and the villagers' perception towards fuelwood shortage. The Cramer's (V), one of the Chi-Square based measures, was selected to measure the relationship between such variables because it is designed for cross-tabulation tables of any dimension with no limitation on the minimum number of the expected frequencies as found with Pearson's Chi-Square. Although Table 34 indicates that most villagers in the villages studied thought that there was a fuelwood shortage, the statistical test shows no relationship between people participation and the villagers' perception towards the problem of fuel shortage in the villages studied, except for Ban Don Gloy 17 where the relationship between these two variables was found statistically significant (Table 35). This suggests that people participation is not necessarily influenced by villagers' perception towards fuelwood shortage.

Table 35. Test of People Participation and Perception Towards Fuelwood Shortage by Using Cramer' s (V) Measure.

Villages	Cramer' s (V)	Significance (α)
Yang Sinchai	.20101	.38094
Nong Had	.57735	.05668
Don Gloy 6	.34816	.29757
Don Gloy 17	.54772	.00522*
Don Bark	.20751	.65010

* Significance at $\alpha = 0.05$

Table 36 shows that the majority of villagers in every village surveyed thought that a community woodlot was needed. Table 37 indicates that benefits in terms of income and fuelwood were the major reasons why most villagers thought that there was a need for a woodlot. Table 36 also shows that of those who shared the Kok Peeba woodlot, a higher percentage thought that a woodlot was needed because of its benefit in terms of income than did the percentage of those who thought that a woodlot was needed because of fuelwood, except in Ban Don Gloy 17, where the percentages are equal. In contrast, cash income alone was not a major reason that made the respondents of Ban Don Bark, who use the Nong E-Jone woodlot, think that a woodlot was needed. Instead, most of them (68.4 per cent) referred to benefits as income, fuelwood, and food, as reasons for the need for a woodlot.

Table 36. Villagers' Perception Towards The Need of A Woodlot.

Villagers' Perception	Villages				
	Yang Sinchai %(N)	NongHad % (N)	DonGloy6 % (N)	DonGloy17 % (N)	DonBark %(N)
1. Need	94.7(18)	100.0(15)	80.0(16)	100.0(26)	95.0(19)
2. Do not need	5.3(1)	-	10.0(2)	-	5.0(1)
3. Not sure	-	-	10.0(2)	-	-
Total	100.0(19)	100.0(15)	100.0(20)	100.0(26)	100.0(20)

Table 37. The Reasons Why a Woodlot is Needed.

Reasons	Villages				
	Yang Sinchai %(N)	NongHad % (N)	DonGloy6 % (N)	DonGloy17 % (N)	DonBark %(N)
1. Cash income	38.9(7)	73.4(11)	50.0(8)	26.9(7)	5.3(1)
2. Fuelwood	22.2(4)	6.7(1)	37.5(6)	26.9(7)	21.0(4)
3. 1+2	16.7(3)	13.3(2)	12.5(2)	34.6(9)	-
4. Fuelwood and food	11.1(2)	-	-	-	5.3(1)
5. Income, fuelwood, food	11.1(2)	6.7(1)	-	11.4(3)	68.4(13)
Total	100.0(18)	100.0(15)	100.0(16)	100.0(26)	100.0(19)

Although the majority felt that there was a need for a woodlot (Table 36), no statistically significant relationship between people participation and villagers' perception towards the need of a woodlot was found in the villages studied. This suggests that people participation is not influenced by villagers' perceptions toward the need of a woodlot. The value of Cramer's (V) in Ban Nong Had and Ban Don Bark cannot be calculated because no variation was found in the perception of need for a woodlot (Table 38).

Table 38. Test of People Participation and Perception Towards the Need of a Community Woodlot by Villages by Using Cramer' s (V) Measure.

Villages	Cramer' s (V)	Significance (α)
Yang Sinchai	.05556	.80866
Nong Had	(V) cannot be calculated	
Don Gloy 6	.30151	.61099
Don Gloy 17	(V) cannot be calculated	
Don Bark	.05263	.81392

The relationship between people participation and villagers' perception towards fuelwood shortage, and the relationship between people participation and villagers' perception towards the need of a woodlot are not statistically significant in most villages. To explain this, it is necessary to refer to the earlier discussion made on how people participation was formed in the two different woodlots. People participation, in fact, was directly stimulated by wage labor in Kok Peeba woodlot project and by villagers' anticipation of future benefits and the tradition of providing labor in the Nong E-Jone woodlot project. Thus the villagers' perceptions toward fuelwood shortage and the need of a woodlot were not the greatest influences of people participation. An exception to the statement that the relationship between people participation and perception towards fuelwood shortage is not significant was found only in Ban Don Gloy 17. This might be explained by the fact that most villagers (76.9 per cent) of Ban Don Gloy 17 perceived fuelwood shortage as a serious problem, while in other villages the percentages of this perception were lower (Table 34).

Proposition 2: The greater the diversity of tree species planted, the greater the income and employment that can be generated.

Based on the data derived from the community woodlot committees, the assumption that there is a relationship between the numbers of tree species planted in the community woodlot and income and employment generated from the woodlot is questionable. It has already been stated that only *Eucalyptus camaldulensis* were planted in the Kok Peeba community woodlot. However, *Eucalyptus camaldulensis, Leucaena leucocephala, Acacia auriculiformis*, and *Cassia siamea* were planted in the Nong E-Jone woodlot. Earlier discussions showed that the Kok Peeba woodlot has generated more income than Nong E-Jone. Kok Peeba woodlot has also generated employment to the villagers in terms of wages, while Nong E-Jone has not generated any employment. Although four tree species were planted in the Nong E-Jone community woodlot, *Eucalyptus* has been the only species sold because pulp mills demand only *Eucalyptus* trees for making paper. The data from the woodlots studied do not support the proposition that if more tree species are planted, the more income and employment can be generated because only *Eucalyptus* trees were planted for the market.

However, one should not overlook other benefits of *Leucaena leucocephala, Acacia auriculiformis*, and *Cassia siamea*. Although these tree species are not marketable, they did provide multiple benefits to meet the needs of local people. In Nong E-Jone woodlot, besides *Eucalyptus*, the branches and twigs of *Leucaena leucocephala* and *Acacia auriculiformis* can also be used as fuelwood and building materials. The leaves of *Cassia siamea* are an excellent food for the villagers. The villagers also reported that they love these trees because they provide shade and beautify their village.

Due to the market demand for *Eucalyptus*, some respondents in all five villages studied have planted and some plan to plant *Eucalyptus* trees on their own land. Some

respondents also reported that *Eucalyptus* gives a better economic return than cassava, so they might shift from growing cassava to planting *Eucalyptus*. In promoting tree species other than *Eucalyptus* in the community woodlot projects, it is important to note the policy of the Thai government concerning *Eucalyptus* plantations. It is widely known that the Royal Forest Department has been supporting villagers to plant *Eucalyptus* in community woodlots all over Thailand. The Thai government also encourages the private sector to plant *Eucalyptus* on a large scale in order to supply the pulp mills. This means that the market is open for *Eucalyptus* only. If the purpose of promoting tree species other than *Eucalyptus* is to provide fuelwood, building materials, and food, the market for these tree species will not be an issue as in the case of Nong E-Jone community woodlot. But if the major objective is to generate income, the market for the tree species promoted must be guaranteed, which is quite difficult in the current situation in Thailand.

Proposition 3: The bigger the size of the woodlot, the greater the income and employment that can be generated.

According to the data derived from the community woodlot committees, the size of the woodlot seems to affect income. The first community woodlot, Kok Peeba, is bigger in size (800 rai or 128 hectares for *Eucalyptus* alone), while the second community woodlot, Nong E-Jone, is smaller (55 rai or 8.8 hectares for all four tree species). The area of the *Eucalyptus* plantation in Nong E-Jone woodlot is only 8 rai or 1.28 hectares.

It is obvious that the income derived from the Kok Peeba community woodlot is greater compared to the income from Nong E-Jone community woodlot due to the bigger size of Kok Peeba woodlot and its longer time of operation (Table 23). Within 10 years, 1982-1991, the committee of the Kok Peeba community woodlot has been able to harvest

and sell the *Eucalyptus* trees six times for a total income of 1,110,000 baht (approximately $43,530), while the committee of Nong E-Jone community woodlot have sold the *Eucalyptus* trees only once within three years, 1987-1990, for 11,000 baht (approximately $431). The average prices of *Eucalyptus* sold per rai were 1,460.5 baht and 1,375 baht in the Kok Peeba and Nong E-Jone community woodlots respectively. The prices of *Eucalyptus* per rai were not very much different in the two woodlots. The advantage of having a bigger woodlot is that the trees can be planted on different plots at different times. By rotating tree planting, the trees can be harvested more often. Thus the villagers can sell the trees and receive the income more often. Unlike the bigger woodlot, the relatively small Nong E-Jone woodlot does not have enough land for the rotation of tree planting as part of the woodlot has been used for the planting of *Leucaena leucocephala, Acacia auriculiformis,* and *Cassia siamea,* which have little market value. As a result, the villagers have to wait longer for the next harvest. However, other benefits such as fuelwood and building materials of non-market tree species should also be considered in evaluating the woodlot.

Proposition 4: A higher degree of community self-reliance is achieved if the effectiveness of the community woodlot committee is greater in terms of managing the woodlots.

In this study self-reliance is evaluated in terms of the villages' dependency on outside financial supports such as the government or development agencies, and the villages' dependency on fuel supply from the community woodlots. Since 1982, when the Kok Peeba community woodlot project was implemented, only Ban Yang Sinchai and Ban Nong Had received a budget, in 1989, from the so-called Job Creation Program of the government to construct a village tap water supply. This budget, however, was not

enough to finish the project. The woodlot committees of Ban Yang Sinchai and Ban Nong Had decided to spend part of their community woodlot revolving funds to finish the project. No financial support from the government or other sources for village development activities was required in Ban Don Gloy 6 and Ban Don Gloy 17 since implementing the Kok Peeba woodlot project.

