# FOREST MANAGEMENT IN NORTHERN THAILAND:

# A RURAL THAI PERSPECTIVE

by

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**ABSTRACT**

Deforestation has become one of the world's most pressing natural resource problems and has emerged as a serious threat to the welfare of rural populations in many developing countries. In Thailand, forest resources have been rapidly depleted leading to adverse environmental and socio-economic conditions. As a result, there is widespread awareness of the need to develop a better understanding of deforestation and its impact on rural people in order to establish management plans which promote the sustainable use of the resource.

This study reviews the emergence of deforestation as a natural resource management issue in Thailand and investigates the characteristics of human-environment interaction as it relates to forest loss. It concentrates on acquiring information on the perceptions of people and developing a better understanding about deforestation in Northern Thailand. In particular, it focuses on the human-forest interactions and the perceptions of rural people regarding the ecological and socio-economic importance of the forest resources and their evaluation of the current management of the resource.

The study is based on the concepts and guidelines developed in environmental perception research. The research design combines three data collection procedures: a questionnaire survey; informal interviews and observations.

It presents the results of 162 respondents in the questionnaire survey and summarizes qualitative information compiled through informal interviews and observations. The responses of villagers from three different villages in the Mae Taeng watershed are compared on the basis of village and gender in the data analysis.

The findings indicate that respondents have a general awareness and concern for forest loss around their villages and in the country. They identify factors contributing to forest loss and outline the effects of deforestation on their communities. Additional information on the evaluation of forest management and a summary of local ideas for potential management strategies is also provided.

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## TABLE OF CONTENTS

## LIST OF TABLES

## LIST OF FIGURES

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## CONVERSION UNITS

### Currency Equivalents

| | | |
|---|---|---|
| Canadian $ 1 | = | Baht 21.5 |
| Thai Baht 1 | = | CAN $ .046 |

### Area Equivalents

| | | |
|---|---|---|
| 1 rai | = | 0.16 hectares |
| 1 hectare | = | 6.25 rai |

## GLOSSARY OF THAI TERMS

| | | |
|---|---|---|
| Amphoe | = | District |
| Ban (muban) | = | Village |
| Changwat | = | Province |
| Kamnan | = | Tambon leader |
| Phuyaiban | = | Village leader |
| Tambon | = | Subdistrict |

# CHAPTER 1

# INTRODUCTION

## 1.1 Nature of the Problem

Deforestation is considered by many analysts to be one of the world's most pressing natural resource management problems (see, for example, Allen and Barnes, 1985; Gradwohl and Greenberg, 1988; Williams, 1989; WRI, 1986). Once covering six billion hectares, nearly half the earth's land base, forests in the tropic and temperate zones have been steadily depleted. By 1954, the world had lost thirty percent of its forest cover. More recent estimates suggest this loss has risen to fifty percent (Dankelman and Davidson, 1988). Although significant deforestation has occurred in the temperate regions, reforestation has started to counter the trend (WRI, 1986). In tropical regions, however, deforestation exceeds reforestation by ten to twenty times in recent years (WRI, 1986; ICIHI, 1986). If present trends continue tropical rain forests could be eliminated by 2060 A.D. (Guppy, 1983), if not sooner (Myers, 1984).

Almost all the world's remaining tropical forests are located in developing countries where population growth and the rate of land use change are the highest (Lugo, 1988; Ross and Donovan, 1986; WRI, 1986). The majority of people in these nations live in rural areas and depend on the forest resources for their livelihood (Peng and Rajeandran, 1984). Directly, forests supply construction materials, fuelwood, fodder, food, and medicine. Indirectly they protect watersheds, regulate water for agricultural production, provide clean water, and maintain soil nutrients (Dankelman and Davidson, 1988; Dept. of State, 1980; FAO, 1989b, 1989c; Ireson, 1989; WRI, 1986). Tropical forests are also valuable gene banks which house fifty percent of the world's species (ICIHI, 1986; Myers, 1981).

The loss and degradation of tropical forests, therefore, has serious implications for the natural and human environment in the Third World (Brunig, 1977; Myers, 1986a). It has an adverse effect on agriculture through the loss of soil fertility and erosion. It destroys the ecological balance of the forest and threatens many wildlife species and destroys genetic diversity (Alexander, 1986; Goldsmith et al., 1987; Simon, 1986). It can also result in the loss of fixed carbon leading to climate change, and disrupts the hydrologic cycle causing water shortages and drought (Allen and Barnes, 1985; Bowander, 1987). As such, the degradation of the environment can lead to a reduction in the quality of life for many people

in tropical forest areas (UNEP, 1988), and creates increasing hardships for those whom depend on the forest for their survival (Goldsmith et al., 1987). Therefore,

> [t]he need to conserve the tropical forests is obvious to those aware of their value. But awareness in no way matches the rate of destruction of the forests. Ignorance and short-sighted greed among industrialists, businessmen and politicians in both developed and developing countries are playing an important part in furthering the destruction. At the same time a large part of the world's population can only subsist by over-exploiting the forests, thus wiping out their only resource
>
> (Jackson, 1983:254).

Given the extent and magnitude of deforestation in many developing countries, there is a growing awareness and recognition that more effective control and management of forested areas is needed (Ross and Donovan, 1986). However, juxtaposed with poverty, illiteracy, underdevelopment, lack of resources, and increasing populations, reversing the deforestation trend has proven to be very difficult (Bowander, 1987). In many situations, conventional forms of management have been ineffective at curtailing forest loss because the complex interaction between humans and the resource has been neglected and is not well understood (FAO, 1982; Gregersen et al., 1989). As a result, there is a growing consensus that a new framework for forest management, based on the concepts of social and community forestry, must be designed and implemented (see, for example, NTUSFP, 1987; Stevens, 1989 and 1990; Vergara, 1985a, 1985b). This form of management places at its centre the concerns and needs of local people (Morse et

al., 1987; Stevens, 1989). Accordingly, understanding the human-environment relationship is an integral part of management (Bowander, 1987; Hafner and Apichatvullop, 1990).

Researchers now recognize that environmental problems cannot be addressed without understanding and mitigating social problems (Henning, 1989). Therefore local people, particularly those living in rural areas of developing countries, can play a very important role in the management of forest resources and should be considered when assessing a resource problem or implementing a management plan (Bhumibhamon, 1987; Cernea, 1985; Hansen and Erbaugh, 1987; Roy, 1987; Weber, 1987). In order to do this effectively, Agarwal (1986) suggests it is imperative to collect accurate information on the technical, socio-economic and cultural aspects of resource use, and how it relates to the people. Since most studies in the past have focused solely on men, it is also necessary to include information on women, since women in developing countries play an important role in the human-forest interactions (Abdullah, 1981; Agarwal, 1986; Bagchi, 1987; Batliwala, 1983; Birdsall, 1983; Bisilliat, 1987; Cecelski, 1979, 1984). In particular, since women are often responsible for fuelwood collection and cooking, deforestation and the degradation of forests impact on them directly (Dankelman and Davidson, 1988; Mellor, 1988). In the past, women have been an often ignored factor in development planning. It is only within the last decade that there has

been a call for the integration of women into the design and implementation of development projects (Buvinic, 1978, 1986; Charlton, 1984; Kandiyoti, 1985; Loutfi, 1980; Marei, 1985). A balanced investigation into human-environment interaction must therefore incorporate both men and women.

In Thailand, total forest cover has been reduced to what many analysts consider to be a critical stage (Feeny, 1988; Myers, 1980). Catchment areas in Thailand's highland zones have been denuded, rivers are experiencing increased siltation loads and no longer produce regular amounts of irrigation water year round for agriculture, and seasonal flooding threatens many villages in the country (Adams and Solomon, 1985; Myers, 1984; TDRI, 1987). Rural populations in Thailand are therefore increasingly faced with tremendous hardships (TDRI, 1987). The Thailand Development Research Institute (TDRI,1987:5) predicts that:

> Unless Thailand conserves these resources, ensuring sustainable development rather than ruthless destruction, Thais may experience "environmental bankruptcy" along the lines of Africa's Sahel and Ethiopian highlands.

Despite efforts by the government to preserve forests, replant, and prevent further forest encroachment, forest cover has been reduced from seventy percent in 1936 (Ramitanondh, 1989) to less than thirty percent in 1988 (TDRI, 1987). The magnitude of this loss makes deforestation one of Thailand's most pressing natural resource management problems

(Bhumibhamon, 1986; Myers, 1984; Phantumvanit and Sathirathai, 1989). Notwithstanding,

> [t]he continued depletion of Thailand's forest resources has increased awareness that successful rural development requires an understanding of the interactive nature of social and environmental processes, especially ... the relationships between human societies and forest environments
>
> (Hafner and Apichatvullop, 1990:332).

In order for government agencies in Thailand to develop appropriate forest management policies, there is a need to acquire greater knowledge about people's views about deforestation and its impacts on the welfare of rural communities. In Thailand a variety of studies have stressed the importance of understanding the interaction between rural people and natural resources in order to implement effective management strategies (see for example, Apichatvullop, 1987; FAO, 1989a; Hirsch, 1987; Mittleman, 1988; NTUSFP, 1987a, 1987b). However, investigations into human-forest interactions have largely been confined to examining specific forest management projects (see, for example, FAO, 1987; Ngamsomsuke et al., 1987; Sutthisrisinn, 1986). Few attempts have been made to investigate rural people's perceptions of forest resources and forest management on a broader scale (Fisher and Gilmour, 1990; Mittleman, 1988). Furthermore, little research has been conducted into the role of women in the use and management of the forest resources in Thailand (Sukwong, 1990; van der Borg, 1990; Stevens, 1990). In order for policy-makers to develop effective management strategies,

there is a need to determine the extent to which rural people perceive the current state of forests and their management. If people do not perceive a problem, management programmes will be ineffective (Cernea, 1985; Fisher and Gilmour, 1990).

Geography is a discipline that has traditionally acted as a bridge between the physical and social sciences (Johnston, 1985). Many geographers are concerned with the interaction between environmental and social factors, as understanding this linkage is an important component in the design of effective natural resource management programmes (Dearden and Sadler, 1989; Mitchell, 1989). As social scientists, geographers can contribute to the conceptualization of more effective natural resource management programmes by investigating the social causes of resource degradation through the identification of local needs and concerns.

## 1.2 Purpose and Scope of Study

The purpose of this study is to investigate rural people's level of knowledge and concern about deforestation and forest management practices in Northern Thailand. The specific study objectives are:

1. To review the literature that analyses the nature and extent of deforestation in developing countries, and the role of rural people in forest management;

2. To review the emergence of deforestation as a natural resource management issue in Thailand;
3. To investigate villagers' awareness and concern for forest loss and management and to examine whether men and women differ in their responses towards related issues;
4. To examine the implications of the study methodology and findings for the management of forest resources in Northern Thailand.

## 1.3 Outline of Thesis

This thesis has been organized into five chapters. Chapter two reviews the literature that analyzes tropical deforestation in a global context. It then describes the present forest situation in Thailand, and examines the main factors that are contributing to deforestation. It also presents an overview of both the legislative and management history of forests in Thailand, and considers the importance of human-forest interaction in management strategies. Finally, it identifies information needs for improving management programs. Chapter three outlines the research design and data collection procedures, and describes the study area. In Chapter four the results of the study are presented and discussed. Finally, in Chapter five, the study findings are summarized and implications and conclusions are drawn.

# CHAPTER 2

# BACKGROUND

An extensive body of literature exists on deforestation and its impacts on rural societies. This chapter reviews the literature on tropical deforestation and describes the forest situation in Thailand. The review sets the context for the study and demonstrates the need for the present investigation.

## 2.1 Tropical Deforestation

Many attempts have been made to document the rate and extent of deforestation in developing countries, and to assess the resulting impacts on the ecosystem and local populations (see, for example, Allen and Barnes, 1985; Dept. of State, 1980; FAO, 1982; Guppy, 1983; Harrison, 1987; ICIHI, 1986; Myers, 1980, 1984; Shane, 1986; Williams, 1989; WRI, 1986). It must be noted, however, that estimates of the rate and extent of deforestation have varied considerably. This is due to differences in the definition of forest cover and what constitutes deforestation (see, for example, Allen and Barnes,

1985; Myers, 1986b; Williams, 1989; WRI, 1986). It is important, therefore, to review the nature of the differences in the definitions adopted.

Frequently used terms to describe forest cover include: closed forest; open forest; and forestland. Closed forests provide a relatively narrow classification of forests including natural and managed closed forest types which are distinguished by their canopy density and high precipitation. Open forests, another narrow definition, describe areas with open canopies, less precipitation and a higher percentage of grass cover. Forestland, on the other hand, is a broader classification including closed forest and other woodland formations with less tree cover and more grass (Allen and Barnes, 1985; Myers, 1986). The term deforestation generally refers to the total clearing of land and its subsequent use for agriculture, settlement, or some other activity (Chin, 1987). Thus, logging activities and temporary clearing for agriculture or removal of biomass for fuelwood are not included in some definitions (WRI, 1986). As a result, logging is considered to 'degrade' forests, even though this activity can directly or indirectly lead to the complete clearing of land (Chin, 1987).

The estimates of forest loss range from as much as 2,970 million hectares (UNEP, 1989) to as little as 1,935 million hectares (Gradwohl and Greenberg, 1988). Rubinoff (1983) argues that, every minute of the day eleven to fourteen

hectares of tropical forests are destroyed, resulting in the loss of 0.6 percent of forested land each year and an even greater amount of forest degradation due to soil impoverishment and erosion (ICIHI, 1986). However, the World Wildlife Fund suggests that the actual rate of destruction is 1.15 percent per year because surveys often omit the effects of firewood gatherers, excessive grazing, damage from fire and over logging for commercial and domestic purposes (Cross, 1988). If these activities are included, it amounts to a loss of 51,000 hectares of tropical forests each day (Cross, 1988). Others, estimate that 7.5 million hectares of closed forests and 3.8 million hectares of open forests are cut down annually in tropical countries (Bowander, 1987; Gregersen et al., 1989). The world's remaining tropical forests are located in three regions: South and Central America (42 percent); Asia, Australia, Oceania (21 percent), and Africa (37 percent) (WRI, 1986). The rate of destruction varies among countries and according to regions. According to the World Resources Institute (WRI), tropical America has the fastest rate of depletion followed by Asia and Africa consecutively. A summary of per annum rates of deforestation by region is provided in Table 2.1.

**TABLE 2.1: Per Annum Rate of Global Deforestation by Region**

| REGION | PERCENTAGE |
|---|---|
| Tropical America | 0.63 |
| Tropical Africa | 0.52 |
| Tropical Asia | 0.60 |

Source: WRI, 1986 in UNEP, 1988. Sustainable Development of Natural Resources: A Study of the Concepts and Applications of His Majesty the King of Thailand. Bangkok: United Nations Environment Programme.

In tropical America, the annual rate of deforestation between 1976 and 1980 was 3.8 million hectares per year, with one third of this occurring in Brazil alone. In this region, deforestation is driven by population growth, clearing of land for agriculture, land speculation and development of commercial ranches (Shane, 1986; WRI, 1986). In Africa, the annual rate of deforestation between 1980 and 1985, was 3.6 million hectares, with the most severe deforestation being experienced in semi-arid West Africa and Madagascar (WRI, 1986). Some of the fastest rates of deforestation, however, have occurred in Asia. According to Hurst (1987), a minimum of 25,000 square kilometers of forests are cleared each year in this region. In Thailand, Indonesia and the Philippines, annual rates of depletion between 1981 and 1985 increased from 260,000 to 620,000 hectares (Repetto, 1988). Asia's highest rates of deforestation occurred in Nepal (3.9 percent) and Thailand (2.4 percent), where the population size is large in

relation to the size of remaining forest cover (WRI, 1986). Table 2.2 presents a comparison of deforestation rates for the countries in South and Southeast Asia.

Many complex and interrelated factors contribute to the process of deforestation in developing countries. The importance of particular factors varies depending on the region and the development status of the country (Allen and Barnes, 1985; Dept. of State, 1980; Soussan, 1985; Bhagavan, 1985; Dankelman and Davidson, 1988; Rao, 1984; Whitney, 1987). Allen and Barnes (1985) suggest that there is a statistically significant relationship between population growth and forest loss. Since World War II the world's population has increased from 2.5 billion in 1950 to 5.0 billion in 1987 (Williams, 1989). Over two billion people live in the tropics, and the net annual average rate of population increase is 2.6 percent (Gradwohl and Greenberg, 1988). It is anticipated that the population of developing countries will increase by between sixty to sixty-five percent by the year 2000 (ICIHI, 1986). Myers (1984) argues that increased population pressures will lead to over-exploitation and, eventually, to the total destruction of tropical forests.

**Table 2.2: Per Annum Rates of Deforestation in Southeast Asia**

| | Closed Forest Area 1980 (ha 1000s) | Annual Rate of Loss (%) | Area Reduced (ha 1000s) |
|---|---|---|---|
| Group I(a) | | | |
| Malaysia | 21,256 | 1.2 | 255 |
| Thailand | 10,375 | 2.4 | 252 |
| Loas | 8,520 | 1.2 | 100 |
| Philippines | 12,510 | 0.7 | 91 |
| Nepal | 2,128 | 3.9 | 84 |
| Vietnam | 10,810 | 0.6 | 65 |
| Sri Lanka | 2,782 | 2.1 | 58 |
| **Group II(b)** | | | |
| Indonesia | 123,235 | 0.5 | 600 |
| India | 72,521 | 0.2 | 147 |
| Burma | 32,101 | 0.3 | 105 |
| Kampuchea | 7,616 | 0.3 | 25 |
| Papua New Guinea | 34,447 | 0.1 | 22 |
| **Group III(c)** | | | |
| Brunei | 325 | 2.2 | 7 |
| **Group IV(d)** | | | |
| Bangladesh | 2,207 | 0.4 | 8 |
| Pakistan | 3,785 | 0.2 | 7 |
| Bhutan | 2,170 | 0.1 | 2 |

**(a)** Higher than average rate of deforestation and large areas deforested.
**(b)** Relatively low rates of deforestation, but large areas deforested.
**(c)** High rates of deforestation and small areas of remaining forest.
**(d)** Low or moderate rates of deforestation and small areas affected.

Source: WRI, 1986. World Resources 1986. New York: Basic Books, Inc. pp. 73.

One of the main causes of deforestation is the need to increase the area under cultivation in order to feed increasing numbers of people. This process takes two forms: the encroachment at the forest edge and shifting cultivation (FAO, 1982; Guppy, 1983; UNEP, 1988; Williams, 1989; WRI, 1985). If practised on a long-term rotation basis, shifting cultivation is a sustainable land use (FAO, 1985; Gradwohl and Greenberg, 1988). However, due to the increasing populations in the developing world rotation periods have been significantly reduced. In the tropical regions, it is estimated that shifting cultivation accounts for nearly three-quarters of the deforestation in Africa, half in Asia and a third in the Americas (UNEP, 1989). According to Gregersen et al. (1989) crops and grazing land in developing countries increased nearly one hundred million hectares or 11.5 percent between 1954 and 1983, with much of it converted from forests. It is estimated that 110,000 square kilometers are cleared for agriculture annually (Williams, 1989).

Government resettlement programs in the last two decades have also had an adverse impact on forest cover in Indonesia, the Philippines, and in the Amazonian Basin (Gradwohl and Greenberg, 1988). In the latter case, during an eighty day period in 1987, it was estimated that 200,000 square kilometers of forest were burnt in an area called Rondonia (Williams, 1989). Another leading cause of deforestation in South and Central America is ranching which results in the

clearing of 25,000 square kilometers annually (Myers, 1984; Shane, 1986; Williams, 1989; WRI, 1985).

Higher population levels also lead to increased demand for construction materials, fuel and other forest products (Gregersen et al., 1989). Of these, fuelwood supply is considered to be of particular importance (Dankelman, 1988; Ross and Donovan, 1986; Soussan, 1985; Whitney, 1987; Gill, 1987; Harrison, 1987). In developing countries, three quarters of the population, a total estimated number of 1.5 to 2.0 billion people, some thirty to forty percent of the world's population, depends on wood and other traditional fuels for their daily energy needs (FAO, 1982; Goodman, 1985; Williams, 1989). As a result, the amount of timber extracted for fuelwood and charcoal is roughly eight times that extracted from logging (UNEP, 1989). According to Myers (1984:115),

> ...fuelwood gathering ranks as one of the major pressures to which tropical forests are subjected. Areas in question include Nepal, northern India, Pakistan and Bangladesh, parts of Sri Lanka and Burma, much of Thailand, most of Vietnam, all of Java, northern Sumatra, southern Sulawesi, much of northern Philippines, eastern Madagascar, several sectors of West Africa, and portions of Central America.

Fuelwood demand is highest in rural areas where the majority of people live (Eckholm, 1975). Although it is used in both the domestic and industrial sectors, over eighty percent of all wood is used for cooking, space heating and lighting and

other domestic purposes (Myers, 1984; Goodman, 1985; WRI, 1986).

For at least 1.5 billion citizens in the developing world, rapid deforestation and fuelwood shortages play a dominant factor in their daily lives (WCED, 1987). Many people have difficulty finding enough fuel to meet their daily requirements (Myers, 1984), and millions of rural dwellers cannot meet their needs without exhausting available resources (FAO, 1982; WRI, 1986). Virtually everywhere in the developing world, wood resources are being depleted resulting in environmental and social problems (Foley, 1985; WCED, 1987). Despite growing shortages and environmental impacts, most rural households in developing nations will have no choice but to continue to use of wood as their primary source of energy for many years to come (Bhagavan, 1985).

The commercial timber trade has also had an adverse effect on tropical forests (Dept. of State, 1980; FAO, 1982; Harrison, 1987). In many countries, early exploitation was conducted under colonial powers (Williams, 1989). Today, logging operations cover five million hectares of tropical forests each year (Gradwohl and Greenberg, 1988). In Indonesia and the Philippines, forest exploitation is resulting in a decline in production, and in parts of Malaysia, the rate of extraction is four times that of natural regeneration. Logging also gives way to greater exploitation as roads become the pathways for the migration of shifting

cultivators. As a result, over half of all forests logged eventually become totally deforested (UNEP, 1989). In total, 44,000 square kilometers of tropical forests are logged annually (Gregersen et al., 1989). If logging companies continue to cut at their current rate, there will hardly be any tropical forests left by the year 2000 (Peng and Rajeandran, 1984).

Destruction of tropical forests results from a variety of interconnected human activities. These activities now threaten the very existence of tropical ecosystems and the welfare of rural populations who depend upon them. As noted by Ross and Donovan (1986:120):

> Given the extent and magnitude of the destruction that has occurred already in many regions, it is clear that more concerted efforts are needed to protect remaining forests.

Many believe there is a need to move away from traditional forms of forest management to ones which are community based and focus more specifically on the needs and desires of local people (see, for example, Henning, 1989; Gregersen et al., 1989; Ramitanondh, 1985, 1989). In order to do this, many nations and analysts see a need to gain greater understanding about human-forest interactions.

## 2.2 Forests in Thailand

Thailand occupies approximately 513,115 square kilometers in the center of continental southeast Asia and is bordered by the Union of Myanmar (Burma) to the west, Laos to the north

and east, Cambodia (Democratic Kampuchea) to the southeast and Malaysia to the south. The country can be divided into five main regions on the basis of their distinctive topography - the Central Plain, the Southeast Coast, the Northeast Plateau, the Central Highlands, and Peninsular Thailand (Figure 2.1). Located in the tropical zone, the country has two main forest types - deciduous and evergreen (Sriburi, 1987; TDRI, 1990). Deciduous forests account for two-thirds of the current forest cover and evergreen forests the remainder (Myers, 1980). The evergreen forests include pine, mangrove, and tropical rain forests, while the deciduous are represented by savannas, dry-dipterocarp, and mixed deciduous: the later of which occurs predominantly in the north and is the primary source of teak (Jengjalern, 1989; TDRI, 1990; Sriburi, 1987; Yasuhara and Yashizawa, 1987).

Following World War II, approximately sixty percent of Thailand remained under forest cover (NTUSFP, 1987; TDRI, 1990). However, between 1961 and 1976, forest cover declined from fifty-three percent of the nation's total area to thirty-four percent (UNEP, 1988). Between 1981 and 1985, Thailand lost forest cover at a rate of 2.4 percent each year, the highest rate of depletion in Southeast Asia and the second fastest rate of depletion in Asia next to Nepal (Dankelman and Davidson, 1988; Hirsch, 1990; UNEP, 1988). By 1985, only 29 percent of the forest cover remained. Between 1938 and 1985, the annual rate of depletion was estimated at 3.9 million rai


Source: Phantumanit and Sathirathai (1988)

Figure 2.1: Geographical Location and Regions of Thailand

(6.24 thousand hectares) with rates of depletion as high as 7.2 million rai (1.2 million hectares) between the years 1976 to 1978. Since that time, depletion rates have declined to 1.6 million rai (2.6 thousand hectares) between 1982 and 1985 (TDRI, 1990). However, as shown in Figure 2.2, over the last twenty-five years, forest cover in Thailand has declined by 45 percent to 29 percent (TDRI, 1987). Recent estimates place the current level of forest cover between 17.5 and 19.0 percent (Sricharatchanya, 1989; Water Conservation Bureau, 1989).

