

A Study on Contract Tree Farming in Thailand

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タイにおける契約造林に関する研究

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Content

	Page
Table of Contents	1
List of Tables	4
List of Figures	4
Acronym	6
Acknowledgments	6
Introduction	7
1. Background of the Study	7
2. Past Studies of Tree Farming and Contract Tree Farming	8
3. Purpose and Method of the Study	9
PART I EVOLUTION OF CONTRACT TREE FARMING IN THAILAND	
Chapter 1 Processes and Results of Deforestation and Forest Degradation	
1. Deforestation and Forest Degradation	11
1) Traditional Land-use	11
2) Deforestation Process	12
2. Problem Solving in Deforestation and Forest Degradation	15
1) Forest Protection	15
2) Resettlement of Dwellers in the Forests	16
3) Reforestation	17

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4) Economic Forest Plantation	18
Chapter 2 Tree Planting Promotion	
1. Tree Planting Program Evolution	24
1) Traditional and Common Practices	24
2) Extension Approaches in Tree Planting Program	25
3) Promotion of the Private Tree Planting Programs	27
2. Policy Advocacy and Law Amendment	31
1) Amendment of Existed Policies and Laws	31
2) Formulation of New Policy and Law	33
3. Supporting Programs	34
1) Pilot Project on Participatory Forestry Extension	34
2) The Re-afforestation Campaign	35
Chapter 3 Tree Farming	
1. Integration of Tree Farming	36
1) Tree Farming for Local and Industrial Uses	36
2) Characteristics of Trees in Tree Farming	40
3) Socioeconomics of Tree Farming	41
2. Tree Farming System	43
1) Definitions and Characteristics of Tree Farming	43
2) Tree Farming Systems and Management	43
3) Agroforestry as an Alternative to Tree Farming Management	46
3. Policies and Extension Programs	48
1) National Policy and Plan	48
2) Thailand Forestry Sector Master Plan (TFSSMP)	48
3) Extension Programs	49
Chapter 4 Contract Tree Farming	
1. Contract System Evolution in Agriculture and Forestry	52
1) Contract System Evolution	52
2) Contract Farming Characteristics	54
2. Development of Contract Tree Farming	59
1) Definition and Characteristics	59
2) Evolution	61
3) Involvement of Business in Contract Tree Farming	64
3. Forest-Related Industry	67
1) Demand Incentive in Tree Products	67
2) Wood-based Industries	69

3) Company Involvement in Tree Farming/Contract Tree Farming	70
4) Overview of Four Selected Companies' Promotion Areas Related to CTF in Thailand	73
PART II CASE STUDIES ON CONTRACT TREE FARMING	
Chapter 5 An Analysis of CTF by the Agrolines Company——	
The Case Study of Baan Moo Song, Chachoengsao Province	
1. Features of the Company	75
2. Contract Agreement and Its Characteristics	77
3. Area Regional Analysis-Baan Moo Song	79
4. Farmer Side Analysis	83
5. Problems and Prospect	86
Chapter 6 An Analysis of CTF by the Siam Forestry Company——	
The Case Study of Baan Moo Sam, Ratchaburi Province	
1. Features of the Company	88
2. Contract Agreement and Its Characteristics	91
3. Area Analysis-Baan Moo Sam	93
4. Farmer Side Analysis	97
5. Problems and Prospect	103
Chapter 7 An Analysis of CTF by the Thai Plywood Company——	
The Case Study of Baan Moo Kao, Uthai Thani Province	
1. Features of the Company	105
2. Contract Agreement and Its Characteristics	106
3. Area Analysis-Baan Moo Kao	111
4. Farmer Side Analysis	115
5. Problems and Prospect	120
Chapter 8 An Analysis of CTF by the Phoenix Pulp & Paper Company——	
The Case Study of Baan Kam Bon, Khon Kaen Province	
1. Features of the Company	122
2. Contract Agreement and Its Characteristics	123
3. Area Analysis-Baan Kam Bon	132
4. Farmer Side Analysis	136
5. Problems and Prospect	142
CONCLUSIONS	144
REFERENCES	147