The four villages that share the Kok Peeba woodlot have been largely dependent on the income from the woodlot for their village development activities, but not in the case of Ban Don Bark where the amount of income generated from the Nong E-Jone woodlot was small and so far has been used for loan to villagers only. Ban Don Bark is still entirely dependent on the government budget for its development activities.

Data from the survey show that the villagers' dependency on fuelwood from community woodlots varies from village to village. Regardless of the economic classes, more than 78.9 per cent of the respondents in every village studied, except Ban Nong Had, used to collect fuelwood from the community woodlots. Although the respondents were not able to give data on the amount of fuelwood collected each year, most were able to estimate how long the fuelwood collected from the woodlot lasted. The use of fuelwood collected from the woodlot, on average, lasted 9.8, 5.5, 4.7, 4.8, and 1.4 months per household in Ban Yang Sinchai, Ban Nong Had, Ban Don Gloy 6, Ban Don Gloy 17, and Ban Don Bark respectively. Data show that most respondents in Ban Yang Sinchai are highly dependent on fuelwood from the woodlot. Fuelwood collected from the woodlot by 78.9 per cent of the respondents, on average, lasted for 9.8 months.

The villagers of Ban Nong Had were least dependent on fuelwood from the Kok Peeba woodlot, although the average duration of the use of fuelwood per household was 5.5 months, because very few respondents (20 per cent) used to collect fuelwood from the woodlot. This might be due to the fact that the villagers of Ban Nong Had have

another source of fuelwood near their farmland, while Ban Yang Sinchai, Ban Don Gloy 6, and Ban Don Gloy 17 do not.

The dependency on fuelwood from the woodlot of Ban Don Gloy 6 and Ban Don Gloy 17 was not as high as in Ban Yang Sinchai. Although more than 85 per cent of the respondents in these two villages collected fuelwood from the woodlot, the fuelwood collected from the woodlot lasted only 4.7 and 4.8 months on average.

The respondents of Ban Don Bark were not very dependent on fuelwood from the Nong E-Jone woodlot (only 1.4 month per household) because most respondents mainly collected fuelwood from their own farmland. Though 85 per cent of the respondents in Ban Don Bark reported that they also collected fuelwood from the Nong E-Jone woodlot, it seemed that the fuelwood supply from the woodlot was not adequate for all villagers. It is clear from the previous discussion that the dependency of villagers on fuelwood from both woodlots studied is not high, except for Ban Yang Sinchai.

The respondents were asked how satisfied they were with the kinds of woodlot management performed by the committees. It was found that the satisfaction levels varied among villages (Table 39).

Table 39. Villagers' Satisfaction With the Effectiveness of Community Woodlot Committees.

Villagers' Satisfaction	Villages				
	Yang Sinchai %(N)	NongHad % (N)	DonGloy6 % (N)	DonGloy17 % (N)	DonBark %(N)
Very effective	84.2(16)	80.0(12)	55.0(11)	69.2(18)	90.0(18)
Not effective	10.5(2)	13.3(2)	20.0(4)	23.1(6)	5.0(1)
Indifference	5.3(1)	6.7(1)	25.0(5)	7.7(2)	5.0(1)
Total	100.0(19)	100.0(15)	100.0(20)	100.0(26)	100.0(20)

Most respondents in Ban Yang Sinchai, Ban Nong Had, and Ban Don Bark (84.2, 80.0, and 90.0 per cent respectively) were satisfied with the general performance of their

committees. More respondents of Ban Don Gloy 6 and Ban Don Gloy 17 were less satisfied with their committees' performances compared to other villages.

In 1991, the woodlot committee of Ban Yang Sinchai spent the dividend from the community woodlot revolving fund to buy cement blocks for their villagers to grow vegetables. Each household was provided two free cement blocks. In previous years, the committees also spent the dividend to build a village gate and "SALA" (a public rest area) in the village. The idea was that the dividend can be used, but the community woodlot revolving fund must be retained. The village development fund is spent on the revolving basis only. This is why most villagers were satisfied with the committees. No other villages have done what Ban Yang Sinchai did.

In the first year Ban Don Gloy spent their community woodlot revolving fund to finish constructing their temple because temples are culturally very important to village life. Although this was appreciated by most villagers who wanted to have a new temple, it was considered by the woodlot committees a misuse of the community woodlot revolving fund because the committees from all four villages had agreed to spend the village development fund on a revolving basis. As a result, the committee of Ban Don Gloy used the community woodlot revolving fund as a loan for their villagers the following year. By managing the revolving fund in this way, the fund will not be finished, but will increase from the accumulation of interest by the villagers who received a loan.

In the Nong E-Jone woodlot, the income from the woodlot has also been managed on a revolving basis. Some villagers also wanted the committee to spend some money to improve their temple, but this idea was not approved. There has not been other village development activity besides providing loans to villagers, using the income from the woodlot.

The villagers were asked how satisfied they were with the distribution of benefits. The degree of satisfaction with the committees' performances decreased in some villages. For example, 80 per cent of respondents in Ban Nong Had were satisfied with the general performances of their committee, but only 66.7 per cent of them were satisfied with the way the committee distributed the benefits. The respondents complained that the selection of villagers to work in the woodlot was unfair. Some complained that the income from the woodlot had not been clearly declared to the villagers.

A number of respondents in Ban Don Gloy 6 and Ban Don Gloy 17 complained that they had to buy fuelwood from the woodlot. They said that if it was a real community woodlot, fuelwood should be free. They blamed the community woodlot committee for this policy and called the woodlot "Pa Fuen Nai Toon," meaning a commercial woodlot rather than a community woodlot. The community woodlot committee realized this problem existed, but they were not able to force the middlemen to give the unwanted parts of trees to the villagers for free because the middleman had the rights over the trees they had already bought. It is up to the middlemen to give or to sell the unwanted parts of trees to the villagers. The problem was that the villagers normally did not go to the woodlot to collect fuelwood at the same time when an announcement for fuelwood collection was made. Moreover, there was no limit on how much fuelwood each household could collect. Consequently, those who arrived earlier got more free fuelwood. Those who were late might get less free fuelwood or had to buy fuelwood from the middleman. To solve this problem, in 1991 the community woodlot committee began to limit the amount of fuelwood collected each time. The rule is applied to all four villages. According to this rule, each household is allowed to collect only two small push-carts of fuelwood every time fuelwood collection is announced by the committee. The result of this rule, however, was not yet evident at the time of the survey.

In the case of Ban Don Gloy 17, only 50 per cent of the respondents reported that they were satisfied with the way their committees managed the benefits. Most of the respondents who were not satisfied with their committee reported that some committee members were corrupt. This issue was mentioned by many villagers in both Ban Don Gloy 6 and Ban Don Gloy 17. The author was told that in 1990 the government was implementing an electrification project in Lao sub-district and that part Kok Peeba woodlot was consequently cut down to install the high voltage electric poles and cables. The community woodlot committee received compensation of 35,000 baht. This amount of money was divided among the four villages. Ban Yang Sinchai and Ban Nong Had equally received 10,000 baht. Ban Don Gloy 6 and Ban Don Gloy 17 equally received 5,000 baht. Another 5,000 baht was spent on a type-writer for the sub-district council. Every village, except Ban Don Gloy 17, put the money into their community woodlot revolving fund. The members of Ban Don Gloy 17 committee shared this money among themselves. This would have remained a secret, but a villager in Ban Don Gloy 17 found out about the arrangement through a conversation with people from other villages. As a result, the committee of Ban Don Gloy 17 were forced to return the money, and were replaced by others, those who were interviewed in this study. The villagers decided to give the money to the temple because they no longer perceived it as good money.

In the early stage of implementing the Kok Peeba woodlot, the conflict between Ban Yang Sinchai, Ban Nong Had, and Ban Don Gloy was rather serious. There was a confrontation between the villagers of Ban Don Gloy who encroached on Kok Peeba public land and the Lao sub-district council who wanted to move these people out. This case was brought to the district office, and it was judged that the villagers of Ban Don Gloy had to move out, because Lao sub-district council has the rights over Kok Peeba public land. This led to the destruction of seedlings in the woodlot by the villagers of Ban

Don Gloy later on. Because Ban Don Gloy 6 and Ban Don Gloy 17 have had some representatives in the meetings along with official members of the Kok Peeba woodlot committee, and because the villagers of Ban Don Gloy were allowed to grow cassava in the woodlot, this conflict was settled. It must be noted that the idea of having representatives from Ban Don Gloy and of allowing their villagers to grow cassava came from the committees of Ban Yang Sinchai and Ban Nong Had with supervision from the forestry officials of the project. Since that time there has been no serious conflict among the villagers again.

In the Nong E-Jone woodlot, only one conflict concerning the use of trees in the woodlot occurred since the implementation of the project. One respondent reported that her brother, who was temporarily in army service in Bangkok, moved back to Ban Don Bark in March 1991 and wanted some building materials for his new house. He asked the committee for two *Eucalyptus* trees from the woodlot, but the request was refused. Out of anger, he cut down one *Eucalyptus* tree and left it unused. As a result, it was felt by some that the committee had not kept the promise that the villagers could reap the benefits from the woodlot. However, the community woodlot committees reported that the man who asked for the trees was too rude and aggressive and had never participated in any woodlot activity. The committee, in fact, would have granted his request if he did not cut down the tree in anger. The committee were about to send him to the police, but decided not to do so, because they did not want to ruin their good relationship with the villagers. Instead they gave him a caution.