The distribution of the remaining forest cover in Thailand is by no means uniform (Yashuhara and Yashizawa, 1987). Figure 2.3 shows that the Northeast, East, Central and Southern regions of the country have relatively little forest remaining. Northern Thailand, on the other hand, contains the majority of Thailand's remaining forest. However, it is also the region in which the rate of deforestation is the highest (Forest Bureau, 1989; Singhasakares, 1988). At the end of 1960, seventy percent of the north was covered with forests. By the end of the decade, however, two thirds of the forested area above 1,000 meters had been cut through the practise of shifting cultivation by ethnic Thai and Hilltribe people (Banijbatana, 1978). In addition, a large percentage of forests in the North have been heavily logged or burned and as a result have been converted to savannah woodlands and open grasslands (Myers, 1980). Despite their degraded condition,

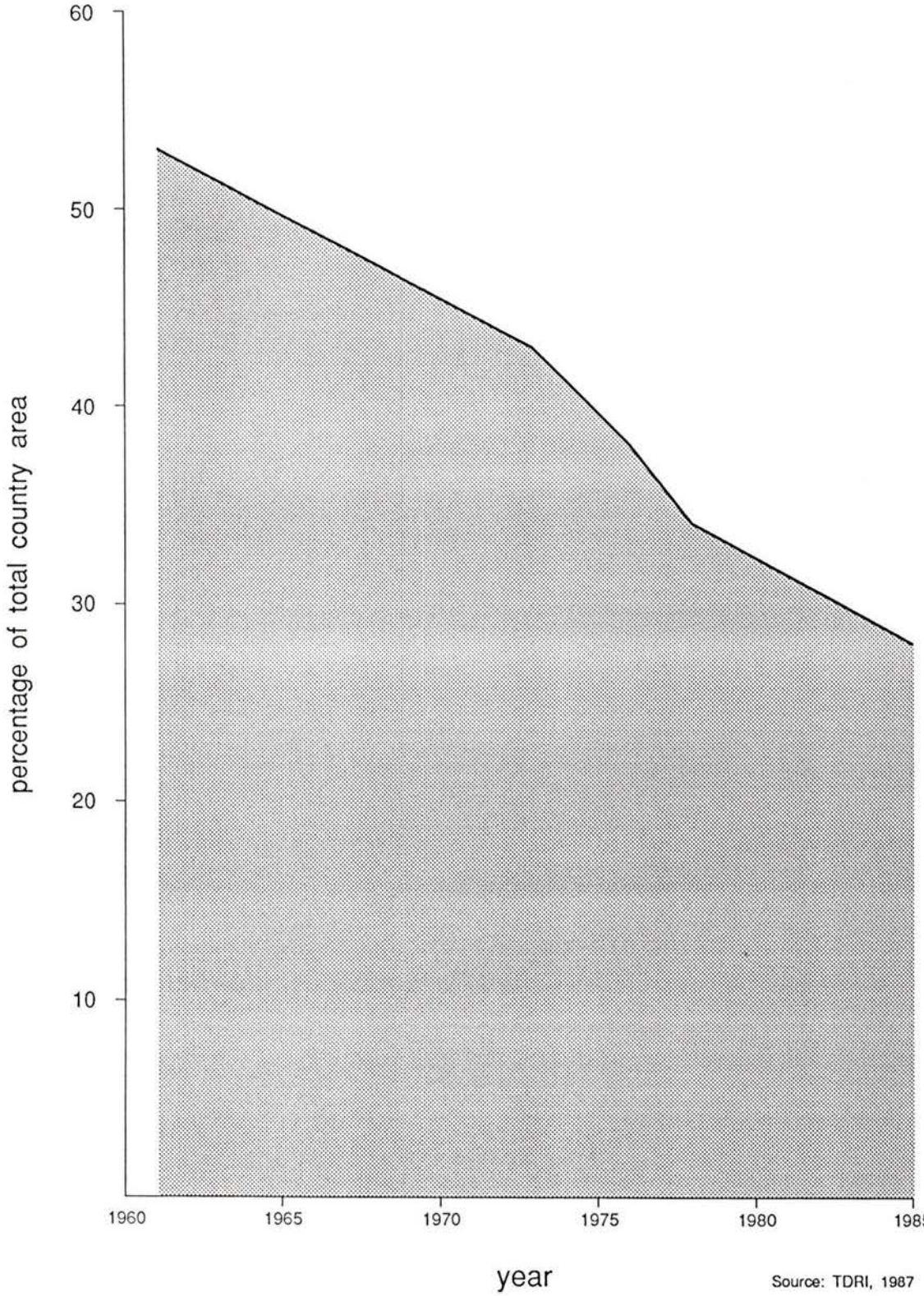
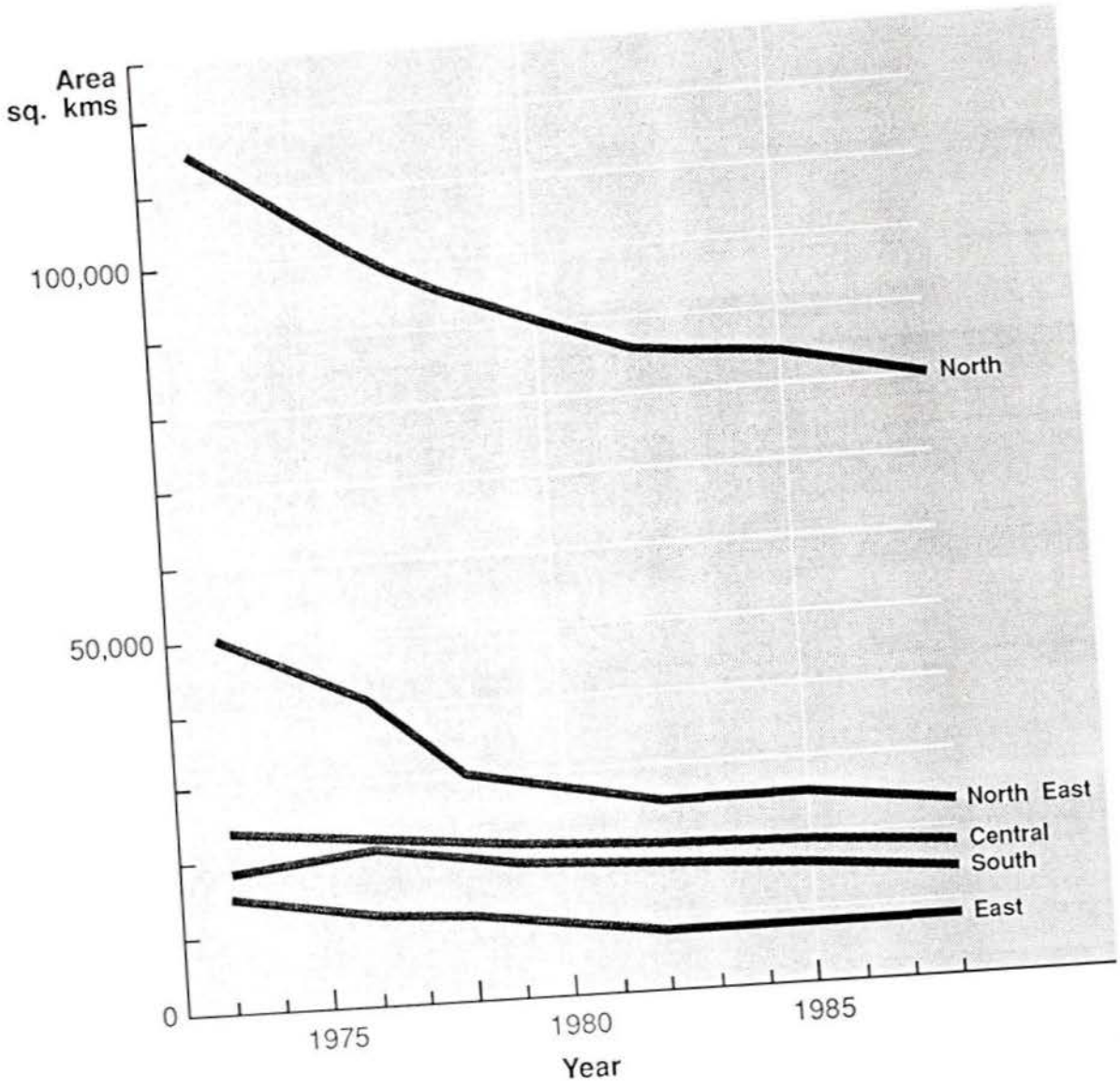



Figure 2.2: Remaining forests in Thailand, 1961-1985




Source: Forestry Bureau 1989. Forest Area in Thailand 1988 (LANDSAT)
Bangkok: Department of Forestry, Ministry of Agriculture & Coopertives

**Figure 2.3:** Forested Area by Region of Thailand.

however, forests continue to be exploited beyond the point at which they can maintain natural regeneration and sustain ecological equilibrium (Tuntawiroon, 1984; TDRI, 1990).

### 2.2.1 Causes of Deforestation in Thailand

Numerous factors contributing to deforestation have been identified. Generally accepted causes of deforestation relate to population growth, the extension of permanent and shifting cultivation, and abuses resulting from illegal forest encroachment for logging (see for example, Bhumibhamon, 1986; Ramitanondh, 1984, 1985; Sungsuwan, 1985; Water Conservation Bureau, 1987; NTUSFP, 1987a). In addition, rising demands for fuelwood, charcoal and other wood products has accelerated deforestation (NTUSFP, 1987). According to Feeny (1988), the decline in forest cover is due in part to the fact that forests in Thailand are often treated as an open and free access resource. Subsequently, Sungsuwan (1985:38) suggests:

> The open access status of the forest resources attracts people, seeking to maximize their profit to utilize the forests in terms of timber, forest products and cleared land as fast as possible since what one does not use now will soon be seized by others, preventing his own access later. People will tend to over exploit the forests, without regard to sustainable yield, loss of watershed and soil protection and other adverse impacts, because some of the costs of doing so are borne by others.

As a result, vast areas of forests have been degraded and totally destroyed. In the case of Thailand, it is difficult to separate the overall impact of legal and illegal logging

from population growth and agricultural expansion (UNEP, 1988).

A key reason for the exploitation of forests in Thailand is the fact that they have been a major source of foreign exchange and government revenue for many years (Chuntanaparb and Wood, 1986). Forests also provide many of the basic needs for rural people including construction materials, farm implements, fuel, food, medicinal plants, animals and genetic resources (Donner, 1978; Feeny, 1988; Gonzal and Shrestha, 1988; Singhasakares et al., 1988b). Furthermore, they help to maintain environmental conditions that are conducive to agriculture (TDRI, 1987; Sungsuwan, 1985).

In Thailand, deforestation has been associated with soil erosion, floods, as well as, the depletion and extinction of wildlife species (Feeny, 1988; UNEP, 1988). Recent floods and droughts on the central plains have focused attention on the condition of the northern watersheds (Feeny, 1988). With rapid population growth, fuelwood consumption that is expected to exceed the amount of supply from existing forests (Wibulswas, 1986), and the extensive use of forest land, the trend of deforestation is expected to continue (TDRI, 1987). The problem is further aggravated by the fact there is an increasing number of landless people in the country, who encroach on designated Forest Reserves to practice subsistence agriculture and obtain forest products (Watnaprateep, 1989).

It is therefore important to review the main causes of deforestation in Thailand as they relate to one another.

**Commercial and Illegal Logging**

Due to their economic value, early exploitation of forest resources in Thailand was based on timber production (Bhumibhamon, 1987; TDRI, 1990). Commercial logging, particularly teak production, grew rapidly under European companies at the end of the 1800s, and later under Thai firms following the second World War. Unabated by timber extraction quotas and laws, timber stocks were rapidly depleted and large tracts of land were cleared (Feeny, 1988). Under the commercial system, many long-term concessions were awarded in reserved forestland with the idea that the concessionaire would care for and preserve the forest. In practice, however, logged areas were left to regenerate naturally. Even the Forest Industry Organization (FIO), a Crown corporation has not acted in accordance with government policy with regard to forest management (Chuntanaparb and Wood, 1986). Land cleared under concession has been further degraded by illegal loggers and local populations through the gathering of firewood and agricultural expansion (Feeny, 1988). Subsequently, commercial and illicit logging are recognized as factors that contribute to deforestation (NTUSFP, 1987).

In the past, Thailand had sufficient timber to meet domestic consumption demands and an export market (Sungsuwan,

1985). During the last twenty years, however, logging production has oscillated. Between 1970 and 1977, timber production increased from 2,340 thousand cubic meters to 3,370 thousand cubic meters (Yasuhara and Yashizawa, 1987). Recognizing that increased production was leading to overextraction, the government abolished concessions throughout the country in 1977, and two years later reduced timber production by fifty percent to conserve wood supplies (FAO, 1988; Yasuhara and Yashizawa, 1987). By 1987, timber production had declined to 390 thousand cubic meters (Yasuhara and Yoshizawa, 1987), and Thailand changed from being a net exporter of lumber to a net importer (Jengalern, 1988; Sungsuwan, 1985). However, an alternative supply was provided by illegal loggers who, operating outside of the law, have often been much more destructive to natural forests (FAO, 1988).

Illegal logging is entrenched in the Thai timber production system and is carried out at a number of different levels. According to Myers (1980), a considerable amount of forest destruction in Thailand is caused by highly organized poaching of valuable trees. A stump inventory conducted in the northern provinces between 1937 and 1956 concluded illegal cutting was 148.6 percent of the legal cut (Banijbatana, 1978; Feeny, 1988). In 1971, illegally cut timber amounted to more than the legal production (Yasuhara and Yoshizawa, 1987).

According to the National Executive Council (NEC) in Donner (1978:724):

> ...one of the most perplexing problems it faced was illegal logging which, if allowed to go unchecked was expected to turn a large part of the country into a semi-desert within 20 to 30 years.

Between 1981 and 1983, 5,198 arrests were made for illegal logging and 186,534 trees (117,567 teak) were confiscated (Yasuhara and Yoshizawa, 1987). The conflict between log poachers and the forestry department has been so intense that forest guards, as well as environmental activists, are often killed (Lohmann, 1990; Myers, 1980).

The northern region in particular suffers heavily from illegal logging and the destruction of plantations because of its remoteness and occurrence of valuable tree species. This problem is accentuated by the fact that it is often done with the knowledge, and occasionally the active support, of forest officials (Donner, 1978:723). In addition, sawmills sometimes cut timber illegally and then wait for it to be confiscated at which time it can be purchased directly from the government (Lohmann, 1990). Illegal logging is also conducted at the village level. Farmers regularly build sturdy houses with extra-large posts and then sell them to timber merchants (Chuntanaparb and Wood, 1986). Traditionally, this has been a way for Thai people to improve their economic status (Ramitanondh, 1990). In 1948, the government restricted the use of wood for construction and allowed households to cut twenty-six cubic meters of wood per person for the purpose of

building a house. This was later reduced to 0.2 cubic meters in 1960 (FAO, 1989a). Today houses continue to be built and sold to timber merchants and people from the cities but, according to the Forest Act, the houses must stand for two years before a transaction can take place (Feeny, 1988). Since the nation wide ban on commercial logging, there is some speculation that this activity has increased but little research has been conducted to date.

In addition to the building of houses, rural people are employed directly by timber merchants to log in the vicinity of their villages. For many rural poor, cash is increasingly important as they are exposed to the desires and needs of an economy with manufactured goods (Kunstadter, 1978). Thus, for many people, illegal logging becomes an economically rewarding alternative to agricultural employment (Phantumavanit and Sathirathai, 1988). In this case, Feeny (1988:128) suggests:

> ...some of the costs of clearing and harvesting are not borne by the agents who reap the direct benefits causing them to over exploit the resources from the socially optimal point of view.

Therefore, even when villagers realize the effects of deforestation on their immediate environment, they have little control. Ramitanondh (1985:10) notes:

> In many situations, the original destruction has been carried out by people in middle to high socio-economic position and live far from forests, through direct cutting or encourage farmers to clear land.

In mid November 1988, heavy monsoonal rain hit southern Thailand causing floods which resulted in the loss of lives

and severe environmental damage (UNEP, 1988). The Royal Thai Government responded by imposing a nationwide ban on logging in January 1989 (Cross, 1989; Hirsch, 1990). Despite the ban on commercial logging, however, illegal logging continues at an alarming rate, operated by local organizations which resort to bribery and violence to silence would-be informants and obtain the cooperation of local authorities (FAO, 1988; Setamanit, 1987). Subsequently, some critics believe the depletion of forest resources in Thailand have been caused primarily by the continuous misuse and mismanagement of forest areas as a whole and the lack of forest law enforcement (Bhumibhamon, 1986).

**Population Growth and Agricultural Expansion**

Population growth and agricultural expansion are viewed by many analysts to be the major causes of deforestation in Thailand because they bear direct relationship to the intensity and impact of other activities (Hirsch, 1988; Yashuhara and Yashizawa, 1987). An increasing population gives rise to higher demands for agricultural land: a problem that is magnified by the fact that only twenty-five percent of the country is suitable for cultivation (Setamanit, 1987). Population growth also leads to greater environmental impacts due to higher demands for forest products (Feeny, 1988; Setamanit, 1987). Subsequently, it is acknowledged that there is a relationship between population growth, agricultural

expansion and forest destruction in Thailand (Feeny, 1988; Singhasakares, 1988). Thailand's economy relies heavily on agriculture with eighty percent of the population living in rural areas and deriving income through agriculture (Bhumibhamon, 1986; Phantumavanit and Sathirathai, 1988). In 1951, the population of Thailand was 14.9 million and two-thirds of the country remained in forest cover (Watnaprateep, 1989). Between 1960 and 1985, Thailand's population increased from 26.4 million to over 51.7 million (Chuntanaparb and Wood, 1986). During the same time, the amount of agricultural land per person increased, as well as, the number of people engaged in agriculture. In addition, the amount of forest land per person dropped from 1.0 to 0.3 hectares in the same period (Chuntanaparb and Wood, 1986). Between 1961 and 1985, ten million hectares of land was converted to agriculture, accounting for eighty percent of all forest encroachment (Phantumavanit and Sathirathai, 1988). In the north, agriculture alone is believed to be responsible for seventy percent of deforestation (Feeny, 1988). Unchecked, these population pressures will lead to over-exploitation, and eventually, to the total destruction of the forest because most agricultural expansion has occurred through the clearing of forests (Hirsch, 1987; Myers, 1984).

This situation is further complicated by the practice of shifting cultivation. According to Komkris (1978), Thailand has suffered heavily from shifting cultivation. Since 1970,

the number of people engaged in shifting cultivation increased from 300,000 to 700,000. In 1986, the total area under shifting cultivation was estimated to be 5,180 square kilometers, and the annual rate of destruction due to this form of agriculture was between 30,000 and 40,000 hectares (Sriburi, 1987).

Shifting cultivation is practised by both ethnic Thais and Hilltribe people. The term Hilltribe is used to refer to highland ethnic minorities (McKinnon, 1989). The impact of their activities are dealt with in a number of studies (see, for example, Harrison, 1987; Kunstadter, 1978; Komkris, 1978; Myers, 1980; Sriburi, 1987). According to Kunstadter (1978), shifting cultivation can be classified into different systems. Hilltribes have traditionally followed a rotational pattern which allowed sustainable use of the forest. However, with population increases, and the growth of cash cropping, they have abandoned cyclic practices and clear more new land (Myers, 1980). Lowland Thais, on the other hand, are:

> ... landless peasants from outside the forest zone who seek a patch of public land on which to establish their temporary gardens. By contrast with the Hilltribes who cultivate subsistence, lowland farmers cultivate primarily to generate cash income (Myers, 1980:110).

These people tend to work away at the forest fringe, planting crops for one to two years and then push further into the forest as the soil nutrients are depleted. Under this practice, the forest gets no time to regenerate and the natural ecosystem is destroyed entirely (Myers, 1980). The

uncontrolled expansion of agricultural land into watershed areas and the practices of shifting cultivation have resulted in severe soil erosion and forest degradation (TDRI, 1990). As a result, Komkris (1978:68) predicts:

> ... vast areas of forests will continue to be destroyed, to the detriment of the lowland people who have to depend on the watersheds for water needed for agriculture, industry, communications, power and household uses.

As the population expands, Thai settlements are pushed farther into the forest where they come in conflict with the growing Hilltribe populations who, at the same time, are expanding their agricultural production and becoming involved in commercial cropping (Hirsch, 1987). Some recent settlements have not only been encouraged, but often promoted and financed by wealthy timber traders and/or maize and cassava merchants (Hirsch, 1987). As a result, much of the declared National Forest Reserve, land that is designated for preservation in its forested state, is "degraded" with an estimated 1.2 million families or approximately seven million people now living illegally in these areas (Watnaprateep, 1989). Therefore, land available for tree planting is limited because landless people are encroaching on the forest reserves and clearing land for growing cash crops to meet their basic needs (Bhumibhamon, 1986).

As Thailand's land frontier becomes increasingly scarce, land shortages pose serious problems for landless people who require land to grow subsistence crops. This is further

accentuated by the fact that the labour force in the agriculture sector has been increasing over last two decades (Feder 1988a, 1988b). In efforts to support themselves through agriculture, the growing landless seek out available land in forest reserves and cut forest to practice subsistence farming (Hirsch, 1988). Furthermore,

> Due to the relatively high rate of population growth over the last two decades and the investment in new upland crop production in the 1950s and 1960s, encroachment on national forest reserves has been widespread, covering a total area of 43 million rai. It is also believed that most of the 30 million rai of reserved area has already been cleared by squatters...
>
> (TDRI, 1990:2).

As a result, problems of tenancy and landlessness have been increasing in recent years and are expected to worsen with intensified agriculture. This is particularly evident in central and upper northern Thailand (TDRI, 1990)

In total, it is estimated that 53 million hectares, one fifth of the officially designated forest reserve is under illegal occupation and cultivation by squatters (Singhasakares, 1988). This is approximately twenty-one percent of all land under cultivation and involves one million families (Feeny, 1988). The regional variation in forest encroachment is illustrated in Table 2.3. According to the Royal Forestry Department the annual rate of forest encroachment in the north is .71 percent, the highest in the country. Land squatted on by northern Thais usually occurs in mixed deciduous or dry Dipterocarp forest (Singhasakares, 1988). Since much of the forested areas are now deforested

Table 2.3: Forest Encroachment During 1982-85 by Region

| Region | Total area (rai) | Forest area in 1982 | | Forest area in 1985 | | Forest encroachment during the three years | | Annual forest encroachment | |
|---|---|---|---|---|---|---|---|---|---|
| | | rai | % | rai | % | rai | % | rai | % |
| North | 106,027,681 | 54,847,500 | 51.73 | 52,578,750 | 49.59 | 2,268,750 | 2.14 | 756,250 | 0.71 |
| East | 22,814,062 | 5,000,000 | 21.92 | 4,993,899 | 21.89 | 6,101 | 0.03 | 2,034 | 0.01 |
| Northeast | 105,533,962 | 16,178,750 | 15.33 | 15,140,000 | 14.35 | 1,038,750 | 0.98 | 346,250 | 0.33 |
| Central region | 42,124,187 | 11,572,500 | 27.47 | 10,767,500 | 25.56 | 805,000 | 1.91 | 268,333 | 0.64 |
| South | 44,196,993 | 10,276,250 | 23.25 | 9,678,125 | 21.90 | 598,125 | 1.35 | 199,375 | 0.45 |
| Country's total | 320,696,885 | 97,875,000 | 30.52 | 93,158,274 | 29.05 | 4,716,726 | 1.47 | 1,572,242 | 0.49 |

Source: Yupin Gro-thong. 1988. "Eucalyptus - Large-scale planting still in doubt," *Bangkok Bank Monthly Review*, 101.29 (5): 225.

many people no longer view them as forests but as cultivatable land (FAO, 1988).

Forest encroachment is a serious problem in Thailand and directly threatens forest conservation and reforestation efforts. Despite the effects of forest encroachment, eviction from forest reserves is not popular. Squatters continue to pay land taxes to government in the form of PBT.5 certificates in the hope they will eventually receive legal title (Feder, 1988a). However,

> ...because villagers do not own the forest and cannot exclude others from using it, they have little incentive to conserve and every incentive to capture the gains from cutting before someone else does
>
> (Feeny, 1988:128).

Apart from encroachment by permanent and shifting cultivation on forest areas, degradation is also occurring as a result of firewood collection and the production of charcoal (NTUSFP, 1987). One of the major industrial and residential uses of wood in the country is fuelwood (Bhumibhamon, 1986; Myers, 1980; TDRI, 1987). In 1970, eight-eight percent of the wood and wood products consumption was in the form of firewood and charcoal (Myers, 1980). In order to meet demands at that time, 8,820 square kilometers of land had to be cleared (Myers, 1980). In 1983, fuelwood and charcoal accounted for over sixty percent of residential energy consumption, most of which was rural (Morse et al., 1987). Annual demand for fuelwood, poles, lumber, plywood, pulp, paper and other items in 1985 was eighty-eight million cubic meters while the

increase in supply was 17.46 million cubic meters (TDRI, 1990). Furthermore, eighty-three percent of the total demand was for fuelwood and charcoal (Bhumibhamon, 1986).