List of Tables

No.	Page
I - 2 - 1	Approaches in Forestry Extension27
I - 3 - 1	Tree Farming Systems in Thailand44
I - 3 - 2	Application Form for Farmer to Join the Government Tree Planting Program51
I - 4 - 1	Example of Agreement to Buy or Sell Agricultural Product56
I - 4 - 2	Memorandum of Understanding between Farmers and the Project for Commercial Fast-Growing Tree Promotion.....57
I - 4 - 3	Contract Systems in Tree/Forest Establishment61
I - 4 - 4	Some Selected Companies, Production Capacity and Input Materials for Thailand's Paper Pulp Industries in 1993.....69
I - 4 - 5	Wood Pulp and Paper Companies Promoted by the BoI71
II - 5 - 1	Agreement of the Agrolines Company, Form SS. 10 (2)78
II - 5 - 2	Costs and Profits Estimation of CTF, Chachoengsao Province84
II - 6 - 1	Promotion Criteria and Agreement of the Siam Forestry Company91
II - 6 - 2	Costs and Profits Estimation of CTF, Ratchaburi Province99
II - 7 - 1	Contract Agreement of the Thai Plywood Company107
II - 7 - 2	Costs and Profits Estimation of CTF, Uthai Thani Province.....120
II - 8 - 1	Contract Agreement of the Phoenix Company for Eucalyptus125
II - 8 - 2	Contract Agreement of the Phoenix Company for Bamboo127
II - 8 - 3	Agreement of the Phoenix Company on Selling/buying on Credit130
II - 8 - 4	Cost and Profits Estimation of CTF, Khon Kaen Province139

List of Figures

No.	Page
I - 1 - 1	Map of Thailand Showing Existing Forests in 199113
I - 1 - 2	Changes of Land Use and Population15
I - 1 - 3	Forest Plantation Areas of the RFD19
I - 1 - 4	Forest Plantation Areas by Objectives21
I - 2 - 1	Change of Prices of Some Cash Crops and Woodchips29
I - 2 - 2	Agroforestry Extension Development Framework30
I - 3 - 1	Factors Influencing Farmer's Incentives to Grow Trees37

I - 4 - 1	A Framework for CTF Development	62
I - 4 - 2	Roundwood Requirements for Various Wood Products	68
II - 5 - 1	Location of the Study Area in Chachoengsao Province	80
II - 5 - 2	Contract Tree Farmers by Age Classes, Education, Land Tenure, and Sizes of Land Holdings, Baan Moo Song, Chachoengsao Province.....	85
II - 5 - 3	Processes of Contract Tree Farming Development in Baan Moo Song, Nong Mai Kaen, Chachoengsao province	86
II - 5 - 4	Contract Tree Farming at Sanam Chai Khet, Chachoengsao Province.....	87
II - 5 - 5	Tree Harvesting at the First Rotation, Chachoengsao Province	87
II - 6 - 1	Location of the Study Area in Ratchaburi Province	95
II - 6 - 2	Contract Tree Farmers by Age Classes, Education, Land Tenure, and Sizes of Land Holdings, Baan Moo Sam, Ratchaburi Province.....	101
II - 6 - 3	Processes of Contract Tree Farming Development in Baan Moo Sam, Ratchaburi Province	102
II - 6 - 4	Association of Crop (maize) and Fast-growing trees (casuarina)	102
II - 6 - 5	Tree Cutting at the First Rotation of CTF in Ratchaburi Province	103
II - 7 - 1	Location of the Study Area in Uthai Thani Province	112
II - 7 - 2	Contract Tree Farmers by Age Classes, Education, Land Tenure, and Sizes of Land Holdings, Baan Moo Kao, Uthai Thani Province	117
II - 7 - 3	Processes of Contract Tree Farming Development in Baan Moo Kao, Lan Sak, Uthai Thani Province	118
II - 7 - 4	Tree Farming Areas under CTF of Thai Plywood Company in Uthai Thani Province	118
II - 7 - 5	Tree Farm After First Cutting for Six Months in Uthai Thani Province	119
II - 8 - 1	Location of the Study Area in Khon Kaen Province.....	133
II - 8 - 2	Contract Tree Farmers by Age Classes, Education, Land Tenure, and Sizes of Land Holdings, Baan Kam Bon, Khon Kaen	138
II - 8 - 3	Processes of Contract Tree Farming Development in Baan Kam Bon, Khon Kaen Province	140
II - 8 - 4	Contract Tree Farming with Fast-Growing Tree in Khon Kaen Province	141
II - 8 - 5	Contract Tree Farming with Bamboo (<i>Dendrocalamus asper</i>) in Khon Kaen Province	141