The above discussion describes the dependency of the villages studied on external financial support for village development activities and on fuelwood from the woodlots, which are the substance of village self-reliance. It also describes how the community woodlot committees in both projects manage the woodlots and their benefits in general

and how the sub-committees of each village manage the benefits from the woodlot as well as the conflicts in their own villages.

It might be concluded that the community woodlot committees in every village studied, to some extent, have been working quite effectively. The management of income from the woodlot on the revolving fund basis in both woodlot projects has demonstrated the capability of the woodlot committees to rely on themselves financially. Many village development activities, especially in the villages that share the Kok Peeba woodlot, have been accomplished without external financial support. Although the community woodlot committee in the Nong E-Jone project is efficient in both woodlot and conflict management, Ban Don Bark has not relied on its own financial resources, because the income from the woodlot has been too little. The degree of dependency on fuelwood supply from the woodlot of each village seems to depend on the ability of each household to collect fuelwood, since there was no limit for fuelwood collection in the woodlot at the times announced for fuelwood collection. In other words, the village that collected more fuelwood from the woodlot is more self-reliant (less dependent on other sources of fuelwood). This seems to suggest that the effectiveness of community woodlot committee in terms of controlling the distribution of fuelwood, has an indirect effect on self-reliance of the villages on fuelwood supply from the woodlot. In other words, if the committee are to put a limit on the amount of fuelwood to be collected for each family on an equal share basis, the large families who collect fuelwood from the woodlot solely may not have enough fuelwood supply for all year round. However, there were also families who never collected fuelwood in the woodlot at all. It may be said that the committees did not see the need for putting a limit on the amount of fuelwood to be collected because villagers normally collected fuelwood just enough for their own use and there was no problem concerning fuelwood distribution among villagers..

Proposition 5: A higher degree of self-reliance of the community is achieved if the size of community woodlot is larger.

Self-reliance refers to the ability of the communities to rely on themselves in terms of income and fuelwood supply from their community woodlots. To examine the relationship between self-reliance of the villages studied and the size of community woodlots, it is necessary to compare the bigger woodlot (Kok Peeba) with the smaller one (Nong E-Jone).

To begin with, we must refer to the conclusion drawn earlier that the four villages which share the Kok Peeba woodlot have been able to rely on themselves financially for their village development activities, in part because of the ability of their woodlot committee to manage the woodlot funds. The committee of Nong E-Jone community woodlot has also been working quite effectively. However, the villagers in Ban Don Bark have not been able to rely on themselves financially because the income from their woodlot was so small. It seems that the effectiveness of the committees to manage the woodlot is not the only factor that makes the villages less dependent on the external fund for their village development activities. The amount of income from the sales of trees is also important for the villages to be able to stand on their own feet.

More income from the woodlot means that the villagers must have a larger woodlot. It has been clear in the discussion of Proposition 3 that there is a positive relationship between the size of the woodlot and income from the woodlot. Thus the degree of dependency of villages on the external fund for village development activities is indirectly related to woodlot size. It can be concluded that a larger woodlot tends to generate more income, and good management of income makes the villages less dependent on the external development fund. In other words, no matter how large the woodlot is and how much the income can be generated from the woodlot, if the woodlot

committees were not capable in managing the village funds effectively, self-reliance of the community might not occur.

Although data show that a larger woodlot (Kok Peeba) provides more fuelwood than a smaller one (Nong E-Jone) in terms of the number of months used by each household, it is too risky to conclude that a larger woodlot yields more fuelwood to the villagers. This conclusion holds true only if we disregard the rule concerning fuelwood collection set by the woodlot committees. No matter how big the woodlot, if fuelwood is considered a by-product of the project and fuelwood collection is allowed occasionally, it is difficult for the villagers to fully rely on fuelwood from the woodlot as their major source of household energy. The villagers still have to collect fuelwood from other sources which are becoming more scarce every year. At best, the community woodlots can be only a supplementary source of fuelwood for most villagers who badly need it.

6.4 Other Impacts in the Two Community Woodlots Studied

Besides income, employment, fuelwood, food, and building materials, the two community woodlots studied also create other impacts. The respondents were asked whether they ever noticed any impacts caused by the woodlots. Table 40 shows the responses to this question.

Table 40. Impacts of the Woodlots as Perceived by the Villagers in the Five Villages. Studied.

Noticeable Impacts	Villages				
	Yang Sinchai %(N)	NongHad % (N)	DonGloy6 % (N)	DonGloy17 % (N)	DonBark %(N)
Yes	73.7(14)	66.7(10)	90.0(18)	92.3(24)	55.0(11)
No	26.3(5)	33.3(5)	10.0(2)	7.7(2)	45.0(9)
Total	100.0(19)	100.0(15)	100.0(20)	100.0(26)	100.0(20)

FAO (1988) indicated that *Eucalyptus* may: (1) consume much ground water; (2) affect soil fertility under certain circumstances; (3) not provide adequate food and habitat for wildlife; (4) not protect the soil against erosion due to its sparse canopies; and (5) upset local values or traditions. These impacts seem to occur in both woodlots studied. The followings impacts were perceived by the respondents:

1. The soil becomes infertile;
2. Ground water dries up;
3. No grass is found in the woodlot;
4. Crops grown near the woodlot are less productive;
5. *Eucalyptus* leaves do not easily decay;
6. The cattle do not like to go into the woodlot because it is too hot.

According to the respondents, these impacts were caused specifically by *Eucalyptus* trees in the Kok Peeba woodlot. The same kinds of impacts were also reported by the respondents in Ban Don Bark who used the Nong E-Jone woodlot. The author also noticed these impacts during his visits to both woodlots. The difference in micro climate between the *Eucalyptus* and non-*Eucalyptus* woodlots in Nong E-Jone was evident. It was much cooler in the non-*Eucalyptus* than in the *Eucalyptus* woodlot. There was also more undergrowth in the non-*Eucalyptus* than in the *Eucalyptus* woodlots. Although most respondents complained about the negative impacts of *Eucalyptus* trees, they still like them.

Table 41. Preferences Toward Tree Species Planted in the Woodlots Classified by Villages.

Preferences	Villages				
	Yang Sinchai %(N)	NongHad % (N)	DonGloy6 % (N)	DonGloy17 % (N)	DonBark %(N)
Yes	94.7(18)	93.3(14)	55.0(11)	69.2(18)	55.0(11)
No	-	-	15.0(3)	23.1(6)	5.0(1)
Not sure	5.3(1)	6.7(1)	30.0(6)	7.7(2)	40.0(8)
Total	100.0(19)	100.0(15)	100.0(20)	100.0(26)	100.0(20)

Table 41 shows that more than 90 per cent of the respondents in Ban Yang Sinchai and Ban Nong Had liked *Eucalyptus* trees. The most frequent reason for liking *Eucalyptus* was their marketability. Other reasons were that *Eucalyptus* trees are fast growing and can be used as fuelwood and building materials. The respondents of Ban Don Gloy 6 and Ban Don Gloy 17 did not like *Eucalyptus* trees as much as the respondents of Ban Yang Sinchai and Ban Nong Had. The market value of *Eucalyptus* trees was also the major reason why the respondents of Ban Don Gloy 6 and Ban Don Gloy 17 liked the trees. The respondents who did not like *Eucalyptus* trees reported that they were more concerned with the negative impacts than with market value. This may be due to the fact that a number of villagers of Ban Don Gloy 6 and Ban Don Gloy 17 have their farmlands close to the woodlot. Some reported that their farmlands were directly affected by the woodlot.

The community woodlot committees were also concerned about the negative impacts of *Eucalyptus*. The chairman of the woodlot committee mentioned that he was told in a community woodlot seminar at the district office that the yield of *Eucalyptus* decreases after the fourth generation. By that time, the soil quality may be very bad because *Eucalyptus* consumes so much water and nutrients. It will not be easy to grow crops or plant trees on the land once *Eucalyptus* has been planted. They now begin to

worry about the future of their woodlot. According to a conversation with a district forestry officer, there is no future plan for the Kok Peeba community woodlot.

Although the villagers of Ban Don Bark were directly involved in selecting the tree species, only 55 per cent of the respondents reported that they liked the trees planted. Among the four tree species planted, *Eucalyptus* and *Acacia auriculiformis* were the most preferred because *Eucalyptus* is fast growing and *Acacia auriculiformis* makes good fuelwood. The respondents who reported that they were unsure whether or not they liked the trees planted were those who enjoyed the benefits from *Eucalyptus* trees and concurrently did not like their negative impacts. Very few respondents of Ban Don Bark mentioned the market value of *Eucalyptus*. This might be due to the reason that income from the Nong E-Jone woodlot has not been evident as compared to income from the Kok Peeba woodlot. Regardless of the tree species planted, most villagers in Ban Don Bark do like their woodlot due to its aesthetic value.

6.5 Summary

The benefits from both community woodlots studied have been cash income, employment, fuelwood, building materials, and food. Besides such benefits, the tree species planted, especially *Leucaena leucocephala, Acacia auriculiformis, and Cassia Siamea* in Nong E-Jone woodlot also provide shade and beautify the village. However, the major benefit from Kok Peeba woodlot has been the cash income from the sale of *Eucalyptus* trees, not fuelwood as planned by the RFD. Fuelwood turn out to be a by-product because Kok Peeba woodlot was managed mainly for the sale of trees. In other words, the *Eucalyptus* trees were not primarily managed for fuelwood supply. The villagers were allowed to collect fuelwood in two occasions only: first, after the trees have been sold and cut down by the middleman, and second, when lopping of branches is

needed. In the Nong E-Jone community woodlot, cash income seems to be just equally important to other benefits because the income from the woodlot has not yet overshadowed other benefits. The villagers of Ban Don Bark enjoy not only the income from the sale of *Eucalyptus* poles but also other benefits from other tree species.