Wood is the main source of energy in rural Thailand (Wibulswas, 1986). Virtually all fuelwood consumed in rural households is collected by user and half of it is collected in forest reserves (Morse et al., 1987). In addition, an estimated five million people derive much of their charcoal from forests in remote parts of the country (Myers, 1984). According to the Dept. of State (1980:18):

> charcoal production is an integral part of the process of clearing forests for agriculture, and settlers support themselves during the first seasons by producing and selling charcoal from the trees they clear.

The problem is further aggravated by illegal wood cutting which accounts for ninety percent of all fuelwood and charcoal consumed in Thailand (Bhumibhamon, 1986). Although fuelwood supply in some regions has not reached a critical stage, it is expected that by 2001 there will be a fuelwood deficit as the resource is further depleted through agricultural expansion and other activities (Morse et al., 1987; Wibulswas, 1986).

It is evident that many social groups play an active part in the continued depletion of forest resources. In the past, much of the blame has been placed on Hilltribe people and other forest encroachers. According to Hafner and Apichatvullop (1990:332),

> In the face of accelerated postwar rates of forest degradation, official recognition of human-forest

> interactions was primarily manifest in blaming this problem on the illegal and irresponsible actions of rural people.

Others suggest that it is unproductive to blame deforestation on rural people because the real causes are usually out of their control (Ramitamondh, 1989; Steven, 1990). Sungsuwan (1985:5-6) asserts that,

> [w]hile the felling of trees for fuelwood and the clearing of forest land for agriculture are undoubtedly important sources of deforestation, the root causes of the problem are deeper and more fundamental, such as population growth, insecurity of land tenure, absence of advancement in agricultural technology, lack of employment opportunities, high prices of fuel, wood, and agricultural products.

In the past, Thai forest management failed to account for the complexity of the situation resulting in ineffective policies and programs (Chuntanaparb and Wood, 1986; Somsak, 1990). Thus, in order to provide a direction for the future, it is important to look briefly at the past.

### 2.2.2 Managing Forests and People in Thailand

The involvement of the Thai state in forest management dates back to the late nineteenth century. In 1896, the Royal Forest Department was established, and the first forest protection act was promulgated in 1897 giving forest lands throughout the country Crown property status (Stubbs, 1981; NTUSFP, 1987a). Prior to this, forest lands belonged to the King and the rulers of provinces, especially in the north (Watnaprateep, 1989). Since that time, forest policy has been

further defined by subsequent Acts and legally binding Cabinet decisions which have provided for the control and regulation of logging concessions, reforestation, and the establishment of protected areas and forest reserves. Additional guidelines and targets for forest policy implementation have also been set out in the country's five year National Economic and Social Development Plans which date from 1961 to the present (FAO, 1988). A list of the forest legislation implemented since the conception of the forestry department is provided in Table 2.4. For further description of the history of Thai forest policy see (Chuntanaparb and Wood, 1986; Hirsch, 1990; NTUSFP, 1987a).

In general, forest policy in Thailand has reflected an orthodox approach to management (Hafner and Apichatvullop, 1990). In its early development, legislation focused predominately on the control of forest exploitation, particularly the teak industry, and later evolved to include broader conservation issues (Feeny, 1988). The first significant attempt to preserve a portion of the country's forest cover came in 1938 with the Protection and Reservation of Forest Act, established to control the exploitation of commercial timber species and coordinate the creation of forest reserves (Chuntanaparb and Wood, 1986). Conservation was further stressed in 1948 by an FAO study which recommended that Thailand preserve at least fifty percent of its total land area as forest for the purposes of agricultural

**Table 2.4: Forestry Legislation in Thailand**

1. The Forest Protection Act (1897)
2. The Teak Protection Act (1897)
3. The Act Prohibiting Illegal Marking of Timber (1998)
4. The Act Prohibiting Extraction of Teak Timber Which has Not Paid Royalty and Duty (1899)
5. The Other Woods Protection Act (1913, 1936)
6. The Protection and Reservation of Forests Act (1938), second revision in 1953, third revision in 1954, and replaced by the National Reserved Forest Act (1964)
7. The Wild Animals Reservation and Protection Act (1960)
8. The National Park Act (1961)
9. The Forest Act of 1941, revised in 1948, 1951, 1960, 1975, 1979 and 1982.

Sources: Bhumibhamon, 1986:19; TDRI, 1987:83; Setamanit et al., 1987:195.

production and public and residential use (FAO, 1988). Any level below forty percent is considered insufficient to maintain the water cycle, renewable fuelwood and charcoal supply, and the prevention of flood and drought (Korvanit, 1984 in Sungsuwan, 1985).

By 1961 only fifteen percent of the targeted fifty percent of the total forested area of Thailand had been declared as National Forest Reserve (Watnaprateep, 1989). In that same year, the first National Development Plan (1961-1966) encouraged the protection of half the country, 161 million rai (25.8 million ha), as forest and promoted the Wild Animals Reservation and Protection Act 1960 and the National Parks Act 1961 (Bhumibhamon, 1986). However, despite the proclamation and enforcement of these Acts, deforestation continued to take place. In 1962, the Royal Forest Department (RFD) estimated that only half of the country was forested (Hafner and Apichatvullop, 1990), making the rate of destruction faster than the government's ability to establish reserves.

In 1964, the National Forest Reserve Act was promulgated in realization that Thai forests were inadequately protected under the Forest Act. The new legislation was established for the purpose of speeding up the process of designating forest reserves (Watnaprateep, 1989; Hirsch, 1990). In the first year of the new legislation, thirty-seven forest reserves comprising 4.2 million rai (18.4 million ha) were designated

(Hafner and Apichatvullop, 1990; Sappasn, 1987). Between 1964-1983 a further 110.8 million rai (17.4 million ha) were added to the forest reserve (Chuntanaparb and Wood, 1986). However, rapid designation and inadequate field checks resulted in the inclusion of several villages and agricultural areas into forest reserves (Watnaprateep, 1989). In addition, gazetted forest land exceeded the treed area of forest land (Hirsch, 1990).

By 1982 Royal Forestry information indicated that there were 1,304 reserved forests, covering 200,000 square kilometers and 149 preserves covering 34,000 square kilometers. The actual total forest cover for the country at that time, however, was only 156,000 square kilometers (Sungsuwan, 1985). Made flexible in order to deal with the varying situations of shifting cultivation and encroachment, the legislation inadvertently provided loopholes for log poachers and corporate land interests (Setamanit, 1987). Subsequently, the Act was ineffective at dealing with the growing demand for land due to the growing population and expanding commercial logging. Today one-third of all farmland lies within designated National Forest Reserves (Hirsch, 1990).

In response to the continued demand for land and ongoing forest encroachment, the government of Thailand has been involved in community based reforestation for over three decades. In 1956 the National Land Allotment Committee

established a policy to have twenty percent of the country's forest land set aside as communal forests to meet the needs of rural people. Since that time, a series of community based programs have followed. These include, the Integrated Watershed Management Project in 1965; the Forest Industry Organization (FIO) 1967; the Royal Forest Department (RFD) 1975; People's Voluntary Tree Planting Programme 1978; Sor Tor Kor Program 1978; and the Village Woodlot Project 1981 (Ruangpanit, 1984).

To meet the needs of landless people and to solve the problem of people living illegally in the national forest reserve areas, a number of land settlement projects were authorized by the Cabinet. In 1974, Cabinet granted usufructuary rights to forest dwellers and in 1978 the Forestry Act specified conditions under which disturbed forestland may be used for non-forestry purposes, including agriculture (FAO, 1988). Forestry measures were aimed at conservation, rather than commercial exploitation, and efforts were made to deal with population pressures and forest encroachment (FAO, 1988). In 1981, the Ministry of Agriculture and Cooperatives empowered the Director General of the RFD to grant usufructuary rights to up to fifteen rai (2.4 ha) of reserved forestland to qualified petitioners. This scheme known as Sor Tor Kor (STK), or 'right to harvest', is now a regular feature of the RFD sponsored Forest Village Project and other land tenure programs established to control

forest encroachment. In addition, there are three divisions within the RFD that are involved in tree planting for community consumption: the Watershed Management Division (WAD) which is responsible for the rehabilitation of degraded watershed areas; Silvicultural Division (SD) which implements a range of nursery programs for tree propagation; and National Forest Land Management Division (NFLMD) which has three programs one of which is the Forest Village Program (Chuntanaparb and Wood, 1986; Watnaprateep, 1989).

The overall goals of the projects are to provide a viable socio-economic alternative to shifting-cultivation and forest encroachment on National Forest Reserves. This is done by the development of integrated land use whereby food production and forestry activities are combined (FAO, 1988). The projects attempt to meet the goals of forest management i.e. watershed protection and the needs of local people while at the same time improving the villagers' standard of living (Amyot, 1988; Thomsom, 1988). Since these programs are largely community oriented some believe that they have the greatest potential to deal with the problem of deforestation (Ramitanondh, 1984).

Despite these initiatives, however, continued demographic and agricultural expansion in the 1980's made deforestation and shortage of agricultural land a serious concern (Hirsch, 1987). As a result, the Fifth National Economic and Social Development Plan (1981-1986) departed from its predecessors by stressing income distribution and poverty alleviation more

than economic growth. In 1985, the National Forest Policy set a goal to have forty percent of the country covered with forests despite the fact forest cover had already been reduced to twenty-nine percent (Sungsuwan, 1985). The policy further stated:

> Cooperation with related government agencies and among the Thais of every walks of life in preserving forest resources should be strengthened. The basic problems, including land tenure problems, the promotion of cash crop growing in the forest area, dysgenic selection, as well as the failure in forest management towards the sustained yield, should be solved
>
> (Bhumibhamon, 1986:4).

The impact of reforestation over the last eighty years has been small - three million rai (1.44 million ha) for the whole country (TDRI, 1990). During the past decade the total area reforested, has been substantially less than that deforested in a single year (FAO, 1988). In 1984, only one percent of the land base had been replanted, and in 1985 only ten percent of the annual rate of natural forest destruction was being replanted (Sriburi, 1987). Today, twenty-five percent of Thailand is targeted for reforestation much of which will be conducted under commercial plantations (TDRI, 1989). Unfortunately, reforestation programmes are created to meet the future supplies of industry rather than meeting the needs of rural people (Hurst, 1987; Westoby, 1989). This has created tension amongst rural people and government officials (Lohmann, 1990).

There has been a growing awareness for the need to preserve and protect forests in Thailand, however, most of the attempts to date have been ineffective because they do not take into consideration the needs and concerns of local people. In order to do this management must emphasize the integration of both the bio-physical and human social systems.

## 2.3 Information Needs

Policy makers in Thailand have long been aware of the need to protect national forests from encroachment and degradation, but have consistently fallen short of stated objectives and goals. Furthermore, some critics suggest there is little question that forest management programs in the Forest Reserves have facilitated the continued encroachment and degradation for the forest lands in Thailand by providing access to remote areas (see, for example, Hafner and Apichatvullop, 1990). Despite the establishment of forest management policies, forest encroachment, illegal logging, and deforestation still go on at an alarming rate (Setamanit, 1987). One of the main challenges for resource planners and managers in the future will be to raise levels of awareness among rural people regarding the degradation of the resource and to implement strategies to ensure sustainability (NTUSFP, 1987).

One of the main weaknesses of Thai forest policy is the lack of emphasis on participatory measures (NTUSFP, 1987).

The participation of communities in management processes is often clearly articulated but seldom achieved in reality (Hafner and Apichatvullop, 1990). In its Sixth National Economic and Social Development Plan, Thailand plans to increase its forest cover to the optimal level of forty percent of the nation's total land mass (Bhumibhamon, 1986). An additional objective of the plan is to develop public awareness programmes to educate and inform people about the importance of forest resources (TDRI, 1987). In order for such programmes to succeed, however, there is a need to find out people's level of knowledge and concerns about deforestation and present management systems before resource managers can design education and management strategies that suit local needs and concerns. It is therefore imperative to find out how people perceive the situation and incorporate their concerns and views into the management plan (Chuntanaparb and Wood, 1986; Pragtong, 1986).

Forest management must be designed to suit local resources and potential, and to meet the expressed needs and aspirations of local people who have traditionally depended on the resource for a range of products and as a source of income (Ramitanondh, 1985 and 1990; Chuntanaparb and Wood, 1986).

> Only when the people have secured access to natural resources and benefited from them will they participate fully in conservation for the duration
>
> (Ramitanondh, 1989:46).

Also important, is the role of women in resource management and environmental conservation (Dankelman and Davidson, 1988). Recent studies indicate that women as homemakers, caretakers of children, and agricultural workers, have the greatest potential to become effective agents of change because they directly influence children and therefore could reduce the future impact on the environment (Thomsom, 1988). Many government officials involved in the management of tropical forests may have techno-scientific orientations but lack sufficient understanding of the societal values necessary for decision making (Henning, 1989). Furthermore, while many agencies may subscribe to the ecological approach in reality they revert to superficial and short-term planning which address the old values and vested interests of agencies and industry (Henning, 1989). As a result, there are often tensions between government officials and villagers because the aspirations of each party are conflicting and contradictory (Feeny, 1988). Therefore, understanding the interrelationships between the environment and society is essential to environmental administration (Henning, 1989).

Local control still holds the most hope for resisting the wave of forest destruction that sweeps the country. Agencies are beginning to realize they must understand the views and concerns of rural communities in order to address the situation (Sriburi, 1987), and meet the needs of immediate population (FAO, 1985; Peng and Rajeandran, 1984). Therefore,

in order to understand deforestation in Thailand, it is important to examine local and specific social processes (Hirsch, 1990).

> ...it is clear that involvement of local people is paramount in any programme of rehabilitation and prevention of further encroachment
>
> (Hirsch, 1990:173).

In Thailand, there is a shortage of detailed information on the interaction between rural societies and resources (Fisher and Gilmour, 1990; Hirsch, 1987). In addition, very little research has been conducted on women and their interaction with forest resources (Sukwong, 1990; van der Borg, 1990). Therefore, the role of social scientists in the area of understanding human-forest interactions needs to be expanded and integrated into management programmes (Hafner and Apichatvullop, 1990). Understanding rural people's knowledge of and concerns about the resource and its management are the bases for sound forest management that can meet the needs and aspirations of both parties (Ramitanondh, 1984). This study represents an attempt to gain further insight into human-forest interactions in Northern Thailand.

## 2.4 Summary

This chapter has provided an overview of tropical deforestation with a particular emphasis on Thailand. It has documented the fact that local people are important in forest management and that there remains a shortage of detailed

information about local perceptions towards the current situation. This suggests a need for detailed case studies of the forest situation from the perspective of local people. The remainder of this thesis presents a case study of rural peoples perceptions towards forest resources in three villages in Northern Thailand. The following chapter outlines the research methodology and describes the study area.

# CHAPTER 3

# CONCEPTUAL FRAMEWORK AND RESEARCH DESIGN

This chapter outlines the conceptual framework adopted for the study and describes the research design and data collection procedures. It also explains the selection of the study area, describes its regional setting, and reviews local environmental and socio-economic characteristics.

## 3.1 Environmental Perception

There is a tradition of geographic research focusing on human-environment relationships (Johnston, 1979; Saarinen, 1976). This research has been applied to, and made a particular contribution in the area of resource management. One avenue of this area of research in geography is the study of environmental perception (Saarinen, 1976; Mitchell, 1989; White, 1973). Though not a new concept it holds potential for application in developing a better understanding toward the social factors leading to resource degradation. In doing so,

it may contribute to the design and implementation of more effective management strategies.

The conceptual framework for this study is based on a body of literature that deals with the study of environmental perceptions (see, for example, Saarinen et al., 1982, 1984; Gold and Goodey, 1985). Environmental perception research is rooted in the human-environment relations paradigm in which humans as individuals, and collectively as societies, shape the environment through their choices and behaviours. As an area of study, environmental perception research is a loose confederation of research interests with a common orientation and philosophy (Whyte, 1977). Research in this area first appeared in the 1960's but gained attention and considerable momentum in the 1970's (Gray et al., 1985; Mitchell, 1989; Whyte, 1977). Since its emergence, the inquiry into environmental perception has been interdisciplinary, drawing on various fields of research, such as psychology and sociology, and involving an array of methodologies (Mitchell, 1989; Saarinen, 1976; Tuan, 1974).

The rationale for conducting this type of research can vary from the scientific, which emphasizes improving knowledge and understanding about given human and environment relationships, to policy oriented research which strives to be socially useful in the planning context (MAB, 1976). The basis for the research is the philosophy that the environment is both a physical and social milieu (Whyte, 1977).

Therefore, this research recognizes that humans have an expanding capacity to alter their environment intentionally and inadvertently. According to a panel of experts,

> [e]nvironmental change is at least partly dependent on the ways in which people perceive their environments and upon their objectives and aspirations in using, modifying, and creating environments within which they can satisfy wants and needs
>
> (UNESCO, 1973 in MAB, 1976:15).

Furthermore, the use of the environment is governed not only by what is true, but also what is believed to be true. In order to understand how humans use their environment, it is imperative to understand what they think about it (MAB, 1976). Thus, an environmental perception approach to understanding human-environment interactions places the beliefs, attitudes, and values of people at the center of its theory and method (MAB, 1976). Despite this common cord, the diversity of research into environmental perception has lead to disagreement about the definition of some key words. It is therefore important to define the terms associated with the research design in order to avoid misinterpretation.

Perception can be defined as any insight, knowledge or intuitive judgement arrived at by becoming aware of something through the senses (Funk and Wagnalls, 1980). In the broad psychological sense, perceptions can range from the neurological to the physical and the social. According to Schiff (1971) in Mitchell (1989), it is the social aspect with

which geographers are concerned. A perception is viewed as the:

> impression one has of a social stimulus or set of stimuli, as that impression is modified by the perceiver's past experience in general, his previous experience with the same or similar stimuli and the individual's state at the moment he is viewing the stimulus of interest
>
> (Schiff, 1971:7 in Mitchell, 1985:102).

An individual's perception is believed to be governed by past experiences and present outlooks which are conditioned by the person's values, moods, social circumstances and expectations (Mitchell, 1989; Wheeler and Waites, 1976). The term environmental perception, is sometimes confused with this more rigorous concept of sensory perception. However, environmental perception is generally concerned with the human-environment relationship as a function of human perception (Whyte, 1977). According to Wheeler and Waites (1976), environmental perception is developed through the environmental perception process, in which an individual experiences the environment through their senses and filters it through a complex series of values, which have been derived from beliefs and attitudes, to form an individualized perception of the environment around them. Therefore, in order to determine environmental perception it is imperative to understand attitudes because they form the foundations of perception.

Attitudes are an organized set of feelings and beliefs which influence an individual's behaviour (Schiff, 1971 in

Mitchell, 1989). Fishbien and Ajzen suggest, an attitude can be described as a "learned predisposition to respond in a consistently favourable manner with respect to a given object". According to social psychologists, attitudes consist of three components: cognitive (beliefs, facts, principles, knowledge, or understanding); affect (emotion, feeling, or emotional evaluation); and conative (behavioral tendency of intent) (Gray et al., 1985). Structurally, attitudes are reinforced by beliefs, attract strong feelings, and lead to particular behaviours (Oppenheim, 1966). An individual's actions and opinions are considered to be the product of values, which are created by attitudes and a series of beliefs. Whereas attitude refers to a person's favourable or unfavourable evaluation of an object, beliefs represent the information the individual has about the object (Smit and Flaherty, 1981).

Since attitudes and perceptions cannot be measured directly, the researcher must infer them from asking questions and observing (Mitchell, 1989). Such questions try to reflect respondents' feelings about a topic through the use of a rating scale (Sheskin, 1985). In particular, attitude inventories on a topic can be gathered through the use of Likert scales (Gray et al., 1985). The theoretical and methodological bases for the use of attitude scales are presented at length in texts such as those by Fishbien and Ajzen (1975) and Gray et. al. (1985). Beliefs, on the other

hand, can be measured by determining what a respondent thinks is true or false (Sheskin, 1985). Determining environmental perception, therefore, involves understanding people's basic attitudes and beliefs, as well as, their interaction with the environment.

In the field of geography, the study of environmental perceptions originates from the early work of numerous geographers under the division of behavioral and perceptual geography (Gold and Goodey, 1983). This early work inspired new approaches to behaviourial research which were multidisciplinary in orientation and meant:

> greater emphasis upon the role of the individual as someone who shaped, as well as responded to, the conditions of the physical and social environment, stressing the links between perception, decision making and behaviour
>
> (Gold and Goodey, 1983:579).

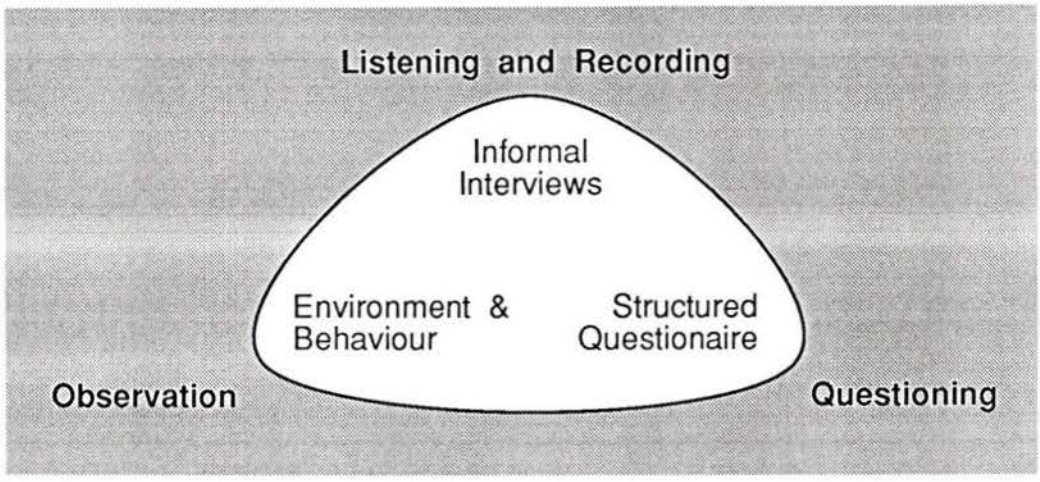
It also resulted in the evolution of humanist approaches such as the work on done 'sense of place' by Tuan (1974). Notwithstanding variations, environmental perception research in geography has predominantly focused on resource appraisal and the demonstration of how the perceptions of different groups can provide an explanation for differing cultural landscapes (Johnston, 1986; Mitchell, 1989). With regard to policy and the solution to environmental problems, most research has been conducted on natural hazards (Gold and Goodey, 1983). It has also served as a means of supplying

valuable knowledge which can be applied to understanding environmental problems (Wheeler and Waites, 1976).

Geographical research into the understanding of environmental perceptions as they relate to environmental problems has been conducted through the use of questionnaires and interviews. According to Mitchell (1989) this approach to investigation has been criticized and requires additional information to reinforce data. In order to investigate the attitudes and perceptions of local people towards the environment, this study has adopted a research design consisting of three distinct elements. The following section outlines these components.

## 3.2 Research Design

The principal methodological approach for this research is based on a model presented by the committees for Man and Biosphere (MAB) (1976) and Whyte (1977). Within this model, the elements of questioning, observing, and listening and recording form the overall dimensions of the research design. Illustrated as a triangle, these elements are satisfied through the application of complementary data collection procedures. An illustration of the model is presented in Figure 3.1. Due to the complexity of environmental perceptions, it has been suggested that one form of data collection is inadequate for surveying a representative sample, particularly when dealing with different cultures




*Adapted from Whyte, 1977*

**Figure 3.1** Environmental Perception Research Components

(Mitchell, 1989; Whyte, 1977). One way of overcoming the problem of sampling environmental perceptions is to use different data collection procedures (Gregersen et al., 1989). Therefore, Mitchell (1989) advocates the use of methods which complement and reinforce one another in order to ensure both reliability and validity of data (Mitchell, 1989).

In this study, data collection involves questioning through the use of structured questionnaires, listening and recording through informal interviews with key informants, and observing the environment and behaviour of villagers. The following sections describe the focus of the research, data collection procedures, their design, and implementation.

### 3.2.1 Questionnaire Survey

Personal interviews using a structured questionnaire were chosen as the main form of data collection for a number of reasons. First, this form of inquiry is particularly useful when collecting information about attitudes and information relating to environmental perception (Sheskin, 1985; Stoddard, 1982; Whyte, 1977). It was also felt that given the available funds and time, this method of surveying, would provide the researcher with the broadest cross section of individuals in the selected study area. Since the projected sample was over one hundred, it would not have been time and cost effective to conduct indepth interviews of a representative sample of villagers. In addition, since the population surveyed speaks

the Northern Thai dialect, it was necessary to hire research assistants to conduct the interviews. It would therefore have been difficult to maintain consistency without a well structured questioning procedure. By developing a series of questions to solicit information about the issues, considerable thought could be given to cultural considerations and to the interviewing process. On the whole this made the collection of information more focused, orderly, and uniform across respondents.