ACRONYM

ALRO	Agricultural Land Reform Office
BAAC	Bank of Agriculture and Agricultural Cooperatives
CTF	Contract Tree Farming
CF	Contract Farming
DLD	Department of Land Development
DFO	District Forest Office
FIO	Forest Industry Organization
GDP	Gross Domestic Product
IRR	Internal Rate of Return
MOAC	Ministry of Agriculture and Cooperatives
NESDB	National Economic and Social Development Board
NESDP	National Economic and Social Development Plan
OAE	Office of Agriculture and Economics
PFO	Provincial Forestry Office
RFD	Royal Forest Department
S.T.K.	Sor Tor Kor or Usufructory rights, or Right for cultivation
TF	Tree Farming
TFSMP	Thailand Forestry Sector Master Plan

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Introduction

1. Background of the Study

The tropical forest is one of the most important economic and biological resources providing various kinds of products and materials for people's livelihood, economic activities, and industries. In addition, it is essential for protection of the environment as well as being the home for indigenous communities. Natural forest provides various kinds of forest products used in medicine, agriculture, and industry as well as timber. The forest also helps in protecting ecosystem, preventing soil erosion and downstream silting, regulating drainage basin hydrological processes and influencing climate on the local, regional and even global scales. The decline of the forest reflects human disturbance of the forest habitat. So, the loss of remaining forests enormously affects economic, environmental and social aspects of the community. Forest decline comes in two forms, that is, degradation and depletion. Degradation involves the complete loss of forests, which might be cut down and replaced by open woodland or agriculture. The loss for some purposes are permanent. Depletion involves critical changes in the forest ecosystem, but not complete removal. Some plant and animal species are lost, but the forest remains. Natural regeneration can re-establish the forest ecosystem if given a long enough period without further depletion. However, some areas where land has long been used for other land use has little chance for natural regeneration. Tree planting was widely extended to allocated farmland of various government land allocation projects.

Thus, various forms of tree planting are needed. The government of Thailand has managed reforestation for half a century, but it has not succeeded because of various factors. Among them are a slower rate of reforestation than of deforestation. Under the National Economic and Social Development Plans (NESDPs), the Government set up many programs to acceler-

ate the reforestation process. The private sector also plays a very important role in developing alternative enterprises. They change policy and production targets by diversifying products and markets, increasing investment in the wood and paper and paper pulp industries, and creating production promotion systems for their own raw material. Consequently, more farmers plant more trees on farmland. Companies which face high competition try to maintain supplies of materials by using contract agreements to encourage farmers to participate in tree farming and sell their trees to the company. Many companies provide farmers with free tree seedlings to motivate farmers to grow trees and sell them back to the company.

In Thailand, there are few viable tree farm operations managed solely by farmers without subsidies from the Government, such as the man-made mangrove forest farming at Samut Songkhram Province and bamboo plantations for cottage industry in many parts of central Thailand. However, such farming is threatened at present and ultimately might not be able to survive since the farmers cannot earn enough for their families and are not supported by the government. As a result, they must convert their tree farms into prawn farms or cultivate crops for export, etc. with very little assistance from the government since the government emphasizes new products for export.