Generally, there were not many differences concerning the benefits derived from the woodlots among the respondents in different economic classes in both woodlot projects. Most respondents in every economic stratum of the four villages in Kok Peeba woodlot project got loans from the community woodlot revolving fund, and collected fuelwood from the woodlot, except for Ban Nong Had, where only a small percentage of respondents collected fuelwood. In Nong E-Jone project, almost every respondent interviewed collected fuelwood from the woodlot. Only one respondent was found to have received a loan from the community woodlot revolving fund.

Besides the benefits in terms of cash income, fuelwood, building materials, and food, both community woodlots also created undesirable impacts such as poor soil quality, drying up of ground water, and no grass for cattle. *Eucalyptus* is perceived by villagers to be a major cause of these negative impacts. However, it is still the most popular tree species among the villagers in both woodlots studied, due to its market value and fast growing characteristics.

The conclusion concerning the relationship between people participation and development approaches must be drawn based on the types of participation. People participation in decision making to adopt the woodlot project was found higher in the Nong E-Jone than in the Kok Peeba projects. However, the involvement of villagers in the decision making process did not necessarily make people participation in other stages of project higher. People participation in project activities of Ban Yang Sinchai (Kok Peeba project) was almost as high as of Ban Don Bark (Nong E-Jone project), though the

villagers of Ban Yang Sinchai were not involved in the decision making process to adopt the project. The incentives for participation (hired labor or future benefits) and the management of woodlots must be taken into account to explain this relationship. It was also found that participation in benefits was quite high in every village studied, though different development approaches were applied. The relationship between people participation in project activities and villagers' perceptions toward fuelwood shortage and the need for a woodlot was not statistically significant in most villages studied. In other words, fuelwood shortage and the need for a woodlot were not major factors influencing villagers to participate in woodlot activities in both projects.

No relationship between diversity of tree species and cash income from the woodlot was found. Although four tree species were planted in the Nong E-Jone woodlot, *Eucalyptus* is the only marketable species. Thus the assumption that if more tree species are planted in the woodlot, more income will be generated is not true because not all tree species are planted for the market. However, the amount of income generated was found to be dependent on the size of woodlot. A conclusion can be drawn from a comparison between the cash income from the sale of *Eucalyptus* poles from Kok Peeba and Nong E-Jone woodlots that the larger the woodlot, the more income can be generated.

For the villages to be self-reliant, the villagers should be able to rely more on themselves financially and be less dependent on external funds. The villagers should also be able to rely on fuelwood supply from their woodlots as a major source of their household energy. The ability of community woodlot committee of the Kok Peeba project to manage the income from the woodlot on the revolving basis has made it possible for all four villages to rely on themselves financially. In contrast, Ban Don Bark, in the Nong E-Jone project, is still dependent on external financial support for its village

development activities, though the community woodlot committee use the same revolving fund basis as the Kok Peeba project. It can be concluded that income from and size of the woodlot are determining factors of village self-reliance. But self-reliance of the community would not be possible unless the community woodlot committee were very effective in managing the woodlot.

A direct relationship between self-reliance on fuelwood supply from the woodlot of villages and the effectiveness of community woodlot committees was not found because the woodlot has been managed mainly for income generation for the villages. However, the way the committee distribute fuelwood to the villagers seems to reflect their effectiveness in controlling the amount of fuelwood to be collected. There was no relationship between size of the woodlot and self-reliance on fuelwood supply. While the fuelwood collected from the Kok Peeba woodlot lasted, on average, months longer than that collected in the Nong E-Jone woodlot, fuelwood collected from the Kok Peeba woodlot was still not sufficient for most households.

The ecological complex framework has helped us to understand the interactions between the social system and the environment in the context of a rural energy problem. The ecological approach allowed us to carefully examine the relationships between variables in the context of community woodlots discussed earlier. In the model, income and employment were treated as population variables. In both community woodlots income turn out to be a major benefit for the communities. The villagers involved in both woodlots have enjoyed income benefit in various ways such as infrastructure development and loans. In the Kok Peeba woodlot, villagers who were employed to work in the woodlot also received additional income. In fact, income generated from the Kok Peeba woodlot has been cited by the Royal Forestry Department as a major success of the project.

Development approaches, community woodlot committees, people participation, and self reliance were placed under organizational variables. Data showed that the community woodlot committees were very capable in managing their woodlots technically and financially. People participation was also a fundamental factor in the success of both Kok Peeba and Nong E-Jone woodlots. Participation was stimulated in different ways. Some villagers participated in the project because they were hired. Some participated because of tradition. Some participated because they were interested in the potential benefits of the project. Development approaches did not affect people participation in the villages studied. Regardless their involvement at the initial stage of the projects, villagers participated in the woodlot activities according to the above mentioned reasons. Among the four organizational variables in the model, self-reliance seems to be the most difficult one to study, especially self-reliance on fuelwood supply. Sometimes it was difficult for the villagers to tell how much they relied on fuelwood from the woodlots, because they normally collected fuelwood from many sources. However, the four villages in the Kok Peeba woodlot were self-reliant financially due to the income from the sale of *Eucalyptus*.

The size of community woodlot and diversity of tree species were viewed as technology proposed to the villages to help rural villagers meet their fuelwood need. The size of woodlot was important for income generation. The bigger woodlots can generate more income. Selection of tree species was dependent on the objectives of the project. As a technology, the size of woodlot and tree species to be planted should be carefully designed if the project objectives are to be met.

The villagers' perceptions toward the need of a woodlot and availability of fuelwood were considered as cultural variables. Although the villagers in both woodlots had different perceptions toward their woodlots and fuelwood shortage, it did not affect

their participation. One of the reasons why villagers participated was that participation belongs to village culture.

In this study, population, organizational, technical, and cultural variables were analyzed in the framework of a biophysical environment which was the condition of forest cover around the village areas. From the ecological complex perspective, the organizational variables, especially the woodlot committees, seem to play the most important role in the success of both woodlots studied. The ecological perspective showed how the villagers individually or collectively responded and organized themselves to cope with the forest resource problems they were facing. This indicates that no matter how good the technology is, the project success is dependent on the villagers' ability to organize themselves.

6.6 Conclusion

To say that the community woodlot issue is, in fact, an environmental issue is not an overstatement. Fuelwood has long been the only major source of household energy for most rural villagers in Thailand. The environmental destruction by human beings, especially of forest resources, has led to a decrease in the fuelwood supply from natural sources, which in turn, affects the lives of rural people. Community woodlots, as a technology, were proposed to solve such fuelwood shortage problems. However, it was not easy for most rural people to comprehend the proposed technology (community woodlots) which was somewhat of a new concept for them. Thus a local organization (community woodlot committees), as the representative of villagers, was needed to handle such new technology so that they would be able to solve their environmental problem (fuelwood shortage).

The review of literature in Chapter 2 suggested that people involvement in

woodlot projects could be affected by factors such as local organizations, land-use conflicts, perceptions toward community property resources, gender, development approaches, labor, political commitment, and local culture. This study has demonstrated that local organizations play the most important role in community woodlot projects. The community woodlot committee, as a local goal-oriented organization, is an essential factor for project sustainability. Though the two projects studied were differently initiated by different organizations, the community woodlot committees in both projects have been capable for the most part in managing their woodlots socially and financially. The committees of Kok Peeba community woodlot have demonstrated their ability in settling land-use conflicts among villages in the initial stage of the project, which finally made people participation from every village involved in the project possible.

This study has also confirmed that people participation, as suggested in most literature, is one of the substantial factors contributing to project success in both community woodlots studied. However, the study does not support the notion that totally bottom-up participation is a must if the projects are to be successful. The villagers in Kok Peeba project were not involved in the decision making process to adopt the community woodlot. Moreover, they were paid for the contribution of their labor to most community woodlot activities, which was an attribute of the woodlot project at that time. However, the project has been quite successful in terms of people participation, and the woodlot activities were continued quite satisfactorily without any external intervention. There were also occasions when the villagers worked without pay in some activities, such as lopping branches of trees and maintaining the woodlot. This can lead to the further conclusion that people participation is not solely dependent on expecting benefits from the community woodlot. In Thai society, especially in rural areas, people participation is in fact part of the culture. In most villages in Thailand, there is a tradition that when the

village headman asks for cooperation in developing the villages, each household is supposed to contribute one laborer. It is often the case that villagers participated because it is a tradition to do so. Sometimes they did not even think about what benefits they could derive from their contribution. This principle is verified by the observation of this study, especially in the case of Nong E-Jone community woodlot. It was reported that at present it is more difficult to get people to work in the Kok Peeba woodlot even though they are paid. This is because there are more job opportunities in the district area where the villagers can get higher wages. This example suggests that incentives like hired labor sometimes cannot induce people participation if the villagers can have access to other sources of better income.

It has been mentioned that diversity of tree species and size of woodlot were viewed as a proposed technology in this study. The choice of technology made either by the outsiders or by the villagers created different impacts to the target villagers. *Eucalyptus* is a good example of proposed technology that caused both positive and negative impacts. It is not denied that *Eucalyptus* has provided an immense benefit in terms of cash income in the Kok Peeba community woodlot project. Concurrently, *Eucalyptus* also caused perceived undesirable impacts. The magnitude of benefits and undesirable impacts seemed to have a positive relationship with the size of the *Eucalyptus* woodlot. One cannot expect a huge benefit from a large scale *Eucalyptus* plantation without meeting with large scale negative impacts caused by the same plantation. It seems that while trying to solve environmental problems by proposing a new kind of technology, it was not realized that the proposed technology could harm the environment as well.