The development of the questionnaire followed the general principles provided by Sheskin (1985) and Backstrom and Hursh-Cesar (1981), and was supplemented by the guidelines presented in Converse et al. (1986) and Whyte (1977). To ensure the reliability of the instrument, particular emphasis was placed on the logic of the questioning, clarity of wording, question order, questionnaire length, and the incorporation of cross-checks. Since the research was conducted in a very different cultural setting, and was administered to individuals with relatively little education, the design of the questionnaire involved on-going consultation with Thai professors and researchers at the Social Science Research Institute (SRI) and the Faculty of Social Sciences at Chiang Mai University during the early stages of the research project. The questionnaire was also reviewed by geography faculty at the University of Victoria and Thai graduate students. As a result, the questionnaire under went numerous revisions in order to

streamline the questions and reduce the possibility of cultural biases.

Once the questionnaire was completed, it was translated into the Thai language. It was then pretested on randomly selected villagers to check both the reliability of the instrument and the validity of questions by monitoring ease of question comprehension by the respondents and identifying length and wording problems. Twelve individuals were interviewed at Ban Papae during the pretest; the responses of whom are not included in the final study. Following the pretest, the questionnaire was revised into its final form. A copy of the questionnaire used in the study is included in Appendix 1.

The final version of the questionnaire consists of three sections. The first is designed to provide greater insight into how villagers use the forest and to investigate their knowledge of the ecological and socio-economic importance of this resource. It also surveys the attitudes and perceptions of villagers towards forest loss at the local and national levels, and identifies whether or not they perceive deforestation as a problem. This section also investigates people's knowledge and perception of forest management practices and explores alternative management techniques and people's willingness to participate in management programs. Section two deals specifically with fuelwood consumption. By acquiring more detailed information on one aspect of forest

use, some of the data collected in section one could be complemented and cross-checked. The last section elicits information on the personal characteristics of the respondents.

Since the population selected for interviewing spoke the Northern Thai dialect, three university graduates with proficiency in both English and the local language were hired to conduct the survey. To ensure that the questionnaires were administered correctly, the assistants were trained on interviewing and sample selection procedures. In conducting the survey, the interviewers were encouraged to establish rapport with the potential respondents prior to the interview request. At this time, they would explain the purpose of the research, and reassure them that any information provided would be treated confidentially.

The survey was conducted between March 30th and April 28th, 1990. The respondents were selected randomly in three villages. The selection of the villages and a description of their socio-economic characteristics is presented in section 3.3. To determine which households would be interviewed, each assistant picked an arbitrary number that was then used as the sampling frame. For example, if number "two" was selected, the interviewer would go to every second house. If there was no one home, the interviewer returned to the house one more time later in the day. When both men and women were interviewed at the same time, an effort was made to

separate them to ensure that they would not be influenced by the other's responses. The response rate to the survey was approximately eighty-five percent. There was approximately one refusal for every ten people and one no-one home on the second visit in every twenty people. During the data collection period, individuals between the ages of sixteen and seventy years were interviewed. In total, 162 individuals were interviewed, with the sample evenly divided between the gender groups and proportionally drawn from each village according to their respective populations.

### 3.2.2 Informal Interviews

Informal interviews with key informants formed the second stage of the study. The advantage of listening to and questioning key informants is that it often reveals information about the topic of interest not brought out in a questionnaire (MAB, 1976). Informal interviews allow the researcher to acquire more indepth information (Sayer, 1984). It also enables the researcher to "explore the issue in a broader context and examine it from different angles" (Whyte, 1976). For example, if a respondent indicated in the questionnaire that villagers were responsible for deforestation, the informal interview provided the opportunity to ask other individuals about villager's daily activities and how they could impact on the forest.

For this research component, key informants from each of the villages were interviewed. Altogether there was eighteen individuals interviewed from the villages. The selection of the key informants was based on purposive sampling. It was felt that certain people within these communities would have greater insight regarding the general views of villagers towards deforestation and local activities. This would arise from the fact that they interacted on a regular basis with villagers, had direct experience dealing with the issues and, in some cases, were more educated. The key informants for this study included Phuyaibans (village leaders) and their wives, leaders of local women's groups, past village leaders, village monks, teachers, village elders, and government employees, all of whom were residents of the villages. In one community, a meeting was arranged with twenty members of the village women's group. Since most of the informants spoke Thai, interviews were conducted through the use of an interpreter. The setting for the informal interviews varied considerably from people's homes to the local Buddhist temple. As a result, the interviews adopted an open and flexible format to accommodate the different interviewing situations and respondents. Generally, the discussion was kept informal with an initial explanation of the study's objectives and the researcher's affiliation. This facilitated the establishment of a positive rapport and enabled the researcher to move from a discussion of broad forest issues to more difficult and

sometimes sensitive issues such as illegal logging and corruption amongst government officials.

The informal interviews were designed to obtain additional information about the villages and the villagers. Of particular interest were the main problems facing the villages and whether deforestation was considered to be one of them. In the interviews, an attempt was made to acquire more information regarding the causes of deforestation and its effects on the community. They were also used to investigate how villagers felt about forest management and whether or not they had particular views as to what would be a more appropriate form of management at the village level. Furthermore, the informal interviews provided a follow-up and a means of validating and confirming the findings obtained in the questionnaire.

### 3.2.3 Observations

The observational component of the study was directed at landscape description and human behaviour. In environmental perception research, observation of human-environment interactions is an important means of supplementing other data collection procedures (MAB, 1976; Whyte, 1977). By simply observing the daily activities of people, greater insight into the use of the forest can be obtained than what is collected using a structured questionnaire. Therefore, personal observations of the environment and behaviour provide an

important means of supplementing and verifying findings and explaining the results. It is also useful for interpreting the data collected in the questionnaire, in describing the study area, and for understanding the context in which the human-forest interaction occurs.

In this study, observations were used to obtain information about the forest and village conditions, as well as the interaction of the villagers with the forest environment. Several visits were made to the villages and to the surrounding area over the course of the six month research project. In addition, the researcher stayed in each of the villages to observe village people at their daily activities. The observation methods used in the study included unobtrusive and quasi-participant techniques explained in Stoddard (1982). Since it was often difficult to observe villagers without their knowledge, the later observation technique was used more frequently. In this case, the observer is known and accepted, but interacts with the subjects as an outsider. As the researcher observes and/or interacts with the subjects, information is recorded to preserves the holistic nature of what is being observed (Stoddard, 1982). To reduce the effect of personal and cultural biases in interpretation, observations were discussed with research assistants who provided additional explanation and description of the activity within its cultural context.

The three components of the research design selected for this study serve to complement one another. The questionnaire was carefully designed in cooperation with Thai researchers in order to bridge cultural differences in wording and interpretation, and to ensure ease of translation. The informal interviews and observations were used to obtain additional information, and to cross check questionnaire responses for reliability.

## 3.3 The Study Area

There are many areas in Northern Thailand in which this study could have been conducted. As noted in Chapter 2, the remaining forests in the north are under continual pressure. In some areas, forest land has already become seriously degraded. The constraints of time and financial resources, however, made it impractical to survey the entire north. Thus a representative study site was selected. In choosing the study area, overall consideration was given to the research activities of the Regions and Resources Study Group (RRSG) at the University of Victoria which sponsored the study. Since the RRSG had already selected the Mae Taeng watershed as its research unit, the villages selected were all chosen from within this watershed boundary. The advantage of conducting the study in this watershed was that it ensured access to the expertise of researchers at the Social Research Institute (SRI) at Chiang Mai University which was vital to acquiring

background information on the villages and understanding the culture of the north for designing the study. The affiliation with the SRI was also important for establishing contact with village leaders in the watershed and for acquiring their support and approval for conducting the study. The following section describes the regional setting and local characteristics of the study area and the selected villages.

### 3.3.1 Regional Setting

The northern region of Thailand encompasses seventeen million hectares of land with a population of 10.39 million in 1985 (Phantumvanit and Sathirathai, 1988). It is divided into two subregions which comprise a total of seventeen provinces. In the upper northern subregion, there are eight provinces: Mae Hong Son, Chiang Rai, Chiang Mai, Nan, Lampang, Lamphun, Phayao, and Phrae (see Figure 2.1).

The topography of the North is mountainous with intercepting plains and valleys. There are five parallel mountain ranges running north-south with elevations ranging between 550 and 2,500 meters a.s.l. (Singhasakares, 1988). In the valley basins elevations range between 150 to 380 meters a.s.l. (Santisuk, 1988). Collectively, these mountains are known as the Phi Pan Nam range and form an important catchment area for several major rivers. From the southern and eastern slopes the four main tributaries - Ping, Wang, Yom, and Nan - flow south to the Chao Phraya River, the main water artery to

the Central Plain. Of these rivers, the Ping is the largest tributary with its headwaters originating in many watershed areas including: the Mae Taeng, Mae Faek, Mae Chaem, Mae Ngad, Mae Nam Li, and Mae Nam Tun (Smitinand, 1978). The parent material of the region is diverse; represented by gneiss, schist, shale, sandstone and limestone of varying ages which result in the formation of specific soils and the occurrence of a variety of vegetation types throughout the region (Uraivan et al., 1988). In the mountainous area of the north the two main soil groups are podzolic and lateritic. These soil types and parent material are decisive factors in determining natural forest cover (Santisuk, 1988).

The climate in the north, as in the rest of the country, is influenced by seasonal monsoons and a marked hot dry period (Sriburi, 1987). According to Santisuk (1988), the seasonal periods can be divided into three categories. From May to September southwest winds carry heavy monsoon rains over the region with peak precipitation occurring in July, August and September. During this season, eighty percent of the annual precipitation is received. In October, winds from the northeast bring cool dry air masses resulting in periodic precipitation and colder temperatures. Between November and February, lowland temperatures range between nineteen and twenty-three degrees celsius with frost occasionally observed above 1,500 meters a.s.l. (Santisuk, 1988; Sriburi, 1987). The hottest time of the year occurs between February and

April, with temperatures reaching forty degrees celsius (RFD, 1988b). These seasonal ranges and varying elevations in the north influence vegetation types.

Forests are considered to be the most important natural resource in the north (RFD, 1988b). Forests in the region include two sub-types of deciduous forest, dry dipterocarp and mixed deciduous, and three sub-types of evergreen forest including tropical, hill and coniferous (Abeyrama et al., 1983). These occur in various locations in association with different altitudes, soil types, rainfall and land use. In the early 1980's, dry dipterocarp forest accounted for 50.9 percent of the total regional forest cover, while mixed deciduous accounted for 49.6 percent and evergreen forests, including conifers, accounted for 4.2 percent (Donner, 1978). The dry dipterocarp forests, which generally occur in soil which is gravelly, sandy or lateritic, are important because they are the principal source of fuelwood, posts and heavy construction timber. The most economically important forest, however, is the mixed deciduous forest which comprises an abundance of bamboo and many hardwood species including the highly valued teak (Santisuk, 1988).

The mountainous areas of the north and their intercepting valleys, are occupied by both Hilltribe and Thai people. The Hilltribe people include a number of distinctive groups: Karen, Lua, Hmong (Meo), Yao, Akha, and Lahu, Lisu, H'tin, and Khamu (Hoare, 1986; McKimmon and Vienne, 1989). Although they

share common linguistic and cultural links with the Thai people, they are linguistically and culturally distinct from the general Thai and Northern Thai population (Hoare, 1986). These groups occupy upland areas at varying elevations depending on the group, and rely on shifting cultivation for their subsistence living and, more recently, cash cropping (Kundstadter, 1978; McKimmon and Vienne, 1989; Uraivan et al., 1988). The lower elevations, along river valleys where land is more level and fertile, are generally occupied by Thai Lue, Northern Thai, and Shan, although there is some overlap and intermixing with Hilltribe groups (Kundstadter, 1978). The majority of these people are Northern Thai and speak the Northern Thai dialect and practice both wet rice cultivation in the valleys and upland shifting cultivation on adjacent land to supplement their permanent rice fields with cash crops (Hoare, 1986; Komkris, 1978).

Despite the fact that Northern Thailand is mountainous, it is a major food production area. Over seventy percent of the population in the region earn their living in agriculture (RFD, 1988b). Annually, a large amount of rice, fruits (longan, lychee), vegetables (cabbage, broccoli, garlic, onion), and field crops (peanuts, soyabean, tobacco) is produced to supply other parts of the Kingdom (Uraivan et al., 1988). Most of this production occurs in the river valleys, with the Chiang Mai valley representing the largest and most productive (Gypmantasiri et al., 1980). However, since most

of the land in the valley areas is now being farmed, growing numbers of landless people have moved into upland areas to practice subsistence agriculture (Hirsch, 1990; Hurst, 1987).

In 1985, forest cover in the northern region was approximately 50 percent of the total area (Phantumvanit and Sathirathai, 1988). However, forest degradation in the watersheds of the north, due to commercial logging, agricultural expansion, and illegal logging, continue at a steady pace and pose a serious threat to thousands of people downstream (TDRI, 1990). In the province of Changwat Chiang Mai, the 765,950 rai (122,552 ha) of National Forest Reserves are being rapidly degraded through forest encroachment and illegal logging activities. This has far reaching implications because many watersheds in the North form the principal tributaries converging with the Mae Ping River which is the major river feeding the Chao Phraya river that extends to the Gulf of Siam and feeds the country's key agricultural areas (Phantumvanit and Sathirathai, 1988). As deforestation spreads, an accumulative chain reaction leads to adverse environmental and socio-economic conditions downstream. Accordingly, lowland areas are experiencing marked water shortages and erosion is leading to increased siltation in many rivers (UNEP, 1988). This is particularly evident in the Mae Taeng watershed which is the origin of many creeks and streams that support the Mae Ping river and in turn the Chao Phraya river. According to the Royal Irrigation Department

(RID), sediment levels in the Mae Taeng River, increased three fold between 1960 and 1970 (TDRI, 1987). Seasonal water levels have also been declining over the past couple of years (EGAT, 1990).

### 3.3.2 Mae Taeng Watershed

The Mae Taeng watershed extends from the border with the Union of Myanmar (Burma) to meet the Ping river approximately fifty kilometres north of Chiang Mai (see Figure 3.2). Within the watershed there is a variety of Hilltribe groups and lowland Northern Thais. These people occupy land at different elevations depending on their ethnic background (McKinnon and Vienne, 1989; Uraivan et al., 1988). Land within the watershed area has been categorized according to a watershed classification system designed by the government (UNEP, 1988). Under this system, land is classified according to physical conditions, such as soil types and slope, and provided with outlines for preferred land use and levels of importance for environmental protection (TDRI, 1987). Within the watershed all levels of watershed classifications are represented. A description of these classifications is presented in Appendix 2. Agricultural uses in the area range from permanent rice paddy cultivation to various forms of shifting cultivation. In addition, a considerable portion of the area is designated as forest reserve with the presence of a range

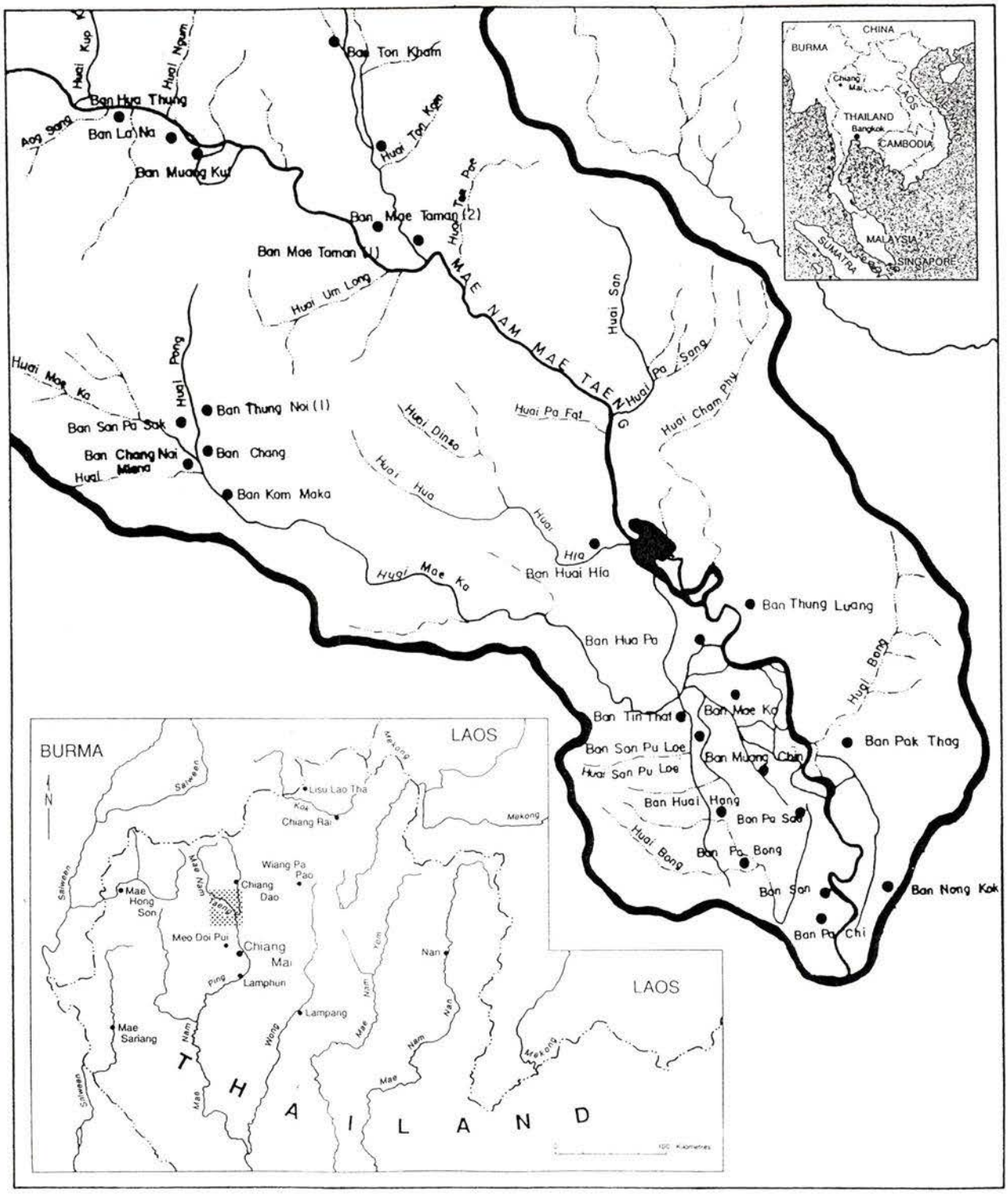



Figure 3.2 Geographic Location of Mae Taeng Watershed

of reforestation and development projects occurring throughout the watershed (Kijmee, 1990; Wichai, 1990).

The forest situation in the Mae Taeng watershed is in a constant state of change and exhibits varying degrees of degradation and deforestation. During a field trip to the upper northern part of the watershed, along the Burmese border, it was noted there is considerable deforestation. In the lower reaches of the watershed, forest cover varies but is considered highly degraded, with deciduous mixed forest being replaced with bamboo (Maxwell, 1990). As forest degradation continues, water shortages are becoming noticeable and more frequent (Chookara, 1990).

According to the Head of National Forest Reserve Improvements Section of Land Management in Chiang Mai, the condition of the watershed is considered poor because the ecosystem is being destroyed by forest encroachment and shifting cultivation practices (Kijmee, 1990). A Royal Thai Forestry Official, on the other hand, attributes forest loss to not only shifting cultivation, but also to illegal logging. This has resulted in the government losing both income and control over the forest reserve land in the watershed (Chookara, 1990).

In response to deforestation and encroachment in the lower reaches of the watershed, the Royal Thai Forest department has implemented a number of forestry programs including reforestation plantations, a Forest Village program

and the provision of usufructuary rights in Forest Reserves (Kijmee, 1990). According to Wichai (1990), 3,290 rai (526 ha) have been replanted in the lower part of the watershed since 1980. The implementation of such projects, however, sometimes lead to arguments between local people and government officials because the people lose access to land for subsistence agriculture and the collection of other forest products. Subsequently, the success rate of the reforestation projects is only fifty to sixty percent (Kijmee, 1990). The largest reforestation program underway in the lower reaches of the watershed is a teak plantation program north of Ban Ton Kham. There is also a forest village called Pa Mae Taeng Ban Tubduea Moo 9 Tumbol Intakhin, that began in 1987, and involves 101 people and encompasses 378 rai (60.5 ha) where mango, longan and field crops are grown. The village is managed by the Royal Thai Forest Department and is geared largely towards farming and the provision of fuelwood. To meet their energy demands, the people plant twenty-five rai (4.0 ha) of eucalyptus for firewood (Kijmee, 1990). In addition to these projects, the government also contracts forest plantations out to private industry. In this situation, industry is usually responsible for planting the trees but do not continue follow-up work. Aerial patrols of the watershed are also conducted a couple times a month to survey the area for illegal logging activity (Chookara, 1990).

### 3.3.3 Village Selection

There are several Hilltribe and lowland Thai villages in the Mae Taeng watershed. This study selected three lowland Thai villages in which to conduct the questionnaire survey and interviews. Villages were selected on the basis of their location within the watershed and proximity to forest reserves. Each of the villages is located in the lower reaches of the Mae Taeng watershed, in lowland areas adjacent to the Mae Taeng river or a tributary. Lowland villages were selected because they tend to experience the accumulative effects of deforestation (NTUSFP, 1987a; WCED, 1987). Another criterion for village selection was the cooperation of the Phuyaiban (village leader). Since the social customs in the north are such that one cannot simply walk into a village and conduct a survey, the introduction to the village leaders through the Social Research Institute was crucial to gaining approval to conduct the survey. The village leaders cooperation also extended to arranging both accommodation for the research and interviewers and for setting up meetings with key village informants. The selection of the villages was also influenced by time constraints and available funding which permitted three villages. The villages selected include: Ban Muang Kuad, Ban Mae Taman; and Ban Ton Kham. Their location is presented in Figure 3.2.

The forest type around the study villages is basically mixed deciduous, which has been severely disturbed by

excessive cutting and burning (Maxwell, 1990). The forest structure originally had two to three layers plus some emergent trees (eg. Terameles nudiflora (Datiscaceae) and Acrocarpus fraxinifolius (Leguminosae, Caesalpinioideae). Almost all original teak trees (Tectona grandis (Verbenaceae) and other commercially valuable timber trees (Dalbergia spp. and Pterocarpus spp. (both Leguminosae, Papilionoideae) have been removed and replaced by dense stands of bamboo (eg. Bambusa tulda and Dendrocalamus membranaceus). These forests are also being cut for construction materials by villagers (Maxwell, 1990). A more complete description of the mixed deciduous forest type is provided in Appendix 3. The following sections briefly describe the geography and socio-economic characteristics of the villages.

#### 3.3.3.1 Ban Muang Kuad

Ban Muang Kuad is located along the Mae Taeng river at 85 degrees 30' longitude and 24 degrees latitude six kilometres from Ban Mae Taman and seventeen kilometres from the Amphoe Mae Taeng district office. The village is 450 meters a.s.l. and is surrounded by mountains that are covered with mixed deciduous forest which have been degraded through agricultural expansion and the removal of valuable trees such as teak. According to the village leader and the monk, the village is approximately 700 years old with a temple ruin that dates back several hundreds of years. In the last census (NESDB, 1988),

the population was 794, however, the Phuyaiban believes it is more in the area of 1,200 people. According to him, there are 242 households, with 550 women and 650 men. The ethnic composition is predominantly Thai who practice the Buddhist faith, with a small group of Christians living in the northern part of the village.

The socio-economic condition of the village is considered good by the most recent census (NESDB, 1988). The majority of people in the village get their water from wells but approximately twenty households have running water as a result of a new water piping system. In addition, some water is collected from Huay Mae Taeng and Huay Mae Angson creeks. The water from the Mae Taeng is used for irrigation, bathing and washing. The majority of the houses have electricity which is produced by a government hydro plant. Seventy percent of the households have a latrine and there is a local medical volunteer to administer drugs for common diseases such a malaria and dysentery.

Each child in the village has the opportunity to attend school to grade six. There is one school with seven teachers and 146 students. In 1990 ten students out of twenty-seven were expected to further their education outside the village. There is also a nursery school for early child development, a reading place where a few books are available, a Buddhist temple, and a Christian church.