2 . Past Studies of Tree Farming and Contract Tree Farming

In the past, the study of tree planting in Thailand focused on the search for appropriate tree species for forest plantations under various types of management. The studies were mostly made in government forest plantations or in village woodlots, most of which were planted on forest land or public land, such as the studies of Sahunalu et al (1995) and Chumreonpruk (1994), which focused on yield and management aspects of forest plantation; Huamuangkeaw (1990) and Kongekapop (1990), which were financial and economic analyses of timber yields of forest plantations and cash crops, the studies of Petmak et al (1989) and (1991), Takagaki (1991), and Wannawong et al (1991) on timber production and financial return from various tree-crop combination and management practices on research plots; the study of Suksard and Thammincha (1995), Haumuangkeaw and Thammincha (1989) and focusing on tree marketing, the study of Manarungsan (1990) on general contract farming; and Puntasen et al (1991) and Puntasen and Tongpan (1996) on policy concerned with private forest plantations. Nevertheless, none of these research studies covered the whole system of production and management of tree farms, extension and service programs, marketing, contract agreements, nor program management of CTF seriously.

This study was made with the realization that tree farming and farmers are important in the restoration and development of forest resources and in contributing to the development

of the agricultural and industrial sectors. Tree farming could be an alternative source of raw material for household consumption, cottage industry, and industrial use. It can also encourage the private sector to help development progress on rural marginal land. Contract tree farming has never been studied in Thailand, and so little Thai literature on this subject could be found. However, by studying literature on the subject of other countries of this region, such as Japan, the Philippines, Indonesia, China, and Pakistan, etc. and documents of international agencies concerning tree farm, it was found that most researchers emphasized trees, selecting tree species, different management techniques, maximizing yields, environmental improvement, or benefits provided to the private sector, middlemen or the industrial sector. Very few researchers studies or paid attention to the tree farmers and interactions between farmers and companies, especially to how farmers who had planted trees for a long time or who had just begun farming trees lived; mechanisms of tree farming, and various kinds of agreements made between the farmers and private sector businesses such as tree planting business, post-tree planting care, cutting and transporting trees, buying trees; how tree farmers survive amidst the risks of weather, fire, and theft, and the advantages and disadvantages of the agreements the farmers make with companies.

3. Purpose and Methods of the study

This research attempted to examine how contract tree farming related the farmer and the company. It might not cover every aspect of contract tree farming but the attempt was made to find the factors motivating tree farming, how farmers practice tree farming as well as various contract agreements between companies and farmers so as to make known the situation. The study has primarily been developed from a 3-year research cooperation programme (1990-1994) entitled "A Study on Forest Utilization Patterns in Southeast Asia: Changes in the course of socio-economic development, among Japan, Indonesia, Philippines, and Thailand" with supported by the Ministry of Education, Science and Culture of Japan. The CTF was selected as a topic for further study. It was because CTF has emerged and was identified as a promising multi-cooperation program of the government and private sector to restore forest and marginal agricultural land.

The case studies examined tree farming programs being implemented by four companies in four distinct areas: one was an area changing from cassava production to fast-growing tree plantation to produce woodchips as an export commodity, one was an area changing from sugarcane cultivation to fast-growing tree plantation to supply raw material for the pulp and paper industry, one was an area changing from maize cultivation to fast-growing tree plantation to produce raw material for pulp and particleboard, and the last was an area changing from cassava production to fast-growing tree plantation to produce woodchip as