This chapter described the roles of community woodlot committees, types of people participation, and benefits derived from both community woodlots studied. It also

discussed the relationships between variables in the research propositions based on an ecological perspective. Finally it presented the impacts caused by the woodlots. The next chapter discusses the conclusion and implications of these results.

CHAPTER 7

CONCLUSIONS AND RECOMMENDATIONS

This chapter summarizes the study and its findings. Conclusions and implications of this investigation are discussed. The limitations of the study and recommendations for future research are also presented.

7.1 Summary of the Study

The rapid growth of population and the destruction of natural resources in many developing countries have affected greatly the ecological balance of our natural environment. An over-exploitation of forest resources by such means as shifting cultivation, commercial logging, and fuelwood collection, has led to a decrease in fuelwood supply from the natural forests, which have been the only major source of fuelwood for rural villagers in most developing countries. Those rural dwellers, to varying degrees, are now facing a problem of fuelwood shortage. Thailand is no exception to this problem. The problem of fuelwood scarcity has been felt by both the governmental and nongovernmental agencies. Among other rural energy projects, community woodlots, under the social forestry scheme, are deemed one of the most promising strategies to alleviate the problem of fuelwood shortage in rural areas, while also generating income and employment for the rural households.

This study focused on community woodlots as a response to the rural energy problem (fuelwood shortage) and their impacts on rural communities as well as rural development. The general purpose of this study was to describe the benefits of community woodlots to local people and their communities. The study also attempted to discover why and how community woodlots provided such benefits, and what contributions community woodlots have on rural development goals. For comparative purposes, two community woodlots, which differed in size, the species of tree, and

development approaches were studied. Both community woodlots are located in the same province of northeastern Thailand. The first community woodlot, Kok Peeba, was proposed by the Royal Forest Department (RFD). The second woodlot, Nong E-Jone, was initiated by a nongovernmental organization, the Population and Community Development Association (PDA). The first woodlot is bigger in size with only *Eucalyptus camaldulensis* planted. The second woodlot is smaller with four tree species planted including *Eucalyptus camaldulensis, Acacia auriculiformis, Leucaena leucocephala*, and *Cassia siamea*. The first woodlot is shared among four villages, while the second woodlot was used by only one village.

Because this study involved the relationship between people and the environment, an ecological perspective was proposed as a framework for analysis of research questions. The ecological complex model is comprised of four major components: population, organization, environment, and technology. Culture was added to the model as a fifth component. Based on the literature reviewed, the key variables concerning community woodlot projects were identified to fit the model. The population variables referred to income and employment. Development approaches, community woodlot committees, people participation, and self-reliance were considered as organizational variables. The community woodlot defined by size and diversity of tree species entered this model as a proposed technology. The villagers' perceptions toward the need of a woodlot and availability of fuelwood were the cultural variables added to the model. This study did not consider environment a variable in the model. Instead it defined the environment, i.e. degraded forest cover, as an explaining factor in promoting community woodlot projects to the rural areas.

Five research propositions were examined in this study:

1. People participation is related to the villagers' perception toward fuelwood

shortage and the need of a woodlot, and to their involvement in deciding to adopt the woodlot project.

2. Income and employment from the community woodlot is related to the diversity of tree species planted in the woodlot.

3. Income and employment from the community woodlot is related to the size of the woodlot.

4. Self-reliance of villages on income and fuelwood from the community woodlots is related to the effectiveness of community woodlot committees.

5. Self-reliance of villages on income and fuelwood from the community woodlots is related to the size of woodlots.

The study describes the historical background of both community woodlot projects in terms of their establishment, size of the woodlots, and tree species planted. It also gives details of project implementation and management. In the analysis, the study begins by describing the roles of the community woodlot committees and people participation in both woodlots studied. Benefits to the villagers in the five villages derived from the two community woodlots studied are discussed. Analysis of the relationships between variables hypothesized in the research propositions follows. These variables are income and employment; people participation; community woodlot committee; self-reliance; diversity of tree species; size of community woodlot; development approaches; and villagers' perception toward community woodlots and availability of fuelwood. Finally, other impacts created by both community woodlots studied are reported.

Cash income from the sales of *Eucalyptus* trees, fuelwood, and building materials are the major benefits in both community woodlots studied. The same principles of woodlot management and distribution of benefits have been used across the four villages

that share the Kok Peeba community woodlot. The villagers were hired to plant the trees and maintain the woodlot. The woodlot committee members also received some wages for their work. The income from selling *Eucalyptus* trees were divided into three parts: (1) sub-district council development fund, (2) community woodlot maintenance fund, and (3) community woodlot revolving fund. The first two funds were centrally managed by the six official community woodlot committee members, but the community woodlot revolving funds were managed differently in each village, based on the agreement of the community woodlot sub-committees of each village and their villagers. The revolving fund has been used as a basis for managing the community woodlot revolving fund in all four villages to maintain the amount of funds they have. The community woodlot committee of Nong E-Jone woodlot also managed the community woodlot fund on the revolving basis. No major differences in benefits were found among the villagers in different economic strata in all five villages in both woodlots studied.

In both woodlots, people participation in woodlot activities is not related to villagers' perception towards fuelwood shortage or the need for a woodlot. People participation in project implementation may be related to the involvement of villagers in the decision making process to adopt the community woodlot project as in the case of Nong E-Jone. However, this is not true in the case of Kok Peeba woodlot where villagers were not involved in the decision making process. Nonetheless, people participation in woodlot activities in some villages that share the Kok Peeba woodlot is almost as high as people participation in the Nong E-Jone project.

The numbers of tree species planted in the woodlots are not related to the amount of income generated because only *Eucalyptus* are marketable. The amount of income generated rather depends on the size of woodlots.

The effectiveness of the community woodlot committee in managing the

woodlots partly influences the self-reliance of villages on income from their community woodlots. The community woodlot committees of both Kok Peeba and Nong E-Jone woodlots basically manage their income from the woodlots on the same revolving basis. But only the villages in the Kok Peeba project are able to rely on themselves financially, due to the larger amount of income derived from the woodlot. This implies that self-reliance of villages on income from the community woodlots is also related to the size of woodlots. There is no relationship between self-reliance on fuelwood supply from the woodlots, the effectiveness of community woodlot committee, and the size of woodlots. Neither community woodlot studied has yet become the major source of fuelwood for most villagers.

Both Kok Peeba and Nong E-Jone woodlots have created some undesirable impacts to the project beneficiaries. These impacts include a perceived decline in soil fertility, drying up of ground water, and decrease in grass for cattle as a result of planting *Eucalyptus*. However, the community woodlots also provide aesthetic and recreational value.

In summary, the analyses of the relationships among variables presented above were made through the ecological complex model which included population, organization, technology, and environment, with culture as an additional variable. Income and employment were treated as population variables. Development approaches, community woodlot committees, people participation, and self reliance were placed under organizational variables. The size of community woodlot and diversity of tree species were viewed as technological variables. The villagers' perceptions toward the need of a woodlot and availability of fuelwood were considered as cultural variables. The degraded forest cover, as a biophysical environment, was used as a frame of the study. The study indicated that organizational variables were very important for the

success of community woodlot projects.

7.2 Conclusions

A number of conclusions can be drawn from the results of this study. First, the initiation of both community woodlot projects studied originated from outsiders, governmental and nongovernmental agencies, who perceived fuelwood shortage and environmental degradation as nationwide problems. Although these problems were also felt by rural villagers, it was beyond their ability to establish a woodlot without external financial and technical support. Even if the villagers had been able to establish a woodlot at their own cost, especially a large woodlot like Kok Peeba, it is doubtful whether they would have been willing to do so. Some of the woodlot committee members reported that it is not advisable for the villagers to invest in a project like a community woodlot because the project needs a large financial investment, and it takes a long time for the villagers to receive an economic return. It seems that the future of this type of community woodlot will still be dependent on an external financial support for its initiation.

Second, people participation in both community woodlots was not the self-initiated type of participation, as defined by FAO/SIDA (1987), because both projects were proposed by outsiders. Based on the study of community woodlots by Foley and Barnard (1984), the type of people participation in the initial stages of Kok Peeba woodlot is considered passive because the government initiated the project and provided technical and financial support, and the villagers were hired without their involvement in project formulation and decision making. In contrast, the villagers of the Nong E-Jone community woodlot, though the project was proposed by outsiders, were consulted and involved in project formulation and decision making. Some suggest that project

formulation and decision making is the most crucial element of participation (World Bank:1988, Noronha:1982, Lohani:1980, Hoskins:1979). However, this study demonstrates that people participation in the later stages of the woodlot project should be encouraged regardless of villagers' involvement in project formulation and decision making as the case of Kok Peeba project shows.

The villagers' decision to participate in project implementation seems to be influenced by different incentives such as wages or potential benefits from the woodlots. In other words, people participation can be encouraged in different ways. The villagers were hired to work in the woodlot in the case of Kok Peeba, whereas in the case of Nong E-Jone, the villagers participated because they anticipated the future benefits or were influenced by tradition. The success of both woodlots, to some extent, was dependent on people participation, regardless of the villagers' reasons or incentives to participate. This evidence suggests that involvement of local people in project formulation and decision making is not compulsory for the projects to be effective and successful. The case of Kok Peeba community woodlot demonstrates the possibility of hiring local villagers to perform all kinds of woodlot activities under supervision of the woodlot committee. It was presented in Chapter 6 that there were also occasions when villagers in Kok Peeba project were willing to help develop their woodlot without getting wages. This explains that the tradition of voluntary labor, in fact, does exist, and people participation is not necessarily dependent on the expected benefits.