The main source of income in the village is agricultural production. Crops grown around the village include: paddy rice; corn; soyabean; coffee; tea; white lettuce; mangoes; lychee; and banana. The main cash crops are corn and soyabean, while rice is grown for household consumption. Some families raise pigs for sale, as well as buffalo for working in the fields and chickens for eggs and meat. A Japanese agricultural project has been established just east of the village which employees 100 villagers and grows fifty rai (8 ha) of melon and fifty rai (8 ha) of salabee (a type of green vegetable popular in Japan). People working for the Japanese project earn fifty Baht a day if they are men and forty Baht a day if they are women. There is also a 150 rai (24 ha) garden resort under construction which will provide accommodation for tourists. Some villagers also earn income from off-farm employment.

This village is well suited for this investigation because it is surrounded by National Forest Reserve land. It is located in a class four watershed area adjacent to class three, two and one. Class four watershed areas can be used for agriculture given that farmers follow guidelines, while class three indicates the adjacent area has been degraded by agricultural activity. The other classifications identify areas that should not be used for agricultural practices and ones that require regeneration and protection for maintaining water supply. Since agricultural area is limited, this

creates problems for the villagers because they cannot obtain tenure for land they occupy or farm. If people have an occupancy certificate (SK.1), they can change it to legal title (NS) after several years of occupancy, but if they do not have occupancy rights they cannot get legal title for land. These people then have little choice but to encroach onto the forest reserve to grow crops. A description of the land tenure system is presented in Appendix 4.

#### 3.3.3.2 Ban Mae Taman

Ban Mae Taman is located on the Mae Taeng river at 88.5 degrees longitude and 23 degrees latitude. It is connected to the main northern highway by a gravel road and is approximately eleven kilometres from the district office. The village is 425 meters a.s.l. and is in a valley surrounded by mixed deciduous forest. At the time of the last census (NESDB, 1988), there were 201 households with a population of 858, 414 women and 444 men. The village is between 200 and 300 years old with an ethnic mixture of predominantly Thai with a few Hmong Hilltribe people.

The socio-economic status of the village is considered good. Approximately one hundred households have electricity. Health conditions in the village have improved over the last decade. Water comes from wells and from Huay Nam Yate and almost all households have running water for cleaning and bathing. There is a health center in the village which is run

by a trained volunteer. There are a few services in village, including nine grocery stores and one gas station. The primary school provides education to grade six with only one out of every five students furthering their education outside of the village. In 1990, there were sixty-nine students and six teachers at the school.

The main source of income is from agriculture, although some people are employed to do off-farm labour. The most important crops grown in the valley include: rice; soyabean; coffee beans; cucumber; sweetgrass; lychee; mango; and lomyi. The key cash crops are soyabean; cucumber and sweatgrass. Some villagers raise chickens and buffalos, but usually for their own use and consumption. There is also a rafting and elephant camp called Mae Taman Rafting which employs approximately twenty people, but only ten of the employees come from Ban Mae Taman.

The village is set next to the Mae Taeng River adjacent to Forest Reserve area. It is similar in its setting to Muang Kuad, but has a smaller population and a smaller amount of land in the lowland areas for cultivation. The village is situated in a class three watershed zone adjacent to class two and one 'a and b'. This indicates that agriculture can occur in this area under strict control and that the surrounding hillsides fall into the watershed protection and restricted use zones. Since agricultural land is limited, many people in the village do not have legal tenure to land and rely on the

forest for fuel and other forest products. As a result, Ban Mae Taman provides a good example for study.

#### 3.3.3.3 Ban Ton Kham

Ban Ton Kham is located at 87 degrees 30' longitude and 26 degrees latitude in the lower reaches of the Mae Taeng watershed, along the Huay Mae Taman approximately six kilometres north of the village Ban Mae Taman. It is connected to the main northern highway by an all-weather dirt road, the later of which is considered by the locals to be rough and in a state of disrepair. It is set on the slope of a valley at 475 meter a.s.l. and is surrounded by mixed deciduous forests and mountains.

According to the Phuyaiban, the village dates back at least 50 years, and currently comprises 53 households. In the last census (NESDB, 1988) the population was 218 persons: 116 males and 102 females. The ethnic composition of the village is Thai, all of whom are Buddhists. Education is mandatory to grade six and there is a primary school and four teachers to serve the needs of seventy-nine students. Very few children in this village further their studies beyond this level.

Living conditions in the village have improved over the last few years. Eleven years ago the government Health Department installed a water system which consists of both wells and running water. Four years ago the National Energy Board provided electricity to the village although not all

houses are hooked-up to the service. Many of the houses have latrines and those that do not will often share one with a neighbour. As a result, public health within the community is considered to be good. There is a health volunteer who administers drugs for common aliments such as malaria. For additional medical attention villagers must go to the medical center in Ban Mae Taman or to the hospital at Ban Mae Taeng.

The main source of income for the villagers is from agricultural production. This occurs in the form of self-managed farms, as well as employment labour with the Arunsci Seed Company. In addition, some villagers earn money cutting trees and selling houses that they build. The main cash crops grown include soyabean, cucumber, corn, tea and coffee. Soyabean earns approximately 4,000 to 5,000 Baht per year for each household. Also, a variety of fruits are grown such as lychees and bananas and lahung (castor seed) and ngar. Many families keep buffaloes, pigs and chickens for food.

The area surrounding the village is designated Forest Reserve land. The village is situated in a class three watershed zone, adjacent to conservation and protection forests. Although similar ethnic composition to the other villages, Ton Kham is both smaller and poorer than the other two villages. The village also has less agricultural land resulting in forest encroachment. Given these conditions, Ton Kham provides a good example for study and village comparison.

## 3.4 Summary

This chapter has presented the conceptual framework adopted in this study, and outlined the research design. It has also described the general study area and the three villages selected for field investigation. Since each village suffers from an acute shortage of land and forest encroachment is increasing, they are suitable locations in which to pursue the present investigation. The following chapter presents the results of the study.

# CHAPTER 4

# RESULTS

This chapter presents and discusses the results obtained from the empirical analysis of the questionnaire data, and the qualitative information gathered through informal interviews and personal observations.

## 4.1 Questionnaire Analysis

The questionnaire used in this study was designed to obtain information about how rural people in the Mae Taeng watershed perceive forest resources and their present management. This section analyses the data collected in the questionnaire survey.

### 4.1.1 Total Sample

The first part of the analysis undertaken in this study summarizes the responses and socio-economic characteristics of the respondents in the three study villages. This is done in order to provide an overview of the current level of awareness about forest loss around the villages, summarize its causes

and effects, and to identify knowledge and opinions towards forest management. This analysis, indicates how much similarity and difference there is in the villagers' responses to selected issues.

A summary of the socio-economic characteristics of the respondents is presented in Table 4.1. Their average age is approximately thirty-six years, and they have a mean education level of four years. This is somewhat lower than the Thai government mandatory school attendance requirement of six years. The majority of individuals interviewed are married (82.7 percent), had an average household size of four people, and have been residents of their village for approximately twenty-eight years. It should be noted that family planning has been very successful in Thailand in the last twenty years (Muecke, 1984). The average family size in this study is representative of the contemporary trends in the country (Krannich and Krannich, 1980).

Other socio-economic characteristics of particular interest to this study are the types of land tenure certificates people have and their annual incomes. Other studies have shown that the use of forest resources, particularly fuelwood, is directly influenced by socio-economic status (Agarwal, 1986; NTUSFP, 1987a). As noted in Chapter 3, land title and the amount of land owned bears a direct relationship to the amount of forest encroachment. If an individual does not have title to land, they are more

**Table 4.1 Socio-Economic Characteristics: Total Sample**

| Characteristic | Sample N=162 |
|---|---|
| Gender | male 81 (50.0%)<br>female 81 (50.0%) |
| Village | Muang Kuad<br>n=71 (43.8%)<br><br>Mae Taman<br>n=61 (37.7%)<br><br>Ton Kham<br>n=30 (18.5%) |
| Average Age | 35.8 sd. 14.04 |
| Marital Status | married 134 (82.7%) |
| Average Education (Years) | 4.18 sd. 2.60 |
| Average Household Size | 4.16 sd. 1.25 |
| Average No. of rai owned | 5.88 sd. 9.40 |
| Average Income | 23630.6 Baht<br>$1050.25 CN<br>sd. 26735.24 |
| Average length of residence (Years) | 27.65 sd.16.20 |

inclined to encroach on forest reserves, and are less likely to be concerned about the long-term productivity of the land because they do not legally own it (Feder, 1988a, 1988b). Acquisition of legal title to land in Thailand is becoming increasingly difficult (Hafner and Apichatvullop, 1990; Hirsch, 1988; Judd, 1988). This is complicated by the fact that the number of landless people is on the rise with population growth (Jengajalern, 1988).

The average amount of land owned by those surveyed is 5.878 rai (0.94 ha). However, less than half of the respondents had personal title to land. Table 4.2 lists the land tenure certificates held by the respondents. The highest form of land title is the Chanode, which is similar to the fee-simple ownership system in North America. Only 1.2 percent of the sample have this form of land tenure. The most commonly held land tenure certificate was the NS.3. A large number of respondents also stated they held the PBT.5 and PBT.6 certificates. In the case of NS.3, villagers have the right to use the land and borrow money by using the certificate as collateral, while the PBT.5 and PBT.6 are simply land tax receipts (Chuntanaparb and Wood, 1986; Feder et al., 1988). In the later cases, villagers do not have full legal title to the land. They can farm the land and build their homes on it, but cannot sell it or use it for loan collateral. With the PBT.5 and PBT.6, the land can be taken away from them at any time for reforestation or land reallocation under the forest village programme (Feder et al., 1988). This uncertainty leads to the overuse and degradation

**Table 4.2 Land Tenure Certificates Held: Total Sample**

| Certificate | Frequency | Percent |
|---|---|---|
| SK1 | 15 | 9.3 |
| NS3 | 22 | 13.6 |
| NS3A | 10 | 6.2 |
| Chanode | 2 | 1.2 |
| PBT5 | 6 | 3.7 |
| PBT6 | 22 | 13.6 |
| other | 4 | 2.5 |
| combined | 15 | 9.3 |
| no title | 31 | 19.1 |
| do not know | 35 | 21.6 |
| | 162 | 100 |

of the land because there is no incentive for long-term management (Hoare, 1986).

The average annual income of the respondents is approximately, 23,630 Baht (CN$1,099.00). This is in line with the average annual income of 20,900 Baht (CN$972.00) reported by Chuntanaparb and Wood (1986). The difference is likely the result of increased earning power over the last five years and inflation. There is, however, a very wide range in incomes as indicated by the standard deviation. The majority of individuals earn their incomes from agricultural production (39.5 percent) or a combination of agricultural and off-farm employment (35.2 percent). This is representative of the percent of agricultural employment in this region (RFD, 1988b). A summary of the main and secondary sources of income is presented in Table 4.3.

The first set of questions asked the respondents to indicate how important they felt the forest was to their daily lives and to the maintenance of the local environment. As indicated in Table 4.4 the respondents consider the forest to be very important or somewhat important in all of the provided categories. The categories were defined with the assistance of researchers at the Social Research Institute (SRI) because they were familiar with the common uses of the forest in the study area. According to the responses, the most important function of the forest was maintaining water supply, with over half of those interviewed indicating that the forest is very important to maintaining water supply (66.7 percent). It is believed that this response is related to the fact that all

**Table 4.3 Main and Secondary Income Sources: Total Sample**

| Main Source | Frequency | Percent |
|---|---|---|
| Agriculture | 64 | 39.5 |
| Employment | 31 | 19.1 |
| Business | 4 | 2.5 |
| Agriculture/Employment | 57 | 35.2 |
| Agriculture/Business | 6 | 3.7 |
| Total | 162 | 100 |

| Secondary Source | Frequency | Percent |
|---|---|---|
| Off-farm labour | 7 | 9.0 |
| Handicrafts | 2 | 2.6 |
| Sell forest products | 4 | 5.1 |
| Cutting trees | 13 | 16.7 |
| Farm labour | 18 | 23.1 |
| Business | 15 | 19.2 |
| Construction | 9 | 11.5 |
| Other | 10 | 12.8 |
| Total | 78 | 100 |

| | | |
|---|---|---|
| Secondary source income | 78 | 48.15 |
| No Secondary Source income | 84 | 51.85 |

**Table 4.4 Rating of Forest Importance: Total Sample**

| Importance for: | very | somewhat | not | do not know |
|---|---|---|---|---|
| | Freq. % | Freq. % | Freq. % | Freq.% |
| Family Income | 54 (33.3) | 78 (48.1) | 28 (17.3) | 2 (1.2) |
| Water Supply | 108 (66.7) | 49 (30.2) | 3 (1.9) | 2 (1.2) |
| Soil erosion | 67 (41.4) | 80 (49.4) | 12 (7.4) | 3 (1.9) |
| Wildlife Habitat | 68 (42.0) | 87 (53.7) | 6 (3.7) | 1 ( .6) |
| Soil Fertility | 70 (43.2) | 81 (50.0) | 3 (1.9) | 8 (4.9) |
| Building Material | 85 (52.5) | 69 (42.6) | 6 (3.7) | 2 (1.2) |
| Firewood | 62 (38.3) | 90 (55.6) | 10 (6.2) | - |
| Charcoal | 40 (24.7) | 76 (46.9) | 38 (23.5) | 8 (4.9) |
| Food | 66 (40.7) | 79 (48.8) | 17 (10.5) | - |
| Family Health | 56 (34.6) | 82 (50.6) | 18 (11.1) | 6 (3.7) |
| Farming | 76 (46.9) | 72 (44.4) | 12 (7.4) | 2 (1.2) |

three villages have experienced water shortages over the last couple of years. This has resulted in drought and a reduction in the availability of electricity which is generated locally by small hydro plants. It also suggests that these people make a strong connection between forest loss and water shortages. At the same time, however, the respondents also indicated that the forest was very important for supplying building materials (52.5 percent), while less than half said it was very important for supplying firewood (38.3 percent) and charcoal (24.7 percent). The latter findings are somewhat surprising, as firewood and charcoal are the main fuels used in the villages. It may be that the respondents simply do not consider the areas where they collect firewood to be forest because many of the trees have already been removed. It may also indicate, villagers do not make the connection between charcoal production and forest loss.

Given the fact that most rural people in Thailand rely upon the forest for many of their household needs, it is important to determine whether the respondents believe there is enough forest available. The results presented in Table 4.5 indicate that 58.6 percent of the respondents believe that there is enough forest, while 39.5 percent believe there is not enough forest. This suggests that although the majority of people are able to satisfy their household needs, some individuals have difficulty doing so. Given the continued demands being placed on the resource, and the physical condition of the surrounding forest, it is not unreasonable to expect that the number of those experiencing a shortage will

increase in the future. Of those respondents indicating there was not enough forest to meet the needs of the village, the most commonly noted reason was that it was due to the cutting down of the forest and the reduction of forest cover. Others attributed it to a growing population and illegal logging (see Table 4.6). Although it is known that illegal logging is conducted to some extent around each of the villages, only a small number of people attributed forest loss to this activity. This can be explained by the fact that illegal logging is an extremely volatile issue in Northern Thailand. It has resulted in threats of murder and even the death of those acting against the powerful business people that promote the activity (Lohmann, 1990; Myers, 1984). It has also lead to conflict between residents in the villages. As discussed in Section 4.2 the clearing of land by Hilltribe people at the higher elevations of the watershed has caused some tension between them and the lowland Thais. Since the illegal logging issue is sensitive, it is possible people were cautious in their responses by giving a general answer rather than pointing the finger at a specific group. Although this situation likely affects the willingness of people to respond openly and honestly to the questions, confidentiality was continually stressed to make villagers more comfortable. Nevertheless, people were sometimes curious to know if the interviewers were with the forest department. When informed there was no affiliation between the research and the department, people seemed more willing to discuss sensitive issues.

**Table 4.5 Evaluation of Adequate Forest Supply: Total Sample**

| | Frequency | Percent |
|---|---|---|
| Yes | 95 | 58.6 |
| No | 64 | 39.5 |
| Do not know | 3 | 1.9 |
| | N=162 | 100.0 |

**Table 4.6 Reasons for Inadequate Forest: Total Sample**

| | Frequency | Percent |
|---|---|---|
| People cut trees | 21 | 13.0 |
| Population increase | 11 | 6.8 |
| Illegal logging | 8 | 4.9 |
| Agriculture | 3 | 1.9 |
| Forest reduced | 14 | 8.6 |
| Other | 7 | 4.3 |
| | N=64 | 39.5 |

The respondents overwhelmingly felt the amount of forest cover around their village had changed over the last couple of years. Fully, 86.4 percent of them indicated that forest cover had decreased, while 9.9 percent said that there had been no change, and 3.1 percent said there was more forest than before (see Table 4.7). Although over half the sample felt there was adequate forest to supply the needs of the villages, over three quarters of them said forest cover had declined over the last few years. The acknowledgement of a decline in forest cover indicates that the forest cover in the study area is in a state of change and increasing demand could lead to inadequate supply in the future. This could also explain the split in responses regarding the seriousness of forest loss around the villages. Only 29.1 percent of the respondents perceived forest loss around their village to be very serious, 44.4 percent viewed it as somewhat serious, and 25.9 percent did not think it was serious. Again, this suggests that the loss of forest cover is an emerging problem in the study area.

The respondents indicated that the main factors contributing to deforestation around their villages were the activities of villagers (46.3 percent) and illegal logging (30.9 percent). Some respondents also suggested it was due to the influence of capitalists or business people from the city and other agents (14.3 percent). On the other hand, they did not think that commercial loggers, charcoal producers or tobacco curers were responsible for deforestation (see Table 4.8). This response may be due to the fact there is currently

**Table 4.7 Perception of Forest Change: Total Sample**

| | Frequency | Percent |
|---|---|---|
| Less | 140 | 86.4 |
| No change | 16 | 9.9 |
| More | 5 | 3.1 |
| Do not know | 1 | .6 |
| | N=162 | 100.0 |

**Table 4.8 Identification of Those Responsible for Deforestation: Total Sample**

| | Yes | No | Do not know |
|---|---|---|---|
| | Freq. % | Freq. % | Freq. % |
| Villagers | 75 (46.3) | 66 (40.7) | 21 (13.0) |
| Illegal loggers | 50 (30.9) | 91 (56.2) | 21 (13.0) |
| Commercial loggers | 5 (3.1) | 136 (84.0) | 21 (13.0) |
| Charcoal producers | 1 ( .6) | 140 (86.4) | 21 (13.0) |
| Tobacco curers | - | 141 (87.0) | 21 (13.0) |
| Other | 23 (14.2) | 118 (72.8) | 21 (13.0) |

no commercial logging activity in the study area and although tobacco curers were once located in Ban Muang Kuad, the industry closed down several years ago. Thus, it is reasonable to expect people would not make a connection between these activities and deforestation in their area. One of the more interesting responses, however, is the belief that charcoal production in the area does not contribute to deforestation. This may be due in part to the fact that the majority of people surveyed use firewood as their main source of fuel with only a small portion of them supplementing it with charcoal. In addition, there is no commercial charcoal industry in the area; charcoal is produced by villagers for their own use.

Although the Mae Taeng watershed still has considerable forest cover, deforestation is a national problem that has received a large amount of publicity recently. It was decided, therefore, to investigate whether the respondents were aware of deforestation elsewhere in the country, whether they considered it to be a serious problem, and who they thought was responsible. At the national level, 83.3 percent of the villagers were aware of forest loss in the country and 96.3 percent perceived it as a serious problem (see Table 4.9). Responses indicated that while people are aware of deforestation at the local level, the perception of seriousness is more acute regarding the national situation. These findings could result from more exposure to the national situation through the media, and the sentiment that the forest situation in the local context has not yet reached a critical

stage. Some variation also occurred in villagers' attitudes towards who was responsible for deforestation at the national level. The five key activities believed to contribute to deforestation in Thailand are: illegal logging (98.1 percent); shifting cultivation (86.4 percent); commercial logging (73.5 percent); and charcoal production (71.0 percent) and farming in forest reserves (56.2 percent). The variation in between the local and national level indicates a general awareness of the causes of deforestation and highlights those activities of particular importance at the local level. The most interesting result is the overwhelming indication that illegal logging is considered to be a major contributing factor to deforestation at the national level but not necessarily in their villages. This again goes back to the volatility of the issue at the local level.

The most frequently cited effects of deforestation were shortage of water 94.4 percent, shortage of building materials 83.3 percent, shortage of fuelwood 68.5 percent, and loss of family income 56.2 percent. Only 32.1 percent of the respondents thought that floods were associated with deforestation. This provides some interesting results because it indicates that villagers draw a connection between forest loss and water shortages. It also indicates that the forest plays an important role in providing family income. Forests around the village can therefore be evaluated as a valued and appreciated resource. Responses concerning the effects of deforestation are summarized in Table 4.10.

**Table 4.9 Attitudes Towards Deforestation in Thailand: Total Sample**

| | Yes | No | Do not know |
|---|---|---|---|
| | Freq. % | Freq. % | Freq. % |
| Awareness of forest loss | 135 (83.3) | 27 (16.7) | - |
| Serious problem | 156 (96.3) | 3 (1.9) | 3 (1.9) |

**Table 4.10 Perceived Environmental and Socio-economic Effects of Deforestation: Total Sample**

| | Yes | No |
|---|---|---|
| | Freq. % | Freq. % |
| Increased incidence of floods | 52 (32.1) | 110 (67.9) |
| Shortage of water | 153 (94.4) | 9 ( 5.6) |
| Shortage of building material | 135 (83.3) | 27 (16.7) |
| Shortage of fuelwood | 111 (68.5) | 51 (31.5) |
| No change | 5 (3.1) | 157 (96.9) |
| Loss of family income | 91 (56.2) | 71 (43.8) |
| Other | 3 (1.9) | 159 (98.1) |

To assess the level of forest loss around the villages and respondents' perception of its impact on the community, a series of questions on the use of fuel wood were asked. Overall, 34.6 percent of the respondents used firewood as the sole source of energy while a total of 79.0 percent used firewood and another fuel as their source of energy. Of these respondents using and collecting firewood, 58.6 percent collected it in the forest reserves surrounding their village and 50.8 percent indicated they must now travel further to collect firewood then they did a few years ago. This change in distance indicates the resource is being depleted (Agarwal, 1986; Eckholm, 1984; FAO, 1989b, 1989c). Only, 48.8 percent of the respondents felt that firewood collection had an impact on forest loss, 65.4 percent of those who believed it had an impact on the forest believed that the forest would eventually disappear, and 65.4 percent of the respondents felt there was a need to reduce firewood collection. In assessing the present supply of firewood, 74.7 percent consider it to be sufficient, 9.3 percent indicated that it was abundant and 11.7 percent said it was scarce. Notwithstanding the sufficient supply, 78.4 percent said that this would change in the future and 56.8 percent of the villagers said it would become worse (see Tables 4.11 to 4.13). These results indicate there is a strong awareness amongst local people that the condition of the forest around their villages is in a state of decline.

In order to gain insight into possible forest management strategies questions regarding the ownership, and management

**Table 4.11 Assessment of Present Firewood Supply: Total Sample**

| | Frequency | Percent |
|---|---|---|
| Abundance | 15 | 9.3 |
| Sufficient | 121 | 74.7 |
| Scarce | 19 | 11.7 |
| Missing | 7 | 4.3 |
| | N=162 | 100.0 |

**Table 4.12 Perception of Future Forest Loss: Total Sample**

| | Frequency | Percent |
|---|---|---|
| Yes | 127 | 78.4 |
| No | 16 | 9.9 |
| Do not know | 12 | 7.4 |
| Missing | 7 | 4.3 |
| | N=162 | 100.0 |

**Table 4.13 Assessment of Forest Change In the Future: Total Sample**

| | Frequency | Percent |
|---|---|---|
| Better | 32 | 19.8 |
| Worse | 92 | 56.8 |
| Do not know | 3 | 1.9 |
| Missing | 35 | 21.6 |
| | N=162 | 100.0 |

of the forest were asked. Regarding the ownership of the forest, 40.7 percent of villagers said that the village belonged to the community while 27.8 percent of the respondents said it was owned by the Royal Forest Department (Table 4.14). This high level of association with the community could indicate that an appropriate management strategy should involve direct community involvement. Contemporary literature indicates that management strategies are more effective if the local people can derive direct benefit from management (Cernea, 1985; Gregersen et al., 1989).

In evaluating the current management of the forest, 40.1 percent indicated the government was doing a good job; 27.8 percent said they were doing a fair job; and 24.7 said they were doing a poor job. Altogether, 96.9 percent of the sample population were aware that there were laws to protect the forest. Of these respondents, 50.3 percent thought the enforcement of the laws was about right while 33.8 percent thought it was not strict enough (see Tables 4.15 to Table 4.17). Furthermore, 75.9 percent of the respondents felt that villagers should be directly involved in the management of the forest (Table 4.18), with 49.4 percent stating that both men and women should be involved in such management (Table 4.19). These responses suggest there is a need to restructure management strategies to incorporate the involvement of both men and women.