raw material for domestic consumption. These four regions, that is, Eastern, Western, upper Central, and Northeast, are selected to represent the four cases. Sample villages and target villagers are selected and questionnaires were designed to collect data. The study was carried out using interviews with tree farmers, traders, companies, and government officers to analyze tree farming practices in each area. Different methods are applied to the analysis of contract tree farming. Sample surveys were conducted in selected provinces of the four regions in 1993-1996. Simple descriptive statistics were used in the analysis of data collected from the field work. In-depth interviews were carried out as a major tool in collecting data and information from forest-based companies and government agencies such as Provincial Forest Offices, Regional Forestry Offices, and Provincial Agricultural Offices. By using the questionnaire, about 80 households in the study areas were interviewed, some 20 households in each area. The households were randomly selected. Agreements between farmers and companies were analyzed. The case study was limited due to several factors 1) each company has many invisible factors influencing the participation of the tree farmer, 2) it was observed that all respondents were reluctant to answer the questions asked due to accompanying company staff. The study also has limitations due to the unavailability of reliable data on certain aspects, especially on land and economy of the farmer and the company sides. Some data gathered could not be quoted at a company's request.

In organizing research findings, this paper consists of two parts. Part One analyses the background of policies and programs concerned with economic and social development, agriculture, forest and land development, etc. Causes and results of deforestation and forest degradation, various countermeasures for solving those problems, and the promotion of CTF are described. Part Two deals with the four distinct cases of contract tree farming to make clear facts and trends of contract tree farming in Thailand.

PART I

EVOLUTION OF CONTRACT TREE FARMING IN THAILAND

Chapter 1

Processes and Results of Deforestation and Forest Degradation

1. Deforestation and Forest Degradation

Thailand's total area of 51.31 million ha (320.60 million rai¹⁾) is divided into 76 provinces. The population of the country is 59 million and the average population density is 115 per km² (Ministry of Interior, 1994). The people living in the rural areas account for 70% of the total population, and include some 600,000 hilltribe people (Institute of Population and Social Research, 1995; National Security Council, 1994). Traditionally, rural Thai communities cultivated rice and crops for their subsistence and conserved land and forest for their own uses. The management of forests was based on the beliefs, traditions, and culture of local communities and was carried on without any of state intervention mechanisms. The objectives of community-based forest management varies from place to place due to differences in people needs, the forest was considered 'a place for spirits', 'a place for rituals', 'headwater of paddy fields', 'wildlife reserve', 'a place to collect forest product' and 'recreational area'.

1) Traditional Land-Use

Traditional land use differs from place to place. In the North, most land use was covered by forest. Agriculture was practiced in the mountain valleys, flood plains and river sides. In the Central and Eastern Regions, most low and flat land was used for paddy and fruit orchards. In the Northeast, rice was grown on the low land while field crops were grown on upland areas. In the South, land was used mostly for mixed tree crop cultivation. Traditional land use can be seen in various forms such as shifting (rotational) cultivation, home gardens, and forest gardens²⁾.

Shifting cultivation³⁾ was mostly practiced in the mountainous areas of the Northern and Northeastern Regions. Home gardens are commonly seen in the lowlands. Trees and crops are simultaneously planted together in the home compound (Makarabhirom, 1989a and 1991). Forest gardens are traditionally multi-storey agroecosystems that contain many trees. Traditional land-use had real environmental, social, and economic benefits, but farmers have

faced difficulties due to the drastic changes in the rural economy and development policies since the implementation of the NESDPs, particularly, in producing export crops and raw materials needed in agricultural and forestry industries. Therefore, traditional land use has significantly decreased as land has been developed more commercially.

The forest area of Thailand was about 35.92 million ha, or 70% of the country's total area, in 1910. This decreased to about 60% in 1947 (FAO, 1989, OAE, 1991). When the first NESDP was initiated in 1961, the forest area had been reduced to 28.14 million ha, or 54.62% of the country's area. In 1978, after three NESDPs, the forest area of the country had been reduced to 17.52 million ha, or 34.15% of the whole country's area. Then, in 1993, during the period the 7th NESDP was being implemented, 14.38 million ha of forest area, or 26.02% of the nation's area, was left (see Figure I - 1 - 1).