Third, the study shows that people participation can be affected by the conflicts in the use of public land as was the case of the Kok Peeba woodlot project, where seedlings were uprooted by the villagers in Ban Don Gloy at the early stage of project implementation. However, once the conflicts among villages had been settled and some rules concerning benefits sharing were set up, the villagers in every village involved in

the project were willing to participate.

Fourth, the study indicates that people participation can be encouraged if a local organization like the community woodlot committee is strong. The committees of both the Kok Peeba and Nong E-Jone community woodlots have been able to organize the villagers to participate in various woodlot activities.

Fifth, the community woodlot committee, as a local goal-oriented organization, plays a central role in community woodlot projects. The committee are the bridge between project officials and the villagers. Trained and advised by the project officials, the committee in Kok Peeba took over responsibility for managing the woodlot from the project officials after the projects had been completed. This study makes it clear that a community woodlot committee is needed for the project to continue smoothly. However, the committees are respected by their villagers only if they are honest and work effectively. It is not always necessary to appoint a new committee to be responsible for the community woodlot. The existing local organization, such as the village development committee, could also be responsible for the woodlot if it is not too busy with other village development activities and if it is closely supervised by the project staff.

Sixth, at the time of this study availability of fuelwood in the study areas was not documented because the volume of fuelwood available had not been measured. The Royal Forest Department indicates that natural forest no longer exists in the study areas, which implies that the villagers of the villages studied have a limited source of fuelwood. A study of the Kok Peeba community woodlot by Phutaraporn (1983) indicated that the villagers were aware of fuelwood shortage problem. This study also found that fuelwood shortage did exist in both study areas. However, villagers perceived the degree of fuelwood shortage differently due to many factors. Some villagers perceived the problem as very serious because they were hardly able to find fuelwood on their own farmlands,

and they had to travel to other places to collect fuelwood. Some did not perceive fuelwood shortage as a serious problem because fuelwood is still available on their own farmland. The Kok Peeba and Nong E-Jone community woodlots have become another major source of fuelwood for the villagers, although both community woodlots have not been able to fully supply fuelwood to most project beneficiaries. In the Kok Peeba project, a number of villagers have been able to use the fuelwood collected from the woodlot as a year round energy supply for their households.

However, most villagers in the Kok Peeba project seemed to enjoy the benefit of the woodlot in terms of cash income more than fuelwood, due to the larger amount of income generated and the use of such income for various development activities. Cash income has played a crucial role in village development activities. This does not imply that cash income is more important than fuelwood or other benefits, but without this income many village development activities would not have been achieved. Through its income and the management of income, the case of Kok Peeba demonstrates the contribution of the community woodlot to rural development. The Nong E-Jone woodlot reflected more on the benefits in terms of environmental protection and aesthetic value.

Finally, *Eucalyptus* is a two-edge sword. While it provides benefits in terms of fuelwood supply and cash income to the villages, it also creates negative impacts to the natural environment. These negative impacts have been proven by scientific evidence and have been highly perceived by most villagers in the project areas. However, because most villages cannot totally rely on government financial support for their village development activities, most villagers desire the income from their community woodlots, and leave the problems of environmental degradation caused by *Eucalyptus* plantation unsolved. Though most villagers realize the effect of *Eucalyptus* on soil infertility, some have already started planting *Eucalyptus* trees on their own farmlands due to the

attractiveness of *Eucalyptus* in terms of cash income. This trend will probably continue as long as the problem of poverty has not been solved and the Thai government gives more importance to the economic value of *Eucalyptus* than to its severe negative impacts.

7.3 Limitations of the Study

This study is limited by the following factors. First, the study cannot be generalized to all community woodlot projects in Thailand, because only two community woodlots were studied. However, there were not many choices of community woodlot projects available for the study. Only a limited number of community woodlot projects have been implemented long enough to see the development of community woodlot committees, their managerial ability, and the impacts of the projects. In addition, there were different types of community woodlots implemented by different development agencies, which made selecting projects for this study difficult. More cases of community woodlots should be investigated for the study to make generalization possible.

Second, data about the amount of fuelwood collected from the woodlots, time spent on collecting fuelwood, and employment in terms of wages for being hired to work in the woodlot, could not be obtained. The community woodlot committee as well as the villagers in Kok Peeba project could not provide accurate data for such questions because they never kept records.

Third, the results of the study are limited by the nature of the propositions which focused on income related benefits. The proposition which focuses on self-reliance of the community is very much related to the income generated by the woodlots. The income related benefits are probably over-emphasized due to the fact that cash income from selling *Eucalyptus* poles in both woodlots studied, especially Kok Peeba, is the most

tangible benefit as compared to others. It is also one of the major factors that make the Kok Peeba woodlot sustainable.

Finally, the author was not able to witness the woodlot activities, though many visits were made to the villages. The problem was that there was no fixed schedule for woodlot activities such as the sales of *Eucalyptus* trees, the maintenance of woodlots, and the collection of fuelwood. These activities were undertaken at different times of the year. Due to this limitation, the author had to rely solely on the data provided by the villagers and the community woodlot committee without data from personal observations. This limitation especially affected the issue of fuelwood distribution which remains somewhat unclear.

7.4 Study Implications

Several implications can be drawn for the planners of community woodlot projects from the results of this study.

First, project planners should bear in mind that the concept behind community woodlots is to involve rural people in all woodlot activities. This study shows that people participation in the later stages of the project was not necessarily affected by the involvement of villagers in the decision-making process as in the case of Kok Peeba project where the villagers were hired. This implies that people participation is not necessarily limited to free labor. Hiring the villagers to work for the project appears acceptable and appropriate in some situations. But project planners should also keep in mind that not all the woodlot projects have enough budget to hire the villagers. If budget is the project constraint, free labor participation could be the solution. Free labor participation could be encouraged only if the villagers were informed clearly about the nature and objectives of the proposed projects. This can be achieved through the

involvement of villagers in the early stage of project, as in the case of Nong E-Jone community woodlot.

Second, project planners must not overlook the roles of community woodlot committees in managing the woodlots. For community woodlot projects to be successful, the roles of community woodlot committees should be strengthened by the agencies which promote the woodlots. Training and supervision on the management of woodlots should be provided at the early stage of the project so that the woodlot committee members may clearly understand the objectives of the projects and be able to explain it to the villagers. Post-project monitoring and supervision should also be provided to assist the woodlot committees when needed.

Third, project planners should remember that the tree species to be planted in the community woodlots should be carefully selected to meet the objectives of project. This means selecting the right technology to solve a particular problem. Multipurpose tree species like *Acacia auriculiformis* and *Leucaena leucocephala* might be appropriate for projects that aim to produce fuelwood and restore soil fertility, while *Eucalyptus* might be good for the projects that aim to generate income and provide fuelwood and building materials. Both market and non-market values of the trees species introduced to the communities must be considered. In addition, villagers' perception towards negative impacts of a particular tree species should also be taken into account because this may influence villagers' decisions in adopting the project.

In the current situation in Thailand where the problems of fuelwood shortage and environmental degradation are almost equally important, the tree species promoted in the community woodlots should be good enough to provide fuelwood, while being environmentally sound. The project planners should consider the *Eucalyptus* controversy seriously because it provides a lot of benefits in terms of cash to the rural dwellers, but

concurrently creates a tremendous impact on the environment.

A final implication involves the future plan for *Eucalyptus* community woodlots. While project planners are satisfied with and most rural villagers have been enjoying the benefits from *Eucalyptus* woodlots, there is no clear-cut policy concerning the long term impacts of *Eucalyptus* woodlots. The policy makers in the forestry sector and the project planners who are involved in community woodlot projects should not ignore the fact that the benefits from *Eucalyptus* woodlots can be reaped only for a certain period of time. After that period, productivity declines, and the quality of soil in such woodlots may not be good enough for other crops or trees. The policy makers and the planners should develop a future plan for *Eucalyptus* community woodlots and decide what should be done after the woodlot can no longer yield any products. They should also communicate with the local villagers about their future plans.

7.5 Future Research Recommendations

There are many interesting issues concerning community woodlots in Thailand that are raised by this study. First, non-market values of the tree species planted in community woodlots is recommended because this would allow us to see the benefits of woodlot from another perspective besides income. Second, a study of benefits such as increase in soil fertility and biodiversity as a result of planting more tree species in the same woodlot is also recommended. The same kind of study should also be conducted in a *Eucalyptus* woodlot to measure its biophysical impacts. This would be very useful to address the balance between benefits and impacts of *Eucalyptus* plantation, and to compare its benefits and impacts with the multiple species woodlot.

Third, a large scale survey of community woodlots would be useful for a generalization of the results and impacts of the woodlot projects. The variables to be

investigated could be the same as in this study, but the conclusions of the study should be drawn based on the different woodlot implementation agencies. This would provide a clearer picture of the differences and similarities of the results of community woodlots implemented by the different agencies. In addition, comparing community woodlot projects initiated or implemented by the same development agency would help answer the question, If the same approach were used in the different woodlot projects, would the projects yield the same result?

Finally, a detailed study of the amount of fuelwood generated from the community woodlots and how much it helps supply rural household energy demand is recommended. This kind of study needs a longer time frame and requires an anthropological participant observation method to be able to record accurate data. The results of this research would help project planners plan future woodlots for communities where the problem of fuelwood shortage is the top priority.

The issues of population growth, forest resource degradation, and rural energy will continue until the turn of the century and after. Rural energy crises and the condition of forests in many countries are worsening day by day. Governments in many countries have tried various forestry development concepts to solve rural energy and forest resource problems. Reforestation programs are launched and new forest management approaches are tried. However, reforestation is much slower than forest destruction. Non-conventional forest management approaches like participatory forest management and joint forest management are still in a state of trial and error. Some are successful and some fail due to the many social and biophysical factors involved. Community woodlots are one of the attempts to solve rural energy and forest degradation problems. To date, community woodlots are appreciated or criticized by different groups of people for different reasons and views. Whatever view one holds, community woodlots should not

be regarded as having only positive or negative impacts to rural people. The complexity of the relationships between social and biophysical factors or variables must be taken into account when studying their impacts and discussing their utility.