**Table 4.14 Evaluation of Forest Ownership: Total Sample**

| | Frequency | Percent |
|---|---|---|
| Royal Forest Department | 45 | 27.8 |
| Community | 66 | 40.7 |
| Government | 18 | 11,1 |
| Other | 9 | 5.6 |
| Combination | 4 | 2.5 |
| Do not know | 20 | 12.3 |
| | N=162 | 100.0 |

**Table 4.15 Evaluation of Forest Management: Total Sample**

| | Frequency | Percent |
|---|---|---|
| Good | 65 | 40.1 |
| Fair | 45 | 27.8 |
| Poor | 40 | 24.7 |
| Do not know | 12 | 7.4 |
| | N=162 | 100.0 |

**Table 4.16 Awareness of Forest Protection Laws: Total Sample**

| | Frequency | Percent |
|---|---|---|
| Yes | 157 | 96.9 |
| No | 5 | 3.1 |
| | N=162 | 100.0 |

**Table 4.17 Evaluation of Laws: Total Sample**

| | Frequency | Percent |
|---|---|---|
| Too strict | 14 | 8.9 |
| About right | 79 | 50.3 |
| Not strict enough | 53 | 33.8 |
| Do not know | 11 | 7.0 |
| | N=157 | 100.0 |

**Table 4.18 Villagers' Involvement Forest Management: Total Sample**

| | Frequency | Percent |
|---|---|---|
| Yes | 123 | 75.9 |
| No | 24 | 14.8 |
| Do not know | 15 | 9.3 |
| | N=162 | 100.0 |

To manage the forest and deal with forest loss, 92.0 percent of the villagers thought that the government should plant more trees around their village (Table 4.20); and 95.1 percent of the people said that they would plant trees if they were given to them by the government (Table 4.21). The most popular conservation measures and means of providing an adequate supply of firewood were replanting (27.8 percent) and the use of other fuel (38.3 percent). It is therefore apparent there is an awareness for the need to mitigate forest loss through reduced use and better reforestation efforts. In addition, villagers showed a strong willingness to participate in tree planting programmes if given the opportunity.

In the results presented thus far, some degree of consistency is apparent. However, there is also considerable variation in responses of villagers to some questions. In order to gain greater insight as to why this variation exists, it is appropriate to undertake a formal investigation into factors that may be associated with this variability. In accordance, two research avenues have been adopted. The first will compare villages to determine if differences in socio-economic characteristics and location influence responses. The second will investigate possible differences based on gender.

**Table 4.19 Opinion of Gender Involvement in Forest Management: Total Sample**

| | Frequency | Percent |
|---|---|---|
| Men | 41 | 25.3 |
| Women | 2 | 1.2 |
| Both | 80 | 49.4 |
| Do not know | 15 | 9.3 |
| Missing | 24 | 14.8 |
| | N=162 | 100.0 |

**Table 4.20 Need for Government Tree Planting: Total Sample**

| | Frequency | Percent |
|---|---|---|
| Yes | 149 | 92.0 |
| No | 6 | 3.7 |
| Do not know | 7 | 4.3 |
| | N=162 | 100.0 |

**Table 4.21 Villagers' Willingness to Participate in Tree Planting: Total Sample**

| | Frequency | Percent |
|---|---|---|
| Yes | 154 | 95.1 |
| No | 8 | 4.9 |
| | N=162 | 100.0 |

### 4.1.2 Village Comparison

Although the three villages selected for this study are similar in their relative locations and cultural compositions, they also exhibit some distinct differences. As noted in Section 3.3, villages vary in population size, availability of agricultural land, employment opportunities and economic status based on average annual incomes. The villages are also situated within different watershed classification zones and proximity to watershed protection forests. Tables 4.22 to 4.24 provide a comparison of socio-economic characteristics and land tenure conditions for each of the villages. It is, therefore, appropriate to investigate whether the responses differ on the basis of village location and socio-economic conditions.

The socio-economic data shows there is a significant difference between villages and the type of land tenure held, income source, amount of land owned, and family income. Family income and accessibility to land has a direct impact on forest use (Agarwal, 1986). This variation indicates that although villages are in the same geographical area their demands and level of encroachment on the forest reserve will be influenced by these conditions. Land tenure types according to village is presented in Table 4.25. As indicated in these findings, villagers in Muang Kuad have a higher degree of SK.1 ownership, while Mae Taman tended to has the NS.3 classification. In all cases though, there were a large number of people who did not know what kind of tenure they had or did not have tenure at all. This evidence indicates that

**Table 4.22 Socio-Economic Characteristics: Village Comparison**

| Characteristic | Chi Square | D.F. | Significance |
|---|---|---|---|
| Marital Status | 7.19812 | 6 | .3029 |
| Tenure Class. | 68.72305 | 18 | .0000** |
| Income Source | 20.84869 | 8 | .0076 |

** Significance at ∝ = .01

**Table 4.23 Amount of Land Owned (Rai): Village Comparison**

| | Muang Kuad (x=8.85 rai) | Mae Taman (x=3.28 rai) | Ton Kham (x=4.33 rai) |
|---|---|---|---|
| Muang Kuad | - | t=3.19** | - |
| Mae Taman | - | - | t=-1.24 |
| Ton Kham | t=1.86 | - | - |

** Significate at ∝ = .01

**Table 4.24 Family Income: Village Comparison**

| | Muang Kuad (x=26098.59) | Mae Taman (x=20425.00) | Ton Kham (x=24220.69) |
|---|---|---|---|
| Muang Kuad | - | t=1.16 | - |
| Mae Taman | - | - | t=-.78 |
| Ton Kham | t=.29 | - | - |

**Table 4.25 Land Tenure Certificates: Village Comparison**

| Certificate | Muang Kuad | Mae Taman | Ton Kham |
|---|---|---|---|
| SK1 | 10 (6.6) | 0 (5.6) | 5 (2.8) |
| NS3 | 5 (9.6) | 15 (8.3) | 2 (4.1) |
| NS3A | 3 (4.4) | 7 (3.8) | 0 (1.9) |
| Chanode | 0 ( .9) | 2 ( .8) | 0 ( .4) |
| PBT6 | 0 (2.6) | 4 (2.3) | 2 (1.1) |
| PBT5 | 10 (9.6) | 1 (8.3) | 11 (4.1) |
| Do not know | 21 (15.3) | 12 (13.2) | 2 (6.5) |
| Other | 1 (1.0) | 3 (1.5) | 0 ( .7) |
| Combined | 12 ( 6.6) | 1 (5.6) | 2 (2.8) |
| No title | 9 (13.6) | 16 (11.7) | 6 (5.7) |

Chi-Square 68.72305
D.F. 18
Significance .0000

Note: Numbers in brackets represent percentages while numbers outside of the brackets represent frequencies.

villagers to a large degree are simply occupying land without legal title to the land.

In comparing the responses obtained towards the importance of forests in the three villages, some significant differences in attitudes towards the social and ecological importance of forests were found. In particular, differences in attitudes towards the importance of the forest in providing building materials, firewood, charcoal, and maintaining family health (see Table 4.26). In contrast, there was no significant difference between the respondents in each village with regard to whether or not there was an adequate supply of forest to supply the needs of villagers. This suggests that a similar number of people in each village felt that there was an adequate supply while others experienced some difficulty in providing for their basic needs. For those who felt there was not enough forests, there was some variation in the reasons provided for the current situation. Although interesting, the differences are not statistically significant (see Table 4.27).

With regard to forest loss, most respondents thought that forest cover had declined over the last couple of years. Their assessment of the seriousness of forest loss did not differ across villages. Significant differences were found, however, in the assessments of who was responsible for the loss of forest. More people in Muang Kuad said that villagers were responsible for deforestation, while less people in Mae Taman thought villagers were responsible for deforestation. This could be explained by the fact that in Muang Kuad there

**Table 4.26 Rating of Forest Importance: Village Comparison**

| Importance for: | Chi-Sq | D.F. | Significance |
|---|---|---|---|
| Family Income | 8.80910 | 6 | .1846 |
| Water Supply | 7.47486 | 6 | .2792 |
| Stop Erosion | 5.14480 | 6 | .5254 |
| Wildlife Habitat | 2.46868 | 6 | .8720 |
| Soil Fertility | 5.24009 | 6 | .5134 |
| Building Materials | 13.14003 | 6 | .0409* |
| Firewood | 14.34310 | 4 | .0063** |
| Charcoal | 35.59097 | 6 | .0000** |
| Food | 3.02690 | 4 | .5533 |
| Family Health | 22.11512 | 6 | .0012** |
| Farming | 7.23257 | 6 | .2999 |

* Significant at $\propto$ = .05

** Significant at $\propto$ = .01

Note: For the Likert scale used on this question, refer to Appendix 1.

is considerable evidence of agricultural encroachment on forest land visible from the village while in Mae Taman encroachment is not as obvious. This is in part due to the fact Ban Muang Kuad is an older village with a larger population. In addition, the village is situated in a class four watershed area and is adjacent to areas classified as degraded by agricultural activities. The other two villages are adjacent to conservation and protection forests.

Respondent assessments of illegal loggers varied across villages. In Ton Kham, more than expected said that illegal logging was responsible for deforestation, while more than expected in Muang Kuad said illegal logging was not responsible (see Table 4.28). These differences could be related to the fact illegal logging occurs more frequently in the forests near Ton Kham because it is more remote. Ton Kham is also situated in a class three watershed area and is surrounded by two classifications of watershed protection forests. This could suggest that since the area around Ton Kham is more forested and less degraded in relation to Muang Kuad, it provides better selection and accessibility to valuable tree species. Subsequently, illegal logging is more likely to occur in this area. This is supported by the fact villagers in Ton Kham suggested illegal logging is conducted by people from outside the village and therefore feel some hostility towards the activity and are more inclined to identify it as a cause of forest loss. On the other hand, the results could also suggest that villagers in Muang Kuad believe agricultural expansion has a greater effect on forest

**Table 4.27 Local Deforestation Agents: Village Comparison**

| Reasons | Muang Kuad | Mae Taman | Ton Kham |
|---|---|---|---|
| People cut | 6 (9.5) | 12 (7.5) | 3 (3.9) |
| Population growth | 6 (5.0) | 1 (4.0) | 4 (2.1) |
| Illegal logging | 5 (3.6) | 1 (2.9) | 2 (1.5) |
| Agriculture | 2 (1.4) | 0 (1.1) | 1 ( .6) |
| Forest reduced | 7 (6.3) | 6 (5.0) | 1 (2.6) |
| Other | 3 (2.7) | 3 (2.2) | 0 (1.1) |
| Do not know | 0 ( .5) | 0 ( .4) | 1 ( .2) |

Chi-Sq 19.09213
D.F. 12
Significance .0863

Note: Numbers outside of the brackets represent number of responses while numbers in the bracket represent expected responses.

**Table 4.28 National Deforestation Agents: Village Comparison**

| Responsible | Chi-Sq | D.F. | Significance |
|---|---|---|---|
| Villagers | 20.44694 | 4 | .0004** |
| Illegal loggers | 10.85108 | 4 | .0283* |
| Commercial loggers | 5.14492 | 4 | .2727 |
| Charcoal producers | 6.90772 | 4 | .1408 |
| Tobacco curers | 5.08018 | 2 | .0789 |
| Other | 8.94797 | 4 | .0624 |

* Significant at $\propto$ = .05
** Significant at $\propto$ = .01

cover than illegal logging, because much of the area around the village is under agricultural production. Alternatively, they could simply be denying the existence of illegal logging because they felt uncomfortable giving this response.

In evaluating the environmental and socio-economic effects of deforestation on local communities, there was some variation between villages. In particular, significant differences exist in their evaluation of water and fuelwood shortages (see Table 4.29). With regards to water shortages, fewer than expected in Muang Kuad and more than expected in Mae Taman said there was a shortage of water. Since Mae Taman is down stream from both Muang Kuad and Ton Kham, it is likely that a water shortage would be more noticeable at this location. On the other hand, fuelwood shortages were more frequently cited by villagers in Ton Kham and Mae Taman than in Muang Kuad. Since firewood is the main source of fuel in Ton Kham and Mae Taman, these villages are more likely to recognize the shortage of fuelwood as a potential problem. In Muang Kuad, fuelwood is used in conjunction with other fuels. Therefore, fuelwood shortages are not as much of a concern in that village because there is an alternative fuel source.

The majority of respondents were aware of the deforestation problem in other parts of Thailand. In Mae Taman more than expected had heard of the problem while there was fewer than expected in Ton Kham (see Table 4.30). This difference could be the result of greater access to the sources of information such as television. It could also result from the attitudes of the village leaders which would

**Table 4.29 Perceived Environmental and Socio-economic Effects of Deforestation: Village Comparison**

| Effects | Chi-Sq | D.F. | Significance |
|---|---|---|---|
| Floods | 5.05730 | 2 | .0798 |
| Water shortage | 6.16504 | 2 | .0458* |
| Shortage construction | 4.93887 | 2 | .0846 |
| Fuelwood shortage | 10.24406 | 2 | .0060** |
| Do not know | 1.28965 | 2 | .5248 |
| Less income | 4.82760 | 2 | .0895 |
| Other | 2.38515 | 2 | .3034 |

* Significant at $\alpha$ = .05
** Significant at $\alpha$ = .01

**Table 4.30 Awareness of Deforestation in Thailand: Village Comparison**

| Village | Yes | No |
|---|---|---|
| Muang Kuad | 60 (59.2) | 11 (11.8) |
| Mae Taman | 54 (50.8) | 7 (10.2) |
| Ton Kham | 21 (25.0) | 9 ( 5.0) |

| | |
|---|---|
| Chi-square | 5.09403 |
| D.F. | 2 |
| Significance | .0783 |

influence local concern and discussion of the issue. Since Ton Kham is a poorer village and is more remote, fewer villagers have televisions and radios, and newspapers are not available in the village.

Impressions of who owns the forest did not vary significantly across villages. There was also no significant differences between the villages in the evaluation of government programs or for the awareness of forest laws and the evaluation of those laws. A significant difference did appear, however, amongst people's beliefs about who should manage the forest (see Table 4.31). In Mae Taman more than expected thought villagers should be involved in forest management. Opinions about whether or not the government should plant trees around the villages did not vary. Attitudes about who should be involved in forest management, however, did vary between villages. In particular, more villagers in Mae Taman than in Muang Kuad thought women should be involved in forest management (see Table 4.32). This could be a product of varying roles of women within these communities. It could also be influenced by the leadership and opinions of the women's group leaders in the villages.

The assessment of respondents' knowledge of conflict between villagers and forestry officials indicated some significant differences between villages (see Table 4.33). In Ton Kham, more respondents than expected knew of people who had gotten into trouble for farming in the forest. This could be the result of less accessibility to cultivatable land around Ton Kham because it is situated in a narrow valley

**Table 4.31 Attitudes Towards Villagers' Role in Forest Management: Village Comparison**

| Village | Yes | No | Do not know |
|---|---|---|---|
| | Freq. % | Freq. % | Freq. % |
| Muang Kuad | 52 (53.9) | 14 (10.5) | 5 (6.6) |
| Mae Taman | 51 (46.3) | 7 (9.0) | 3 (5.6) |
| Ton Kham | 20 (22.8) | 3 (4.4) | 7 (2.8) |

| | |
|---|---|
| Chi-Square | 10.99739 |
| D.F. | 4 |
| Significance | .0266 |

**Table 4.32 Attitudes Towards the Involvement of Women in Forest Management: Village Comparison**

| Village | Yes | No | Do not know |
|---|---|---|---|
| | Freq. % | Freq. % | Freq. % |
| Muang Kuad | 28 (35.3) | 43 (35.1) | 0 ( .4) |
| Mae Taman | 38 (30.5) | 22 (30.1) | 1 ( .4) |
| Ton Kham | 15 (15.0) | 15 (14.8) | 0 ( .2) |

| | |
|---|---|
| Chi-Square | 9.07478 |
| D.F. | 4 |
| Significance | .0593 |

where lowland areas are already under permanent occupation. As a result, landless villagers are forced to clear forest reserve land on the surrounding hillsides for subsistence and cash cropping. Since the forest around Ton Kham is classified as a watershed protection zone, the activity of clearing the land for crops would bring villagers into direct conflict with forestry officials who have a mandate to protect these zones as catchment areas. In contrast, more respondents than expected in Mae Taman said they knew of someone who had been in trouble for collecting firewood in forest reserves. This could result from the fact that villagers collect firewood in the forest reserve and there is some illegal charcoal production, albeit small scale, in the forests around Mae Taman. In addition, since the village is on the main road leading into the southern portion of the watershed, activities such as firewood collection and charcoal production would be more noticeable to forestry officials, as they frequently pass through this village on their way to other parts of the watershed. Another interesting result relating to conflicts between villagers and forestry officials was that significantly more people in Muang Kuad than in the other two villages had heard of someone getting into trouble for illegal logging. This is a particularly interesting result because in previous questioning, villagers did not view illegal logging as a contributing factor to deforestation or think it was a problem around their village. This would suggest that they think illegal logging is basically not a problem, or that the people they know, have gotten into trouble for illegal logging

elsewhere. The latter would support the perception that agricultural expansion has more of an impact on forests around Muang Kuad than illegal logging. The management implications of these results suggest forest management must vary according to local needs and problems. In Ton Kham, conflict arises from the need for land to grow crops, while in Mae Taman, fuel supply appears to be more of an issue. In Muang Kuad, the involvement of local people in illegal logging activities suggests there is a lack of employment opportunities.

In relation to fuel use, there was a significant difference between the three villages (see Table 4.34). More than expected in Ton Kham used firewood as their main source of fuel, while in Muang Kuad and Mae Taman the reverse occurred. In these two villages, there appeared to be greater use of charcoal and alternative fuels, indicating a higher economic status and possibly the emergence of a firewood shortage. Notwithstanding, most respondents in each village felt there was sufficient fuelwood supply, yet they also thought that this would change in the future to become worse. Also, villagers did not differ in their attitudes towards the impact of firewood collection on the forest. More villagers than expected in Mae Taman, however, thought the forest would eventually disappear, representing a difference in responses at a level of .0088 significance.

The comparative analysis of responses between villages indicated that there was some variation in the responses of the villagers. While each of the villages identified deforestation as a problem in their village, respondents in

**Table 4.33 Knowledge of Villager-Forestry Official Conflict: Village Comparison**

| Activity | Chi-Sq | D.F. | Significance |
|---|---|---|---|
| Farming | 32.90118 | 4 | .0000** |
| Collecting Firewood | 8.74486 | 4 | .0678 |
| Illegal cutting/logging | 12.15373 | 4 | .0162* |

* Significant at ∝ = .05
** Significant at ∝ = .01

**Table 4.34 Fuel Use: Village Comparison**

| Fuel | Muang Kuad | Mae Taman | Ton Kham |
|---|---|---|---|
| Firewood | 18 (24.5) | 15 (21.1) | 23 (10.4) |
| Charcoal | 7 ( 9.2) | 14 ( 7.9) | 0 ( 3.9) |
| Firewood/charcoal | 32 (23.7) | 20 (20.3) | 2 (10.0) |
| Firewood/charcoal Other | 4 ( 5.7) | 6 ( 4.9) | 3 ( 2.4) |
| Charcoal/other | 9 ( 4.4) | 1 ( 3.8) | 0 ( 1.9) |
| Firewood/other | 0 ( 2.2) | 3 ( 1.9) | 2 ( .9) |
| Gas | 1 ( 1.3) | 2 ( 1.1) | 0 ( .6) |

Chi-square 52.38305
D.F. 12
Significance .0000

Note: Numbers outside of the brackets are frequencies while numbers inside the brackets are expected frequencies.

Mae Taman and Ton Kham were more likely to say it was the result of illegal loggers and villagers, while villagers in Muang Kuad said it was the result of agricultural expansion. Villages also showed some variation in their evaluations of the effects of deforestation. This would suggest that geographical location, as well as socio-economic conditions, have an influence on peoples perceptions and concerns. The following section will examine differences on the basis of gender.

### 4.1.3 Gender Comparison

Within the last decade considerable international interest has developed with regard to the role of women in the use and management of natural resources (Dankelman and Davidson, 1988). Previously, research predominately focused on the opinions of men. In Thailand, very little information has been collected from women regarding forest use and management. The information that has been collected has been obtained by asking husbands what their wives think (Ramitanondh, 1990; van der Borg, 1990). Subsequently, contrasting responses on the basis of gender could provide interesting insights into similarities and differences between men and women. This in turn is important for policy and education programmes.

Some differences were found between men and women in their evaluation of how important the forests are for maintaining healthy environmental conditions and standards of living. Significant differences exist with regard to the

importance of forest for inhibiting erosion and providing wildlife habitat. In both cases, men thought that the forest was very important for preventing erosion and providing wildlife habitat, while women only thought it was somewhat important. Men also considered the forest to be more important for building materials and family health than women. Since men are responsible for hunting and building these results are not surprising. However, it is interesting that women did not make as strong an association between good environmental conditions and family health. This may be due to the fact that at the present time forest conditions are such that family health has not suffered from a lack of food or water (see Table 4.35).

Men and women did not differ in their perception of whether there was adequate supply of forest, or in reasons why some felt it was not adequate. Both genders felt that forest cover around the village had declined over the last couple of years, however, attitudes varied towards the seriousness of forest loss. More men than women thought the situation was very serious while more women tended to say it was somewhat or not serious. Although some variation is apparent in the responses these differences are not statistically significant (see Table 4.36). In addition, there was marginal difference between who men and women felt were responsible for deforestation and both were aware of the loss of forest in Thailand.

In relationship to attitudes towards the ownership of the forests around the villages, there was a significant

**Table 4.35 Rating of Forest Importance: Gender Comparison**

| Importance for: | Chi-Sq | D.F. | Significance |
|---|---|---|---|
| Family income | .69678 | 3 | .8740 |
| Water supply | 4.13605 | 3 | .2471 |
| Stop erosion | 7.74229 | 3 | .0516* |
| Wildlife habitat | 8.75321 | 3 | .0328* |
| Soil fertility | 5.40811 | 3 | .1442 |
| Building material | 7.37322 | 3 | .0609 |
| Firewood | .98065 | 2 | .6124 |
| Charcoal | 5.44737 | 3 | .1418 |
| Food | 5.03075 | 2 | .0808 |
| Family health | 5.60840 | 3 | .1323 |
| Farming | 4.06433 | 3 | .2546 |

* Significant at $\alpha = .05$

**Table 4.36 Evaluation of Forest Loss: Gender Comparison**

| | Female | Male |
|---|---|---|
| Very serious | 18 (23.5) | 29 (23.5) |
| Somewhat serious | 38 (36.0) | 34 (36.0) |
| Not serious | 24 (21.0) | 18 (21.0) |
| Do not know | 1 ( .5) | 0 ( .5) |

| | |
|---|---|
| Chi-square | 4.653383 |
| D.F. | 3 |
| Significance | .1990 |

difference between the genders (Table 4.37). Women were more likely to say that the forest belonged to the Royal Forest Department, but were also more inclined to say they did not know who owns the forest. On the other hand, men believed the forest was owned by the community. In evaluating the government's management of the forest, both groups gave similar responses. Men however were more likely to have the attitude that forest laws were not strict enough to protect the forest (see Table 4.38). This difference is not surprising because men would be more likely to come into contact with forestry officials and hear about the activities in the forest through discussions with other men.

For managing the forest around the village, more men than women thought government should plant more trees around the village while more women tended to say they did not know whether or not it was necessary. On the other hand, both genders agreed that women should organize to protect the forest, but more men than women thought that women should be directly involved in forest management. In addition, there was no significant difference between their motivations and willingness to participate in tree planting activities and on their preferences of where to plant trees.

According to gender there was no difference in the responses to the fuel used or fuelwood sources. In addition, men and women had similar perceptions of fuelwood supply but men were more likely to say that firewood collection impacted on the forest. This is due to the fact both men and women are responsible for fuelwood collection in these Thai villages.

**Table 4.37 Attitudes Towards Forest Ownership: Gender Comparison**

| | Female | Male | Expected |
|---|---|---|---|
| Forest Department | 25 | 20 | 22.5 |
| Community | 28 | 38 | 33.0 |
| Government | 5 | 13 | 9.0 |
| Other | 8 | 5 | 6.5 |
| Do not know | 15 | 5 | 10.0 |

| | |
|---|---|
| Chi-Square | 11.62626 |
| D.F. | 5 |
| Significance | .0298 |

**Table 4.38 Evaluation of Forest Laws: Gender Comparison**

| | Female | Male |
|---|---|---|
| Too Strict | 7 (6.9) | 7 ( 7.1) |
| About Right | 42 (38.7) | 37 (40.3) |
| Not Strict Enough | 19 (26.0) | 34 (27.0) |
| Do not know | 9 (5.4) | 2 ( 5.6) |

| | |
|---|---|
| Chi-Square | 8.96223 |
| D.F. | 3 |
| Significance | .0298 |

Much of the contemporary literature on women and their interaction with the environment suggests women are the key providers of fuel in all developing countries (Dankelman and Davidson, 1988). The results of this study would suggest this does not necessarily apply to the rural Thai population in Northern Thailand.

The comparison of responses on the basis of gender indicated strong similarities. Where differences did occur, however, they provided some interesting insight into varying attitudes and perceptions about the value and management of forest resources in Thailand. The following section will examine the information collected during the informal interviews.