Clearly, there has been a major change in land-use in Thailand within the past 30 years; the population has doubled while the forest area has been halved. At least 13.76 million ha of the reduced forest area has been transformed for agriculture or other uses at an annual rate of deforestation of 437,835 ha during the 1961-1993 period (RFD, 1995). In 1988, 48.9% of the country was officially categorized as forest land, consisting of 1,215 national forest reserves (20.25 million ha), 58 national parks (2.59 million ha), and wildlife sanctuaries (2.22 million ha) (RFD, 1990). Degraded forest areas covered about 4.8 million ha. Approximately one million people lived in this area. Moreover, the Department of Land Development (1990) reported 5.39 million ha was misused. The cultivated area which had deteriorated due to erosion amounted to about 17.12 million ha. Problematic soils which are unsuited for cultivation due to their toxicity and poor condition, such as salty, very sandy, acid sulphate, organic, and shallow soils, cover about 13.75 million ha, or 27% of the nation's area.

2) Deforestation Process

Much of the forest land in Thailand has been cleared for agricultural development to produce food for consumption in the country and also frequently to produce export crops (Mekvichai, 1988; Phantumvanit and Panayotou, 1990). Ever since Thailand's policy began to focus on agricultural production for export, this together with the increase of population and migration has brought about a need for more land. Shifting cultivation for subsistence has fallen into disuse, but slash and burn agriculture for commercial purposes is widely practiced. Thus, new forests cannot naturally grow to replace old ones. More forests have been cleared for agriculture and infrastructure facilities. Finally, the land has become degraded, useless and barren. During 1960s, the population grew at a rate higher than 3%, particularly among those living in the hills. This caused a rapid expansion of slash and burn cultivation. Moreover, due to the failure to adopt high-input technology, during the 'Green Revolution', while the population was increasing, the number of landless farmers increased. Consequently,