APPENDIX A

Household Survey Questionnaire

Respondent's number.....

A Household Survey Questionnaire

on

Community Woodlots and Their Impacts
on Rural Households' Fuelwood Supply and Rural Development

Respondent's name.....

Address.....

Village name and number.....

Sub-district.....

District.....

Province.....

Interviewer's name.....

Date of interview.....

1. Respondent's Ideographic Data

1.1 Respondent's identity

1) head of household
2) spouse of household head
3) child of household head
4) parents of household head/spouse
5) other relation
6) other

1.2 Respondent's sex

1) male
2) female

1.3 Respondent's age.....years

1.4 Respondent's educational status

1) no schooling
2) lower than grade 4
3) grade 4
4) grade 5-7
5) grade 8-10 (MS.1 - MS.3)
6) grade 11-12 (MS.4 - MS.5)
7) technical school
8) religious school
9) others (specify).

1.5 Marital status

1) single
2) married, living together
3) married, spouse working off-site
4) married, staying separately (without legal divorce)
5) divorced
6) widowed

1.6 Were you born in this village?

1) yes
2) no

1.7 How long have you been living in this village?

.....years

1.8 Respondent's major activity

1) agriculture
2) civil servant (teacher etc.)
3) trader or merchant
4) on-farm labor
5) waged labor
6) self employed, artisan
7) others (specify)

1.9 Household Members.

Member	Sex	Age	Relationship to Household head
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Sex: 1 = male 2 = female
Relationship to head of household:
1 = household head 2 = spouse of household head
3 = child of household head
4 = parent of household head/spouse
5 = son or daughter in law
6 = grandson or granddaughter
7 = other relatives

1.10 Total number of household members.....

2. Migration History

2.1 Have you ever migrated to other places?
1) yes 2) no

If no, go to section 3.

If yes:

When	Reason	Where	Accompanied

When: Enter exact year

Reason Enter: 1 = employment 2 = marriage 3 = education 4 = others

Where: Enter: 1 = Bangkok 2 = within the province 3 = other regions

Accompanied: 1 = alone 2 = w/family

2.3 If migrated for employment, please specify what kind of employment.
1) construction work 2) factory work
3) housekeeper 4) others (specify.....)

2.4 Will you still migrate for outside employment?
1) yes 2) no

2.5 If yes, why
.....
.....

2.6 If no, why not?
.....
.....

3. Landuse and Land Holding.

Types of landuse (rai)	Paddy field (rai)	Upland field (rai)	Fruit trees (rai)	Forest reserves (rai)	Home-stead (rai)	Fish pond (rai)	others (rai)
1. owned							
2. operated							
3. rented out							
4. rented in							
5. land let by other to use without charge							
6. ownership title							
7. total land holding							

Ownership title: 1. Chanode 2. Nor. Sor.3 3. Sor. Kor.1
4. Others (Specify).....

Total land holding = 1+4+5+-3

4. Livestock Production and Cost Over the Period of Last Agricultural Year.

Types of animal	no. owned	no. bought	total price (baht)	no. sold	total price (baht)
Cows					
Buffs					
Hogs					

5. Loans and other financial benefits from the community woodlot.

5.1 What benefits have you received from the village revolving fund from selling Eucalyptus trees?

1) cash 2) fertilizer
3) Water jar 4) 1+2
5) 1+3 6) 2+3
7) 1+2+3 8) never

5.2 If yes,

cash.....baht
fertilizer.....baht
water jar.....baht

5.3 How long have you owed the money?

.....month

5.4 for what purposes did you borrow the money?

1) buy fertilizer 2) buy water jar
3) household consumption
4) other (specify)

5.5 Do you pay interest?

1) yes 2) no

If yes,

5.6 How much do you pay in interest per month?

.....baht

5.7 It the village fund were not available, What would be another source you can get loan?

1) Commercial bank
2) Bank of Agriculture and Agricultural Cooperatives (BAAC)
3) neighbors
4) relatives
5) businessman
6) will not get any loan, because it is not really needed

5.8 According to the source of loan you mentioned in 5.7, how much interest you have to pay? .....baht/month

6. Household's Energy Consumption

6.1 How many times a day do you cook?
1) once 2) twice
3) three times

6.2 Does the number of times of cooking per day change seasonally?
1) yes 2) no

6.3 If yes, describe how it changes
.....
.....
.....

6.4 What kind of fuel do you use for cooking and heating?
1) fuelwood 2) charcoal
3) gas 4) 1+2
5) 2+3 6) 1+3

6.5 If fuelwood, do you
1) collect
2) buy
3) both collect and buy

6.6 If collect, who in the household does most of the fuelwood collection?
1) male household head
2) spouse of male householdhead
3) female householdhead
4) male children
5) female children
6) all share equally
7) others (specify)

6.7 What parts of tree do you normally collect for fuelwood?
1) fallen branches/leaves
2) lopped branches
3) felled trees
4) any parts of trees found
5) 1+2

6.8 From where do you normally collect fuelwood? (rank the most important 3 sources)

.....1) homestead area
.....2) your own paddy field
.....3) other people's land
.....4) public land, other than village woodlot
.....5) natural forests
.....6) reserved forests
.....7) village woodlot

6.9 For the fuelwood source ranked 1, in question 6.8

- Species of trees collected.....
- Distance.....km.
- Means of transportation.....
- Time spent for traveling (round trip).....hours
- How often do you collect fuelwood per month?.....

6.10 Have you ever collected fuelwood from village woodlot?

1) yes 2) no

6.11 If yes, how often do you collect fuelwood from your village woodlot?

1) every year after the trees have already been sold
2) some years after the trees have already been sold
3) only once since the presence of village woodlot

6.12 What fuelwood did you collect from village woodlot?

1) Eucalyptus 2) Acacia auriculiformis
3) Leucaena leucocephala
4) 1+2 5) 1+3
6) 2+3 7) 1+2+3

What are the advantages and disadvantages of the trees you used for fuelwood mentioned in 6.12?

6.13 Eucalyptus

Advantages.....
Disadvantages.....

6.14 Acacia auriculiformis

Advantages.....
Disadvantages.....

6.15 Leucaena leucocephala
Advantages.....
Disadvantages.....

6.16 How many months can each collection of fuelwood from village woodlot be used for?
.....months

6.17 To what extent do you think the fuelwood collected from village woodlot can lessen the problem of fuelwood shortage of your household?
1) very little 2) a lot

6.18 If you buy fuelwood
- How often do you buy fuelwood a year?.....
- From where.....
- Distance.....km.
- Time spent for traveling.....hours.
- Cost of transportation.....baht.
- Amount of fuelwood buy each time.....kg.
- Price.....baht/kg.

6.19 Do you make charcoal yourself?
1) yes 2) no

6.20 If yes, what is the major source of wood for making charcoal? (rank the most important 3 sources)
.....1) homestead area
.....2) your own paddy field
.....3) other people's land
.....4) village woodlot
.....5) public land, other than village woodlot
.....6) natural forests
.....7) reserved forests
.....8) others.....

6.21 What tree species do you usually use for making charcoal?
.....

6.22 How often do you make charcoal a year?
.....

6.23 Is the charcoal made yourself sufficient for household use all year round?
1) yes 2) no

6.24 If not sufficient, do you buy charcoal?
1) yes 2) no

6.25 In what season do you usually make charcoal?
1) dry season 2) rainy season
3) cold season 4) any season

6.26 Why do you like to make charcoal in such season?
.....

6.27 Does the type of energy used for cooking change seasonally?
1) yes 2) no

6.28 If yes, how?
.....

6.29 If you bought additional charcoal, where did you buy charcoal?
.....

6.30 Price of charcoal per kilogram .....baht

6.31 Annual expenditure for buying charcoal
.....baht

6.32 Besides using trees from village woodlot for fuelwood and making charcoal, what other purposes do you use trees for?
1) fodder
2) fruit/food tree crops/mushroom
3) fences/poles
4) timber/construction materials
5) medicines
6) grazing
7) handicrafts/cottage industry

7. Opinions Toward Trees and Village Woodlot.

7.1 Generally, do you think trees are important for your living?
1) very important 2) not very important

7.2 If very important, why?
1) trees provide shade
2) trees provide fuelwood
3) trees provide construction materials
4) trees cause regular rainfall

7.3 If not very important, why?
.....

7.4 Did you have any idea what exactly village woodlot is when you first heard that a woodlot project will be implemented in your village?
1) yes,
2) no, did not have any knowledge about village woodlot
3) knew a little bit about village woodlot

7.5 Were you interested in planting trees in village woodlot at the very beginning?
1) yes 2 no
3) indifference

7.6 If yes, because
1) expected fuelwood from village woodlot
2) expected cash from selling the trees
3) 1+2

7.7 If no, because
1.....
2.....
3.....

7.8 Do you know who proposed woodlot project to your village?
1) yes 2) no

7.9 If yes, specify the name(s)
1.....
2.....
3.....

7.10 Before the implementation of village woodlot, did you agree to adopt this project?
1) yes 2) no 3) indifference

7.11 If agreed, because

.....

.....

7.12 If did not agree, because

.....

.....

7.13 Do you think your village really needs a woodlot?

1) yes 2) no

7.14 If yes, because

.....

.....

7.15 If no, because

.....

.....