## 4.2 Informal Interviews

Informal interviews with a variety of key informants were conducted in each of the three villages. This was done to enhance the information collected in the formal questionnaire survey and to acquire additional information about the current forest situation and management around the villages. This section summarizes the information obtained in the interviews for each of the selected villages. The identities of those interviewed are not reported to ensure anonymity.

### Ban Ton Kham

The interviews conducted in Ton Kham indicate that the village faces a number of problems, including: the high cost and availability of agricultural land, water and electricity

shortages, unemployment, and deforestation. One woman also expressed a concern over strangers coming to the village to lure young people away. Although these problems were identified separately, some evidence of villagers awareness of their interconnection became obvious during the interviewing process.

Since the village is located in a forest reserve, most of the good agricultural land in Ton Kham is along Huay Mae Taman. Although some villagers own property here, land is expensive because wealthy people from outside the village buy and sell it to make money. The villagers must then rent land from these people or work for them in the fields. Since there is no other land available for landless people, they clear the forest for upland agriculture with typical crops being upland rice and corn. Because villagers do not have full legal title to these plots of land, only tax receipts, land can be reclaimed for reforestation by the Forestry department at any time.

Villagers recognize the forest is an important source of firewood, food, and medicine. Firewood is the main source of energy for the majority of villagers, with very few using charcoal or other alternatives. At the present time, there is a sufficient supply of firewood to meet the needs of villagers, and they believe that their demand for firewood has only a small impact on the forest because they collect it for their own use and generally use dead trees. One man said that people try to protect the forest from outsiders who come here to cut trees, but he knows villagers are also responsible. He

thinks that the cutting of forests is a problem and that if it continues there will not be anything left for their daily survival.

Throughout the interviews, there was a general concern for deforestation because for two years there has been a shortage of water which means they cannot produce electricity. When water is high they have electricity all day but now they only have it all day Saturday and Sunday, and parts of the week days. The frequency with which this issue arose suggests that the village people believe that forest loss is responsible for water shortages.

According to some of the villagers interviewed, forest destruction has been caused by the agricultural practices of and Hilltribe people. There are two Hilltribe villages upstream from Ton Kham, one Hmong and the other Lahu. One man suggested the water shortage was worse this year because the Hilltribes are destroying the forest. Subsequently, when Hilltribe people come to the village to buy products, some villagers try to chase them away. On the other hand, another person pointed out that shifting cultivation is not only done by Hilltribes but by villagers as well. Villagers plant crops in the forest reserve because they do not have land and this causes conflict between the forestry officials and the people. If villagers get caught illegal logging they could get three to four months in jail and have to pay a fine of 5,000 to 6,000 baht depending on how much wood they have cut. In most cases though, the villagers run away without getting caught. Accordingly, one man believes that if the forestry officials

let the villagers cut the forest without control or intervention, there will be nothing left. The respondents also indicated that many people in the village, generally men, go to the forest during the day and cut trees such as mai daeng (redwood) and mai pradu to make lumber which is used to build houses. It is common practice for people to build houses every three years or so and then to sell them to people from the city. The price of these houses depends on the size and the type of wood used, but a small house would fetch at least 20,000 Baht. Since the average annual income is approximately twenty thousand Baht, this is a very profitable activity. Respondents indicated that the capitalists, a term they use to refer to business people, come from the city once a week to buy a truck load of lumber from the villagers and haul it back to the city. They also indicated that sometimes men are directly employed to cut trees and can make 40 to 50 Baht per day.

Forestry officials occasionally visit the village but usually go to where people are cutting trees because it is illegal for them to make lumber without a permit. The villagers that cut trees are afraid of the officials because they think they will be arrested. Most people though have little contact with the officials. Officials though will sometimes confiscate wood and sell it themselves. As a result, many villagers do not trust the officials.

According to one woman, the cutting down of the forest around the village is getting worse and the government must try to solve the problem. Another older woman indicates that

she has a better life because the village had become more civilized with water and electricity. However, she feels she is getting poorer because the shortage of water makes it harder to find food. It is evident that villagers make a connection between water shortages and deforestation. However, many believe that they have no choice but to continue cutting the forest because it is the only way for them to make an adequate income.

In order to save the forest in Ton Kham, the monk believed it was important to have village unity. He also suggested that both men and women should be involved because each has different attitudes so it would contribute to the overall picture. Conversely, one woman felt men and women have the same instinct to protect the forest but men are more effective because women must stay home to care for the children and the house. Other villagers felt that the people should be educated by the forestry officials about the importance of forests and the effects of deforestation, and that definite forest reserve boundaries should be established. Villagers should also have a tree nursery and grow trees to replace the ones that have been removed. However, one man did not like government reforestation projects because they cut down all the natural forest and he perceived this as just another form of forest destruction which created conflict between villagers and officials.

**Ban Mae Taman**

Deforestation is a problem in Mae Taman and some villagers show both concern and understanding for the situation. In particular, the people interviewed believed most villagers recognize water levels in the Mae Taeng are the lowest in fifty years. As a result, the village has a shortage of electricity. Some villagers attribute this situation to an increasing village population and the activities of the Hilltribe people. Others suggest that it results from villagers clearing land for agriculture and rich people coming to the village to buy lumber. One woman, did not consider the cutting of trees to be a serious problem. Her main concern was the shortage of electricity, not the shortage of water. In most of the interviews, however, people thought that the cutting of trees was a problem in the village. They were also concerned about the forest, and expressed some strong views about who is responsible for the destruction.

One 25 year old woman said capitalists from the city employ villagers to cut wood. According to her, villagers get paid 100 Baht a day (other estimates go as high as 500 Baht) to cut trees and 20 Baht to transport one piece of wood. She estimates twenty trees a day are cut and is worried about the situation because they can cut trees very fast using power saws. According to another source, about a third of the people in the village cut trees. He emphasizes that the people who cut down the forest are young men around the age of twenty, who have no land and are unemployed. They go to the

forest during the day to cut mai daeng, mai pradu and mai yom for firewood, charcoal and lumber. They transport it at night so as not to get caught by the police and forestry officials. The lumber is used by villagers to build houses in the village which are later sold to people in the cities.

As in Ton Kham, building houses is a common way for people to improve their incomes. During the study, there were about ten houses under construction, which will bring an average of 60,000 to 70,000 Baht each. According to one man, two or three houses are usually sold each month to people outside the village but he is not sure if this has increased since the national ban on logging. At one time these houses were built of teak but it is too hard to find now. The two most popular trees are mai daeng and mai pradu, but now villagers must go a long ways to get mai daeng.

Some villagers sell wood directly to the wholesalers in the construction industry, while others work in cooperation with government officials, such as forestry officials and police. One man says that the officials from the forestry department, police and government of Changwat Chiang Mai are very powerful. At first a police official may threaten the capitalists with arrest but once he starts to make money from the capitalists he goes on their side. Another man suggested that even some forestry officials from the district office are involved in illegal logging and encourage villagers to cut trees. He says he is afraid because he is telling the truth about what happens here. This situation was confirmed by other respondents who indicated that government officials are

responsible for deforestation because they play and important role in supporting illegal logging.

Three men confess that they cut wood for employment. They say they feel bad about what they do but they have little choice because there are no employment opportunities in the village other than agriculture which pays so little. They are concerned about the bad effects of deforestation and worry about the future of their children. If they use their own energy, it would take much longer. They think illegal logging in Amphoe Mae Taeng is very serious, but, say that the police and the capitalists are the ones who promote the cutting down of trees. They want someone to inform the public about the corruption, but if they do, they will have no source of income. One man said he feels confused because he is caught between caring and survival. He confides:

> When I cut the tree and hear the sound of it fall and then see the water rush from it, I want to cry.

According to the villagers interviewed, the forestry officials come to the village once every couple of months. The villagers that cut down the forest are usually afraid of them because they are worried that they will be arrested for illegal logging. But a couple of people say villagers usually get away and are sometimes given advanced warning by officials that benefit from their actions. Therefore, some people think that the officials are not strict enough. One woman says she has heard of people being arrested but thought they were from other villages. Others say that when villagers are caught, the wood is confiscated but if they pay a bribe to police or

forestry officials they can get the wood back. The amount of money they have to pay depends on how much wood they have. It can range from 10,000 Baht or about 500 Baht per arm length to 60,000 to 70,000 Baht for a truck load. One woman says she is ashamed that this kind of thing happens in her village.

When asked about possible management techniques, key informants provided a number of thoughts and ideas. One individual says it is very difficult to develop a method of managing the forest because the problem people face is the need to make money. He thinks that if villagers had ownership of land they would take care of the forest, but this would only solve the problem for awhile because an increase in population will lead to more destruction. He feels that the forestry officials must be responsible for the protection of the forest because villagers do not have the authority. He strongly opposed government reforestation on the basis that:

> When they come to replant they cut down all the natural forest and plant one type of tree. That is not a forest: it is a garden. They also plant small trees that die in the dry season. If they let trees grow by themselves it is better because the soil will be better.

One woman thinks that the villagers should have more control over the forests because they would respect it more. In addition, forest management should involve the education of the people about deforestation. She thinks forestry officials and teachers should educate the people, but another woman was not sure villagers would trust officials. It was also suggested that the forest should be closed, replanted, villagers provided with a place to satisfy their needs, and

stricter laws imposed. On the other hand, the monk thought that the Phuyaiban or village leader, should control the management of the forest and thinks the Buddhist religion could play a role in educating the people and possibly ordain certain trees.

Another, man says he is not very hopeful for the future of the forest. In his opinion management is,

> [p]ossible if people are responsible for what they do but people are more interested in making money, not in preserving the forest. They will not do anything until everything is gone or there is a disaster. If they had foresight maybe they could do something.

**Ban Muang Kuad**

The majority of people interviewed said that villagers are becoming more aware of the deforestation situation because there is a shortage of water for irrigation. Years ago they used get floods but now the weather is getting hotter and they do not get enough rain. One man observed that as a result of the dry climate the land cannot absorb the water. This year the water level is the lowest he has ever seen in his fifty years of living in the village. In response to the shortage of water many people are changing their crops from lowland wet rice to upland corn. According to those interviewed, they attribute deforestation to agricultural practices and illegal logging which have resulted from landlessness and unemployment.

Currently, there are about 40 households in the village that have no land for growing crops. Of those that do have

land, most have a SK.1 or NS.3 certificate. In addition, everyone has the PBT receipts because they must pay land tax to the Amphoe office at a cost of 5 Baht/rai each year. Since the village is located in forest reserve area, people cannot obtain other forms of title. This concerns the villagers because they can only grow crops but cannot buy and sell land or use it as collateral with which to borrow money.

Unemployment also creates additional problems in the village. This year the economic situation in the village is better because of a Japanese project which employs about 100 villagers. There is also a resort being built two kilometres south of the village which presently employs about fifty people. The resort is owned by a Bangkok business man, who has 150 rai (24 ha) which he is developing into a garden resort with guest bungalows. One man says it is not a good project for the village because the people who sold their agricultural land or had it taken away, must now go to the forest reserve to clear new land to grow crops.

Villagers confirmed that illegal logging occurs in the area. One man says that the six villages most responsible for deforestation are: Muang Kuad, Mae Taman, Sop Kai, Ton Kham, Ban Huay Pu (East of Muang Kuad) and Nam Dang (NE of Muang Kuad). Another says that illegal logging occurs a lot in Ton Kham and Muang Kuad. Those participating in illegal logging in Ton Kham are about 35 percent of the village population, while in Muang Kuad it is about 40 percent. In Mae Taman, illegal logging does not occur as much; about 15 percent of the population participates. One woman thinks that if cutting

continues, the forest will be gone in less than 10 years. She is worried about the future of the village and the children.

The people interviewed generally agreed that villagers are responsible for illegal logging in the forest reserve, but that government officials and capitalists play a role too because they permit it to happen. One man thinks the main problem is unemployment so logging becomes a way to make a living. It is suggested that both old and young men engage in illegal logging and most of them are unemployed, have low educations and depend on it as a sole or supplementary income source. One man in the village says that you can hear chain saws going almost every day. If you have a power saw you can cut up to 70 pieces of lumber a day. If you sell the lumber for 45 Baht a piece you could make 3,000 Baht per day. The highest price wood is teak, mai pradu and mai daeng, however, teak is no longer available. Each piece of the other can cost 100 Baht: an average piece is 3 meters long and 20 centimetres wide.

Building and selling of houses is also a common practice in the village. If they build a house and sell it they can make 50,000 Baht and up. Villagers get the wood to build the houses by going into the forest reserve. The houses are bought by people from outside the village. There are probably ten houses being built for sale now. In 32 years one man said he has owned eight houses. His present house is made of teak which was floated down the river from Chiang Dao two years ago because teak is no longer found around this area. He thinks he can get 80,000 Baht and up for his present house which he

may sell in the near future. Another man estimates that 25 percent of the houses being built are for living and 75 percent will be sold. The house he lives in is made of mai sap (teak) which was reused from a previous house. Originally the wood was taken from the hillside across the river about seventeen years ago.

Forestry officials come to the village to investigate about every month. The villagers that cut the trees do not like them. It is not very frequent, however, that villagers get arrested, maybe a couple times a year. When people are arrested they are fined or are asked to pay a bribe. According to a couple of sources, bribes may be in the area of 20,000 Baht depending on the situation and the amount of wood they want to have returned. Some officials, however, keep the wood and sell it later to someone else. One man said he heard of a 1,000 Baht bribe for the return of a confiscated electric saw. However, if a deal is stuck between the government officials and the villagers, they will let villagers know when they are coming out. At least 50 percent of the cutting is done in cooperation with police and government officials. These officials come from the Amphoe office and also the Forestry Department in Chiang Mai.

One informant feels the forest department is not doing a good job of managing the forest. Another says he remembers the teak but confesses that you cannot find big trees any more, just little ones. "It makes me very sad because it is a beautiful tree and it makes the rain." But it is very difficult to stop the cutting and he is concerned about the

future of the children. He thinks the situation is getting worse and is angry that some officials take bribes instead of arresting people. "If the villagers cut all the trees they will have to go to the cities to work in factories."

Some of those interviewed are hopeful that the situation will change because villagers are becoming more aware of the situation. A woman suggests that since the Kumnan is concerned about deforestation he will be able to stop villagers from cutting the trees. Furthermore, in the opinion of one respondent, the villagers generally trust forestry officials because they are brought up to respect authority. He thinks though that if the government tried to implement a forest management project almost all of the villagers would cooperate except those that would lose their benefits. There is also hope if they educate the children. However, another person suggests that the police and forestry officials cannot be trusted because they try to make money instead of doing their duties. In addition, one source thinks people in the village are not concerned enough about the problem. The villagers know the effects of deforestation but they say they have no choice. "It is impossible to stop them: to stop their passion to make lots of money."

In order to manage the situation, one woman suggested that a committee of people should be established in the village to protect the forest from being cut down. The committee would have both men and women and a representative of the forestry department. The committee would be responsible for guarding the forest but she does not think it

is necessary to replant. Another woman says villagers should have more control over the resource. However, she would not like to see a reforestation program because they come in and cut down all the original tree and plant teak. She does not want teak because she wants to see a natural forest.

Five years ago on the other side of the river they planted just teak. Now a few villagers are employed to take care of trees. She thinks women should be involved in forest management and that they should get paid the same as men. Presently, men make 50 Baht a day and women 45 Baht a day. Forestry officials wanted to set up a reforestation program four years ago but villagers were afraid that they would lose their land. They also did not trust them because they thought that they would cut all the trees down and then plant small ones that would take a long time to grow.

Other villagers were not sure if local people should have more control over the forest. One felt there must first be jobs to employ the people. If they had a good income they would not have to destroy the forest. The best way to manage the forest is to try to educate the village people about the devastating effects of deforestation. The monk thinks that the Buddhist religion can play a role in educating the public. On his birthday he asks the villagers to go and plant trees around the village. He tells them good spirits live in them. But in order to improve the forest villagers must work together, with strong leadership and support from the forestry department and other government officials.

## 4.3 Observations

Observations of the physical environment around the village and human activity served to provide a better understanding of human-forest interaction at the village level. This is valuable in the description of the study area and in the interpretation of information in its regional context. The following summarizes the observations made in each of the study villages.

**Ban Ton Kham**

Ton Kham is located in a national forest reserve on the eastern slope of Huay Mae Taman valley. In the lowlands and adjacent to the river, land is used for permanent fields of soyabean, cucumber and rice. On the hillsides around the village, the mixed deciduous forest has been cleared for corn and other crops. As a result, forest area around the village has been degraded with evidence of swidden agriculture, cutting, and fire. Along the road to Mae Taman, patches of land are charred by recent fires. Fires are a traditional way of clearing forested land. This activity is usually conducted in the dry season.

Many of the houses in the village are constructed of bamboo and wood (teak and redwood), with only the temple and the school constructed with cement. According to Mittleman (1988), building construction is an indication of the economic condition of the village. Around their homes people grow fruits including: papaya; banana; lychee; longon; coconut;

pineapple; maprang (sour plum); and jackfruit. Day to day life in the village is peaceful.

Throughout the days women can be seen collecting wood, cooking, washing clothes in the creek and around their homes; making grass roofing; watching television and listening to the radio; caring for children; and going to the fields to work. Women were also seen returning from the forest with vegetables for cooking, and picking leaves from trees. Since fuelwood is the common form of fuel used in the village, it was common to see fuelwood stacked underneath the houses which are generally built on stilts. One woman was seen dragging a large branch collected from a live tree. This was interesting because most people said they did not collect firewood from live trees. Most of the fuelwood collected is used for cooking. Women tended to cook twice a day on small bucket like stoves set on the ground outside their house or in a small room in the house which was designated as the kitchen. In the morning they made sticky rice which took about 1.5 hours to cook and which was used in the afternoon and evening meals. Firewood was also used for fermenting tea, making khaw kap (rice cakes), boiling greens for the pigs, and for building fires to keep insects away from buffalo.

Men in the village were observed working in the fields collecting firewood, and building houses. Throughout the day power saws could be heard off in the forest. While in the village eight large new redwood houses were being built, some of which were considered rough construction indicating that they could be sold for lumber. One day a house that had been

sold was dissembled and loaded on a truck to be transported to Chiang Mai.

**Ban Mae Taman**

Mae Taman is located in the Mae Taeng valley and surrounded by agricultural fields leading to forested slopes. On the hillsides surrounding the village upland cropping has resulted in the clearing away of the forest. Across the river, there is evidence of recent logging. Tree stumps are dispersed amongst the vegetation and remaining tall trees with trails leading up through the open forest. To the southeast of the village, a uniform patch of trees represents a teak plantation that was planted about ten years ago. There is considerable evidence of swidden burning and, in some disturbed areas, bamboo is taking over.

The village appears to have a higher economic status than Ton Kham because there are more houses built of brick and cement. There is also more evidence of economic activity with small grocery shops and the Mae Taman rafting, company which takes tourists for buffalo cart rides past the village and on raft rides down the Mae Taeng river.

During the day women are seen carrying grass to buffalos, washing clothes in the river, working in the fields, caring for children, cutting branches off trees, cleaning homes, and collecting nuts. Men are seen working in the fields, preparing crops for transportation to market, carrying charcoal, and talking at the temple.

**Ban Muang Kuad**

Ban Muang Kuad is situated in an open area of the Mae Taeng valley. The natural vegetation surrounding the village is mixed deciduous forest but there is considerable evidence that the forest area has been degraded and in some areas completely removed for agriculture. To the south of the village there is a swamp area surrounded by degraded forest and upland crops. In all other directions, upland crops encroach on the edge of the forest. On the other side of the river from the village, there are six tobacco curing buildings which are no longer in use but could account for the level of deforestation in the area because the kilns were wood fired.

During the stay in the village, there was considerable burning on the hillsides surrounding the village and in the lowland areas. On a small knoll near the village, the whole hillside was burnt off with a couple of large trees still standing. At the base of the hill, one tree had been cut up into firewood. Near the same area, a grass and brush fire raged up the hillside. The hillside was on fire for an afternoon and smouldered for two day after. In observing the fire it appeared as if no one was tending the it or was the list bit concerned. On the other side of the village another fire blazed through a drainage where bamboo cutting had been observed the day before. Along the main road leading to the village and along the river, a couple large trees had been felled. There were also patches of cleared and burnt land beside the river and an island in the river that was completely cleared of trees. In addition, saws could be heard

on the north side of the village. Villagers were seen making charcoal in their yards.

During the day both men and women were observed harvesting soybean and thrashing corn cobs. Women were seen collecting water, tending water buffalos, cooking, bathing and washing clothes in the river, and caring for children. Older children played and spear fished in the river. Young men raced around on motorcycles, netted fish in the river, and were seen carrying large wooden planks to a house construction site.

The hillsides around the three villages are forested and to an untrained eye would appear to be in fairly good condition. On closer inspection, however, it becomes obvious that many valuable trees such as mai daeng and mai sap (teak) have been removed and in some areas thick groves of bamboo are taking over. There is also significant evidence of upland swiddens and encroachment onto forest reserves. Burning of the hillsides and the forest was common during the stay in the village because it was the dry season. The continuation of this practice will likely result in further encroachment in the future. In addition, it was obvious that with the constant sound of power saws around the village and the volume of construction underway in the village, the forests in these areas will be further degraded.

Despite these activities, the pace of life around the villages was peaceful and people tended to be open and accepting of the researcher. The daily activities of the village focused around agricultural work in the fields and

domestic work around the village. Both men and women were observed working in the fields, women cared for children and men built houses and carried firewood. Conclusively, the human-forest interaction at the village level can be considered both direct and indirect, but omnipresent.

## 4.4 Summary

This chapter has summarized the data and information collected in the three components of the research design. The analysis of responses of the total sample provided an overview of villagers impressions about forests and forest management around their villages. Variation in responses at this level of analysis lead to the comparison of responses on the basis of village location and gender. This data was supplemented by the information collected in the informal interviews and observations. The following chapter summarizes the findings and conclusions of the study and provides suggestions for the implications of the research.

# CHAPTER 5

# SUMMARY AND CONCLUSIONS

## 5.1 Summary

Thailand stands at the threshold of a critical stage in its history. As the population increases and the country surges towards an increasingly industrial based economy, it will face many environmental and socio-economic challenges. As the country's already limited forested areas continue to dwindle, it is apparent that the current forest management systems are unable to ensure the restoration of the resource and its sustainable use. As a result, unless concerted efforts are made to restructure the system and make it more applicable to local needs, those affected by environmental destruction will likely increase.

This study set out to review the emergence of deforestation as a natural resource management issue in Thailand, and to investigate how rural people in Northern Thailand perceived forest resources and their present management. The information collected in this study indicates that the majority of people in the study area realize the

ecological and socio-economic value of the forest and are aware of forest loss. The results also indicated that villagers are aware of a change in forest cover and that the resource is in a state of deterioration. In identifying the impacts of deforestation on the local environment, respondents expressed a concern for the lack of water and drew a strong connection between this problem and forest loss. They also showed a high level of concern for the current state of forest management in the country and around their villages, and acknowledged that if the current levels of degradation continue the future of their children is in jeopardy because they will likely continue to rely on the forest for their basic needs. In addition, villagers expressed anger and a sense of helplessness in bringing about a change in their situation. Of particular note was their feelings towards the activities of illegal logging and its promotion by powerful business people and influential government officials. They also felt they had little choice but to encroach on forest reserves and participate in illegal logging because they did not own land or have other viable employment opportunities.

In analyzing the data on the basis of village and gender comparisons, the results indicated marked similarities and some interesting differences. In particular, villages varied in their evaluation of the importance of forest and in their assessment of who was responsible for deforestation. This variation is likely the result of varying degrees of dependency on the resource and local influences in relation to agricultural expansion, forest encroachment and illegal

logging. Differences were also found in villagers assessment of the effects of deforestation. Again, this indicates that concern and evaluations of a particular situation can vary depending on location.

With regard to the gender comparison, men and women in the study area showed a high degree of similarity. Both genders acknowledged that deforestation was a problem around their village and within Thailand in general. They did vary however, in their evaluation of the seriousness of the situation, with men assessing it as more serious then women. In relation to forest management, women were more likely to say the forest belonged to the Royal Thai Forest Department while men thought it to be a community resource. Men also felt that the laws governing the management of the forest were not strict enough. In both cases however, men and women showed a willingness to participate in forest management programmes and in the protection of the forest, given the opportunity.

In reviewing the information collected in the three elements of the research design, it is apparent each component played a vital role in contributing to understanding the forest situation in the study area. The questionnaire survey component of the study enabled the researcher to sample a broad cross-section of people so as to acquire a representative sample from the area. It provided an overview of local people's attitudes and perceptions of the forest resources in the north and gave some indication of their impressions of the current management system. It was cost

effective and allowed for uniform data collection in a situation where a language barrier and cultural traditions could have created response biases. The disadvantage of this method for collecting information on peoples attitudes and perceptions is that these concepts are often hard for the respondent to express. A questionnaire therefore provides them with a simplified version of their views and impressions. Notwithstanding this disadvantage, the questionnaire allowed the researcher to identify other key issues that could be investigated in greater detail during the informal interviews.

The interviews with key informants in the villages afforded an opportunity to discuss in greater dealt, issues identified in the questionnaire survey. Thus, interviews made a major contribution to understanding local views and concerns about the current forest situation. Where respondents may have had difficulty expressing the causes of deforestation and their perception of the situation, more time was spent probing for ideas about forest management and connections between certain activities and deforestation. Informal interviews were particularly useful in obtaining more information about illegal logging activities, and the reasons for forest encroachment. For example, in the questionnaire survey, illegal logging did not appear to be as prevalent or as upsetting as was indicated in the interviews. In addition, through the interviewing process one comes to realize that forest encroachment results not only from a lack of cultivatable land and a growing population, but also from the control of land by land merchants and the increase in cash

cropping. These interviews also revealed more about how people felt about the forest and economic situations around their villages. It allowed them to express anger and, in some cases, regret and a sense of helplessness. The drawback of this form of data collection is the summary of information and statistical analysis. Since interviews and responses vary considerably between respondents the identification and summary of common ideas and attitudes is a timely process. In addition, conducting interviews through translation takes a great deal of time and patience.

As the final level of inquiry, observations of the local environmental and socio-economic conditions of the villages contributed a general awareness of the village lifestyle and the current state of the forests in the area. Through several visits to the study area, it became apparent that the forest conditions in the area are becoming increasingly degraded. Village conditions and activities also provided an indication of the economic status of the villages. Therefore, observations provided the context in which to place the information, as well as interpret and present it. To analyze the data collected in the first and second components without spending time in the area would have lead to the misinterpretation of some information.

## 5.2 Conclusions

Deforestation in developing countries of the world poses a serious threat to the welfare of those who depend upon them for their survival. In Thailand, the growing landless

population has little choice but to encroach on forest reserve land for agricultural practices and illegal logging. Since many of the previous and existing forest management policies have been ineffective at dealing with the continual loss of forest, there is a growing awareness for the need to make management of the resource more locally based. In order to do this effectively, there is a need to understand the concerns and needs of local people more fully.

This study provides a useful example of how complementary research techniques can be applied to the investigation of human-forest interactions in the context of developing a better understanding of environmental perceptions. By using a variety of techniques to collect information a clearer picture of the situation can be acquired. If the research had simply relied upon the questionnaire, many valuable insights would have been missed. This is particularly true for the information on the causes of deforestation and the feelings of individuals towards appropriate management systems. In the questionnaire, only a few people provided alternative management ideas while the informal interviews were able to the tap into the creative and knowledgeable minds of the local people more effectively. Furthermore, the element of observation was vital to bringing the information together and for providing the researcher with a gestalt view of the issues. It is therefore believed that this type of research design provides a useful format on which to base research strategies in other developing countries.

The experience gained in this study also provides an opportunity to comment on both the formulation of the research design and investigation process. First, and foremost is the importance of language training where contact with local people is an integral part of the research assignment. People in the villages and government officials were overwhelmingly appreciative of attempts to communicate with them in their language. It is also important to spend time in the villages getting to know the villagers and their way of life in greater detail. While short-term visits and day trips are useful, they should not be the sole basis of contact. Longer visits enable the researcher to become more sensitive to the local situation and also allows more time for the villagers to feel comfortable with the researcher. If possible it would also be suggested that greater emphasis be placed on informal interviews. Although by far more time consuming, these interviews played an important role in providing indepth information into the perceptions of the people. Subsequently, the foundations of forest conservation and management strategies must be based on strong social objectives which address both the needs and concerns of local people. In order to do this, it is imperative to find out what people want, not speculate on what they want or think they ought to want.

As a contribution to future management of the resource, this study can offer some insight into possible approaches. First it is necessary to investigate the current environmental condition of the forest and to determine how local people perceive both its use and management. It is at this stage

where geographic research into human-forest interactions and environmental perception can make a valuable contribution. Once an understanding of the local situation is established, local conservation and management strategies can be identified. In this process both men and women should be involved as each party will provide a different perspective on the situation depending on their social role within the family and the community. The next stage would be to implement an education programme to develop a better understanding about the functions of the forest and the long-term benefit of its conservation and management. Finally, a management committee consisting of villagers and officials from various government agencies could work together in problem identification and solution. Ultimate control and benefit of the management programmes, however, should focus on the community. In doing so, it could provide both an alternative to forest encroachment and more viable employment opportunities.

Although many attempts have been made to control and counter deforestation in Thailand, much of it has had little impact on the situation. This is because the attempts to control the onslaught of destruction, have been at best cosmetic, only scraping the surface of the real problem and serving the needs of an ever-growing industrial economy. As a result, reforestation has fallen behind forest destruction, landless people push farther into the forest, and illegal loggers and influential business people turn a fast Baht while opportunistic and threatened officials turn a blind eye.

To many, the clearing of forests is a matter of survival and the desire for a better life. It is therefore obvious, the solution to the emerging problem of deforestation in Thailand will require a number of changes in the present approach to management. First, it will be necessary to adopt a holistic rather than a fragmented view of the problem. Instead of deforestation being considered in isolation from human problems they must be considered together. Only when those that depend on the forest at the local level have greater control over the destiny of their futures will the forests of Thailand have some hope of survival.

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## APPENDIX I

## FOREST USE AND MANAGEMENT QUESTIONNAIRE

**Questionnaire Number**_____
**Village**_____
**Gender** _____
**Interviewer's Name**_____
**Date of Interview**_____

---

1. a) What does your family use the forest for?

| | | Own Use | Item Sold |
|---|---|---|---|
| 1) | Fuelwood | _____ | _____ |
| 2) | Charcoal | _____ | _____ |
| 3) | Wood for construction | _____ | _____ |
| 4) | Wild vegetables (including mushrooms) | _____ | _____ |
| 5) | Wild fruits | _____ | _____ |
| 6) | Medicinal plants | _____ | _____ |
| 7) | Fodder | _____ | _____ |
| 8) | Wild animals (including snakes) | _____ | _____ |
| 9) | Insects | _____ | _____ |
| 10) | Water supply | _____ | _____ |
| 11) | Other _____ | _____ | _____ |

b) Among the above eleven categories of things obtained from the forest please indicate (with check) the ones you are directly responsible for collecting and/or selling.

2. How important is the forest for:

| | very import. | somewhat import. | not import. | Do not Know |
|---|---|---|---|---|
| a) Family income | _____ | _____ | _____ | _____ |
| b) Water supply | _____ | _____ | _____ | _____ |
| c) Preventing soil erosion | _____ | _____ | _____ | _____ |
| d) Preserving wildlife habitat | _____ | _____ | _____ | _____ |
| e) Soil fertility | _____ | _____ | _____ | _____ |
| f) Building materials | _____ | _____ | _____ | _____ |
| g) Firewood | _____ | _____ | _____ | _____ |
| h) Charcoal | _____ | _____ | _____ | _____ |
| i) Food | _____ | _____ | _____ | _____ |
| j) Family health | _____ | _____ | _____ | _____ |
| k) Farming | _____ | _____ | _____ | _____ |

3. a) Do you think there is enough forest to support the needs of your village?

1) Yes ____ 2) No ____ 3) Do not know ____

If no, why not?_____

4. a) Over the last couple of years do you think the total forested area in your village has become:

1) Less _____
2) No change _____
3) More _____
4) Do not know _____

b) How serious do you think the loss of forest is around your village?

1) Very serious _____
2) Somewhat serious _____
3) Not at all serious _____
4) Do not know _____

c) Who do you think is the most responsible for contributing to the loss of forests around your village?

1) Villagers _____
2) Illegal loggers _____
3) Commercial loggers _____
4) Charcoal producers _____
5) Tobacco curers _____
6) Other (specify) _____

d) What kind of impact could a loss of forest have on the local community?

1) Increased incidence of floods _____
2) Shortage of water _____
3) Shortage of building material _____
4) Shortage of fuelwood _____
5) Do not know _____
6) No change _____
7) Loss of family income _____
8) Other _____

5. a) Have you heard about the loss of forest in other parts of Thailand? 1) Yes ____ 2) No ____

b) If yes, how did you hear about it?

1) Radio _____
2) Television _____
3) Newspaper _____
4) Neighbour _____
5) Kamnan/Phuyaiban _____
6) Other (specify) _____
7) Cannot recall _____

c) Do you think deforestation is a serious problem for Thailand?

1) Yes _____ 2) No _____ 3) Do not know _____

6. Do you think that the following contribute to the loss of forests in Thailand?

| | Yes | No | Don't know |
|---|---|---|---|
| 1) Illegal logging | ____ | ____ | ____ |
| 2) Shifting cultivation | ____ | ____ | ____ |
| 3) Fuelwood use | ____ | ____ | ____ |
| 4) Farming in forest reserves | ____ | ____ | ____ |
| 5) Building of roads and dams | ____ | ____ | ____ |
| 6) Commercial logging | ____ | ____ | ____ |
| 7) Charcoal production | ____ | ____ | ____ |
| 8) Other_____ | ____ | ____ | ____ |

7. Who do you think owns the forests?

1) Forestry department ____
2) Tambon council ____
3) Amphoe officials ____
4) Village people ____
5) Private industry ____
6) Other (specify)_____

8. How well do you think the government is managing the forests around your village?

1) Good ____ 2) Fair ____ 3) Poor ____
4) Do not know _____

9. a) Are there laws in Thailand to protect the forest?

1) Yes ____ 2) No ____ 3) Do not know ____

b) If yes, do you think that the laws to manage the forest are:

1) Too strict _____
2) About right _____
3) Not strict enough _____
4) Do not know _____

10. Do you think the villagers should manage the forest?

1) Yes ____ 2) No ____ 3) Do not know ____

If yes, who should be involved?

1) Men _____
2) Women _____
3) Both _____

11. a) Do the people in the village have contact with forest officials? 1) Yes _____ 2) No _____

If yes, would you say the relationship is:

1) Good _____
2) Fair _____
3) Poor _____

b) Do you personally have contact with forest officials?

1) Yes _____ 2) No _____

If yes, would you say the relationship is:

1) Good _____
2) Fair _____
3) Poor _____

12. Should the government plant more trees in your village?

1) Yes _____
2) No _____
3) Do not know _____

13. a) Do you think women in the village should organize to protect the forest around your village?

1) Yes _____ 2) No _____ 3) Do not know _____

If yes, do you think they should:

| | Yes | No | Don't know |
|---|---|---|---|
| 1) Reduce fuelwood use | _____ | _____ | _____ |
| 2) Plant trees | _____ | _____ | _____ |
| 3) Use different fuel | _____ | _____ | _____ |
| 4) Other (specify) | _____ | _____ | _____ |

b) Do you think women should be included in forest management programs?

1) Yes _____ 2) No _____ 3) Do not know _____

14. a) If the government wanted you to plant 50 trees a year and provided you with the trees would you plant them?

1) Yes _____ 2) No ____

If no, why not?_____

If yes, where would you plant the trees:

1) On your own land _____
2) On your rented property _____
3) In the forest reserve _____
4) In a community forest _____
5) Other (specify)_____ _____

If yes, what kind of trees would you like to plant?

_____

15. a) What do you use for fuel?

1) Firewood _____
2) Charcoal _____
3) Other _____

b) If firewood, how do you get it?

1) buy ____
2) collect/gather ____
3) other (specify) _____

(c) Where do you collect firewood from?

1) Your property _____
2) Forest Reserve _____
3) Public land _____
4) Neighbour's land _____
5) Other_____

(d) How far do you go to collect firewood? _____km

(e) In the last five years has the distance you travel to collect firewood become:

1) Further _____
2) No Change _____
3) Closer _____

(f) How do you transport the wood?

1) Walk _____
2) Cart _____
3) Truck _____
4) Bicycle _____
5) Other _____

(g) Is firewood collected from:

1) Live trees ____
2) Dead trees ____
3) Other_____ ____

(h) In your household, who is responsible for firewood collection?

1) Women ____
2) Men ____
3) Girls (under 15 yrs.) ____
4) Boys (under 15 yrs.) ____
5) Both men and women ____
6) All of the above ____

(i) Which group would you say is the most responsible for firewood collection?

1) Women ____
2) Men ____
3) Girls (under 15 yrs.) ____
4) Boys (under 15 yrs.) ____
5) Both men and women ____
6) All of the above ____

(j) Is the collection done:

1) Individually ____
2) Family ____
3) Communally ____
4) Other (specify) _____

(j) Do you enjoy collecting firewood?

Yes _____ No _____ Do not know _____

16. (a) Would you say present supply of firewood around your village is:

1) Abundant ____
2) Sufficient ____
3) Scarce ____

(b) Do you think this will change in the future?

1) Yes ____ 2) No ____ 3) Do not know ____

If yes, how?_____

17. Do you think the collection of firewood decreases the area of forest?

    1) Yes _____ 2) No _____ 3) Do not know _____

    If yes, will the forest eventually disappear?

    1) Yes _____ 2) No _____ 3) Do not know _____

    If no, why not? _____

18. Do you think there is a need to reduce firewood use to protect the forest?

    1) Yes _____ 2) No _____ 3) Do not know _____

    If no, why not?_____

19. What is the best way to ensure adequate supplies of firewood?

    1) Replanting _____
    2) Intercropping _____
    3) Use fuel efficient stoves _____
    4) Use alternative fuels _____
    5) Other (specify) _____
    6) Do not know _____

20. Do you think that charcoal production decreases the area of the forest?

    1) Yes _____ 2) No _____ 3) Do not know _____

**PERSONAL AND HOUSEHOLD CHARACTERISTICS**

21. Marital status

    1) single ____
    2) married ____
    3) divorced ____
    4) separated ____
    5) widowed ____

22. How old are you? _____

23. How many years of education have you completed? _____

24. How many people are in your household? ____

25. How much land does your family own? ____ rai

26. What type of land certificate(s) does your family have?

1) S.K.1 _____
2) N.S.3 _____
3) N.S.3(a) _____
4) Tra Jong _____
5) Chanode _____
6) Other (specify) _____

27. Do you personally have title to land?
1) Yes _____ 2) No _____

If yes, how many rai? _____

If yes, what type of land tenure? _____

28. How do you earn your income?_____

What is your annual family income? (please estimate)
_____Baht/year

Do you earn any money doing the following:
1) Off-farm labour _____
2) Handicrafts _____
3) Sale of firewood _____
4) Sale of items from forest _____
5) Other_____

29. a) How many years have you lived in this village?____

30. In your household, who is responsible for:

| | Men | Women | Both |
|---|---|---|---|
| 1) Financial Management | _____ | _____ | _____ |
| 2) Planting crops | _____ | _____ | _____ |
| 3) Harvesting crops | _____ | _____ | _____ |
| 4) Deciding what to plant | _____ | _____ | _____ |
| 5) Housework | _____ | _____ | _____ |
| 6) Cooking | _____ | _____ | _____ |
| 7) Collecting water | _____ | _____ | _____ |
| 8) Firewood | _____ | _____ | _____ |
| 9) Caring for children | _____ | _____ | _____ |
| 10) Decisions about family | _____ | _____ | _____ |

# APPENDIX 2

## WATERSHED CLASSIFICATION AND LANDUSE

### Watershed Class 1: Protected or Conservation Forest

This area is to be carefully preserved as the catchment area for the headwaters of rivers. Since it is sensitive to environmental changes such as the use of land for agriculture, it is to remain in its natural state. The value index of this watershed level is calculated from an algebraic equation which is based on the physical characteristics of landscape, namely elevation, slope, landform, geology, and soils. This watershed classification is divided into two levels which are described as follows:

**1A** Class 1A includes areas of protected forest and headwater source areas, usually at higher elevations with very steep slopes. These areas still remain under permanent forest cover. Watershed classification 1A is the area where the forest has been retained in perfect condition since 1982. It is to be preserved as a watershed catchment area.

**1B** Class 1B are areas having similar physical features and environments as Watershed Class 1A, but where portions of the area have already been cleared for agricultural use or occupied by villages. These areas require special soil conservation protection measures and, where possible, should be reforested. In these areas almost all of the forest area was destroyed, occupied and changed for land development before 1987. The use of land and any kind of development should be strictly controlled.

### Watershed Class 2: Commercial Forest

Class 2 comprises areas of protected and/or commercial forest. For the most part, these areas are located at higher elevations, with steep to very steep slopes. Landforms are less erosive than in Watershed Classes 1A or 1B. Areas may be used for grazing or for certain crops. Soil protection measures are required.

**Watershed Class 3: Fruit Tree Plantations**

Class 3 covers upland areas with steep slopes and less erosive landforms. These areas are usually used for fruit tree plantations or certain agricultural crops, and may be used for commercial forests, grazing or other uses. They require soil conservation measures.

**Watershed Class 4: Upland Farming**

Class 4 describes areas of gently sloping lands, suitable for row crops, fruit trees, and grazing with a moderate need for soil conservation measures. In many areas, this forest land has been encroached upon for agricultural purposes.

**Watershed Class 5: Lowland Farming**

Class 5 groups gently sloping to flat areas, used for paddy fields or other agricultural uses, with few restrictions. In many cases this area has been encroached upon for agricultural practices. The forest generally consists of plains and hills with sparse vegetation cover.

**SUGGESTIONS AND RULES FOR THE USE OF LAND IN WATERSHED AREAS**

**1A** Forests in this area should not be changed but should be preserved in their natural state for watershed catchment protection.

All organizations involved in the protection of these areas must work together to stop deforestation, preserve natural ecosystems, and prevent forest encroachment.

The changes in land use since 1982 were to follow the rules listed below:

- If any area which is set to be classified as 1A is found uninhabited and degraded, the relevant organizations must proceed reforestation.
- If any area which is set of be classified as 1A is already permanently inhabited, the relevant forest management organizations must proceed with establishing a form of land tenure so that inhabitants will not encroach into other areas.

**1B** Any area which has been altered due to various activities such as agriculture, should be managed according to established social, economic and environmental policies.

If an area is developed as a resort, land must be used in a way which is not harmful to the environment.

If there is any area which is not appropriate for agriculture or other forms of development, the related government organization must proceed reforestation immediately.

In the case of road building or mining, measures must be taken to control the use and condition of soil in the area so that fish habitat and water quality will be preserved and people can use water.

If the government has no choice to avoid using that land, a analysis of the impacts and a report must be sent to the National Environment Board.

**2** When areas are used by the forestry and mining industries, controls must be followed in order to prevent disasters which may occur in the headwater and lowland areas.

In deforested areas, related organizations must proceed with reforestation. Areas must not be used for agriculture.

**3** In these areas, agriculture, forestry, mining and other industrial practices are permitted but must be strictly controlled in order to preserve the land and water resources.

When land is used for agriculture it must follow the directions and guidelines established to insure proper use. Areas with deeper than 50 cm. of soil may be used for growing economic trees, however, planting must be controlled to insure water use. If and area has less than 50 cm. soil, it is not appropriate for agriculture. It is better to use the land for animal grazing or livestock range.

**4** This land can be used by the mining and forestry industries, but, must follow designated laws.

If the land is used for agriculture, the users must follow specific guidelines. The areas with a slope between 18-25 percent and depth more than 50 cm. are best for growing trees, however, this land must be used with care. The areas with a slope between 6-18 percent should be used for growing crops or rice.

**5** In these areas, mining, agriculture, forestry, and other industrial activities are allowed.

If the land is used for agriculture, the users should follow the specific directions. For areas with a soil depth of less than 50 cm., it is best to use the land for growing trees, livestock or establishing resorts. For areas with a soil depth of greater than 50 cm. it is best to grow rice and crops.

If the land is used for industry, it is best to avoid areas which have high agricultural value.

Sources: UNEP, 1988. Sustainable Development of Natural Resources: A Study of the Concepts and Applications of His Majesty the King of Thailand. Bangkok: UNEP. pp. 68.

TDRI. 1987. Thailand Natural Resources Profile. ed. by Arabhabhirama, Anat et al. Bangkok: Thailand Development Research Institute. pp. 85-86.

## APPENDIX 3

## DRY MIXED DECIDUOUS FOREST

Elevation: Scattered in higher and lower elevations
Soil Types: Colluvial, sandy loam or lateritic
Annual Rainfall: 600-1,000 mm
Structure: Two-storied

### UPPER STORY

**Trees** Tectona grandis (teak), Xylia kerrii, and others, including Acacia leucophloea, Albizzia lebbedoides, A. procera, Bombax albidum, Dalbergia bariensis, D. cultrata, D. dongnaiensis, D. nigrescens, Dialium cochinchinensis, Lagerstroemia balansae, L. calyculata, L. macrocarpa, Pentacme burmanica, Pterocarpus macrocarpus, Shorea talura, Spondias pinnata, Terminalia alata, T. bellerica, T. chebula, T. corticosa, Xylia xylocarpa.

### LOWER STORY

**Trees** Dalbergia ovata, Millettia brandisiana, and others, including Casearia grewiaefolia, Croton oblongifolius, Diospyros chretioides, Grewia paniculata, Mallotus philippinensis, Phyllanthus embilica, Pterospermum semisagittatum, Strychnos nux-vomica, Vitex limonifolia

**Shrubs** Memecylon, Helicteres

**Others** Clerodendrum, Evodia, Grewia, Indigofers, Lespedeza, Micromelum, etc.

**Bamboo** Bambusa spinosa, Gigantochloa alblciliata, Thyrostachys siamensis

**Epiphytes** Orchids: Aerides sp., Coelogyne sp., Dendrobuium sp., Sarcanthus sp. Others: Dischidia sp., Hoya sp.

### GROUND FLORA

Crotolaria sp., Desmodium sp. and others, including Barleria sp., Borreria sp., Brachycorythes sp., Clitoria sp., Derris sp., Eragrostis sp., Euphorgia sp., Hidyotis sp., Lygodium sp., Selaginella sp., Setaria sp., Uraria sp., Zornia sp.

**MODIFICATIONS AND SPECIAL SUBTYPES**

Along ridges between 300 and 500 meters, the forests are more open due to high evaporation, excessive exposure, extensive surface erosion, and much leaching of the soil; under these conditions xerophytic species are found such as Dipterocarpus obtusifolius, D. tuberculatus, Pentacme siamensis, Shoria obtusa.

**ECONOMIC VALUE**

Great potential because of abundance of commercial species, including teak, Xylia kerrii, X. xylocarpa, Pterocarpus macrocarpus, Lagerstroemia spp., Anogeissus acuminata, Afzelia xylocarpa, Dalbergia cutrata, D. oliveri (rosewood), Adina cordifolia, and many others; bark of Terminalia tripfolia, and many others; bark of Terminalia tripteroides and Pentacme burmanica is collected for local consumption; mucilage-yielding bark of Machilus sp. is collected for a basic component in manufacture of joss sticks and for caulking coffins; ropes and cordage are made locally for fibrous bark of Sterculia sp.; fruits of Terminalia chbula and T. bellerica are collected for medicine and sold in urban markets; bamboos, including Bambusa tulda and Dendrocalamus membranaceus, are used in construction of wicker work; Derris elliptica is used locally as an insecticide and sold in the market, D. scandens is collected for medicine.

Source: Smitinand, Tem et al. 1978. "The Environment of Northern Thailand," in Farmers in the Forest. ed by Peter Kunstadter et al. Hawaii: East-West Center. pp. 36-37.

# APPENDIX IV

## LAND CODES AND LAND TENURE

### 1. Occupation

**SK.1** This is a 'Claim Certificate' used to report occupation. It is issued by oral application and is issued as a basis for tax assessment and administration. It grants no rights of ownership, its purpose being to register land prior to implementation of the Land Code where no documents existed, but is not mentioned in the land code. Often used by farmers as evidence of ownership.

**NS.2** 'Pre-emption Certificate' or reserve licence, also known as Bai-Chong. This shows authorization of temporary occupancy of land acquired by squatting. The certificate expires after three years, where upon development of the land must be carried out within six months. Certificate holds right of inheritance and transfer, though the latter is not clear.

### 2. Utilization

**NS.3** Certificate of Development, or Exploitation Testimonial also known as NS.3 (Nor-Sor-Sarm) and NS.3 (Nor-Sor-Sarm-Kor). This is issued on the submission of NS.2 to the district officials and on the verification that use has been made of the land, but issuance is limited to land where title deeds can eventually be given. It has rights of inheritance and transfer, though the latter is not clear.

### 3. Legal Ownership

**NS.4** Legal possession documented in an unrestricted title deed or Chanode. Before this can be issued by an office of Department of Lands, the land must be cadastrally surveyed and boundaries marked. This designates ownership and possessory rights, and can be sold, transferred and legally mortgaged.

**4. Other**

**PBT** A tax certificate not recognized as legal title used by landless farmers to demonstrate occupancy. In Thailand, tax is collected on most legally and illegally occupied land. Most squatters are prepared to pay in hope that it will assist them in obtaining tenure at a later date.

Sources: Chuntanaparb and Wood, 1986:85; and Feder et al. 1988(a):10-19.

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