7.16 Initially, what benefits did you expect from village woodlot? (specify 3 benefits)

1) fuelwood
2) food/fruits/mushroom
3) income and employment
4) timber/poles/construction materials
5) soil and environment protection
6) expected nothing
7) others (specify)

7.17 Did you get the benefits from village woodlot as expected?

1) yes 2) no

7.18 If yes, what benefits did you get? (rank the most important 3 benefits)

_____1) fuelwood
_____2) food/fruits/mushroom
_____3) income and employment
_____4) timber/poles/construction materials
_____5) soil and environment protection
_____6) others (specify).....

7.19 Do you perceive fuelwood shortage as a problem in your village?
1) yes, seriously 2) to some extent only
3) no, not at all

7.20 How do you think about the availability of fuelwood in your village?
1) still plenty
2) still available, but not plenty
3) scarce 4) not available at all

7.21 How many years do you expect the existing natural sources of trees used for .....years

7.22 What kinds of rights do you have on using the trees in community woodlot?
1) fallen branches/leaves
2) lop branches
3) fell trees
4) others (specify).....

7.23 Are villagers from other villages allowed to use trees in village woodlot?
1) yes 2) no
3) for some uses only 4) do not know

7.24 If yes, what uses of trees they are allowed?
1.....
2.....
3.....

7.25 Are there any conflicts among villagers caused by the unfair distribution of benefits so far?
1) yes 2) no

7.26 Are you satisfied with the way the benefits from village woodlot are distributed or managed/used presently?
1) yes 2) no

7.27 If no, because
.....
.....

7.28 Suggestions on how the benefits from village woodlot should be better distributed or managed?
1.....

2.....
3.....

7.29 Have your family ever used the public land that is now being used for village woodlot?
1) yes 2) no

7.30 If yes, for what purposes?
1) growing rice
2) growing cash crops
3) growing vegetables
4) grazing
5) others (specify).....

7.31 How did you deal with the loss of rights in using such public land?
1) accepted the loss of rights and moved out of the public land.
2) protested against the government agency who wanted the public land for implementing village woodlot.
3) formed a group and negotiated with the government agency concerned.
4) destroyed seedlings in village woodlot
) others (specify).

7.32 In case conflicts occurred, who played the role in settling such conflicts?
.....

7.33 Problems caused by the loss of rights in using such public land?
1) .....
2) .....
3) .....

7.34 Have you or any of your household's members have ever participated in village woodlot activities?
1) yes 2) no

7.35 If yes, how did you or your household's members participate in village woodlot project?
1) decision making in accepting village woodlot
2) selecting tree species
3) planting the trees
4) taking care of village woodlot
5) distributing of benefits
6) evaluating the village woodlot project

7) being a village woodlot committee
8) others (specify).....

7.36 How many of your household's members participated in village woodlot activities?

.....

7.37 Why did you or your household's members decide to participate in village woodlot activities?

1) were hired to plant trees in village woodlot
2) voluntary or followed the neighbors
3) expected to receive benefits from village woodlot in the future
4) were forced to do so
5) others (specify).....

7.38 If you or your household's members never participated in any woodlot activities at all, why?

1) not informed by the village headman or woodlot committees
2) not satisfied with the village woodlot project
3) do not have enough labor
4) others (specify).....

7.39 Do you like the tree species planted in your village woodlot?

1) yes 2) no
3) indifference 4) 1+2

7.40 If yes, specify the species you like and reasons

1. Eucalyptus.....
because.....
2. Acacia auriculiformis.....
because.....
3. Leucaena leucocephala.....
because.....
4. Cassia siamea .....
because.....

7.41 If no, specify the species you do not like and reasons

1. Eucalyptus.....
because.....
2. Acacia auriculiformis.....
because.....

3. Leucaena leucocephala.....
   because.....
4. Cassia siamea .....
   because.....

7.42 If you have had the choice, what species will you select to plant in village woodlot? (maximum 5 species)

1.....
2.....
3.....
4.....
5.....

7.43 Have you ever practiced agroforestry (growing some crops like cassava, maize, etc. mixed with or in between trees) in village woodlot?

1) yes 2) no

7.44 If yes, what did you grow?

1) rice
2) cassava
3) maize
4) groundnut
5) others (specify).....

7.45 Did you get a good yield from crop mentioned in 7.4

1) yes 2) no

7.46 If you never practiced agroforestry, why?

1) not interested
2) not allowed to do so
3) did not have time
4) did not have labor
5) did not have land in village woodlot before
6) already have enough land

7.47 Are you one of village woodlot committees?

1) yes 2) no

7.48 Do you think the village woodlot committees are working effectively?

1) yes 2) no

7.49 If no, what are the problems?

1.....
2.....
3.....

7.50 Do you think the villagers could manage the village woodlot without the committees

1) yes 2) no

7.51 In your opinion, who plays the most important role in the village woodlot project? (not necessarily the village woodlot committees)

1.....
2.....
3.....

7.52 Do you know what agency/agencies engaged in woodlot project in your village?

1) Royal Forestry Department (RFD)
2) Population and Community Development Association (PDA)
3) Others (specify).....

7.53 Have you ever received any advice/helps about village woodlot activities from the officials in charge?

1) yes 2) no

7.54 If yes, what advice did you received?

.....
.....

7.55 From what agencies did you receive advice?

1) forester
2) extension worker
3) Population and Community Development Association
4) Others (Specify).....

7.56 Generally, are you satisfied with the woodlot project officials' performances?

1) yes 2) no

7.57 If no, because

.....
.....

7.58 Did you notice any impacts you believe they are caused by the presence of village woodlot?

1) yes 2) no

7.59 If yes, what impacts?

Positive impacts

.....

.....

Negative impacts

.....

.....

APPENDIX B

Guideline Questions For Community Woodlot Committees

Guideline Questions For Community Woodlot Committees

A. Pre-implementation Phase of Community Woodlot Project.

1. How and why the community woodlot was proposed to the village? By whom?

2. What were the reasons for adopting community woodlot project?
   - fuelwood shortage
   - need source of food/fruits
   - need source of poles/construction materials
   - environmental problems
   - others.

3. Were there any conditions or commitments the villagers have to conform when agreed to adopt community woodlot project? If yes, what conditions or commitments?

4. Did the village get any support from the agency who proposed community woodlot project in terms of money, seedlings, fences, advice, etc.? How?

5. What were the steps in adopting community woodlot project in terms of planning, decision making, implementation, and involvement of villagers?

6. Were there any problems or conflicts in adopting such community woodlot project?

If yes, what problems or conflicts?

7. How the problems or conflicts were settled?

8. Who played a major role in the management of conflicts?

9. Were the poor, landless, and women consulted during the adoption process of community woodlot project?
   If yes, how?
   Did they agree in adopting the project?
   If they did not agree, why?

10. Were the villagers consulted on selection of tree species to be planted in community woodlot?

B. Implementation and Management of Community Woodlot?

1. Who were involved in the implementation of community woodlot in terms of preparing the land, planting the trees, fencing, weeding, care taking, etc.?

2. How was the rate of seedlings survival for each cycle of tree planting?

3. What were the factors affected the rate of seedling survival?

4. How the villagers, especially the poor, landless, and women participated in the implementation of community woodlot?

5. Were there any constraints in calling for people participation in community woodlot project? If yes, what?

6. Were there any agroforestry practices in community woodlot? If yes, what crops were planted?
   Who were and were not allowed to do so?
   Number of years allowed?

7. Are villagers in other villages allowed to reap benefits from the community woodlot?
   If yes, what benefits? How?

8. Are there any benefits exclusively reserved for the poor, landless, and women? If yes, what?

9. How the community woodlot committee was formed?
   Did the villagers participate in selecting the community woodlot committees?

10. What are the responsibilities of community woodlot committee?

11. Are there any other local groups/organizations involved in community woodlot activities? if yes, how?

C. Benefits from the Community Woodlot.

1. How many volume of trees have already been harvested so far? In what year?

2. How the harvested trees were utilized?

3. How is the market of Eucalyptus?

4. Where does the village normally sell Eucalyptus poles?

5. Are you satisfied with the market price of Eucalyptus?

6. How much income the village has made from selling Eucalyptus trees so far?

7. How the income is distributed to the villagers?

8. How did the village woodlot committee come up with the idea of the way the income is now being distributed? Who initiated this idea? Why?

9. Has the committee ever got any other income from village woodlot, besides selling Eucalyptus poles?
   If no, does the committee has any plan to make money out of the community woodlot, besides selling Eucalyptus poles? If yes, what plans?

10. What are the trees in community woodlot mainly used for?

D. Opinions Toward Community Woodlot and Fuelwood Shortage and Rural Development.

1. Did the village woodlot committee/village leaders perceive fuelwood shortage as problem in their village? If yes, how serious?

2. Are there any environmental problems, e.g., soil erosion, flood, drought, etc. in your village?

3. How do the village woodlot committees value village woodlot in solving problems of household energy needs and environmental degradation, and in contributing to the well-being of households and community as a whole?

4. Are there any obvious social and environmental impacts caused by the presence of community woodlot?

If yes, what impacts, positive or negative?

5. Did the community woodlot really solve the problems of fuelwood shortage, environmental degradation, rural poverty, and unemployment, etc., as expected? If yes, how? If no. why?

6. What do you think how your village would be, if a community woodlot has not been proposed and implemented in your village?

E. Information on other village development projects.

1. Besides village woodlot project, what were the major village development projects in the past 10 years?

2. Were there any major changes caused by those village development projects? If yes, what changes, and caused by what development projects?

3. Do you think there are any differences between village woodlot project and other village development projects in terms of project planning, decision making, implementation, and people participation?

4. How do you value the benefits of village woodlot project as compared to other village development projects?

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