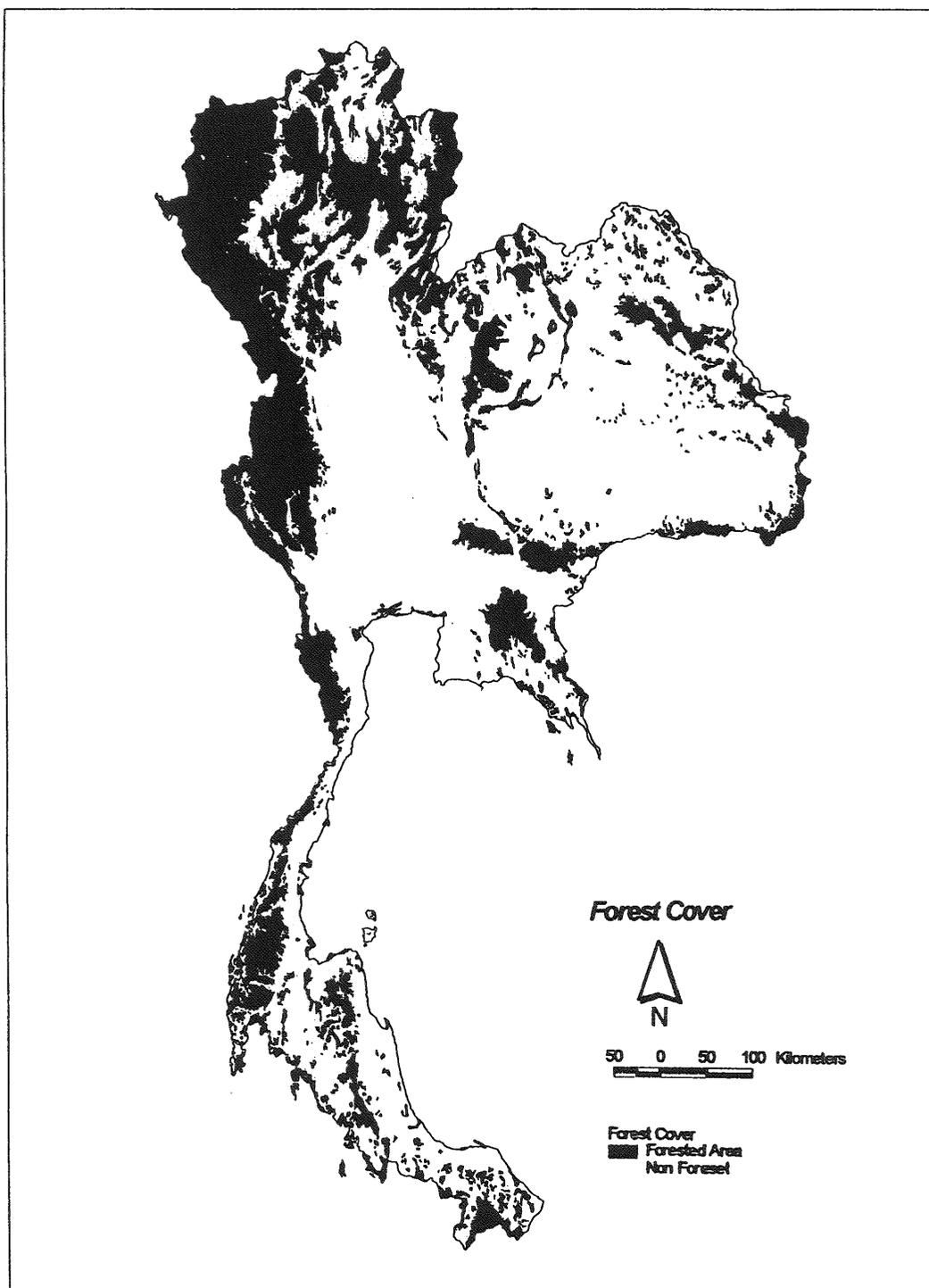


Figure I-1-1 Map of Thailand Showing Existing Forests in 1991

more lowland farmers whose crops had failed or were insufficient invaded the highland forest areas where soil was still fertile.

Forest loss is also attributed to logging concessions. This encompasses the effects of selective logging, which causes a temporary change in canopy cover, forest structure, biomass, and species composition. Furthermore, illegal logging by poachers after concessionaires left caused more degradation. Generally after any deforestation⁴⁾ event, some form of vegetation returns to the land in the form of crops, pasture, or regrowth, although in its density, structure and species composition, it will usually be inferior to the forest it replaces and so degradation⁵⁾ has occurred.

Population pressure is often singled out as the prime factor behind deforestation, but its effects are far from simple (Myers, 1990; Rudel, 1989). Driven significantly by population growth, migration, and sheer pressure on existing farmlands, population growth and migration are the contributing factors in deforestation in the mountainous watersheds. The population of these cultivators often increase at annual rates about the same as the rates of nationwide increase. There are similar migrations into tropical forest, in many regions of Thailand. In all these instances, population growth and migration are a significant, if not the predominant, factor in deforestation. Some other factors which frequently operate in addition to population growth include poverty among peasant communities concerned, multidistribution of existing farmland, inequitable land-tenure systems, lack of property rights, insufficient attention to the subsistence farming sector, lack of rural infrastructure, and faulty development policies overall (Sukwong, 1996; Phantumvanit and Panayotou, 1990). Deforestation is more a land use problem than merely a forestry problem and it usually takes place in such a way that forest is replaced permanently by another land use (Grainger, 1993). Deforestation results from complex socio-economic processes, and in many situations it is impossible to isolate a single cause (Walker, 1987), but other studies dispute this. One study revealed that 90% of tropical deforestation can be attributed to the agricultural sector, while only 10% was due to forestry (Landly, 1982). But this study regards the contribution of the industrial sector as negligible. Bruenig (1989) estimated that 60% of deforestation was caused by shifting cultivators and small-scale agriculture.

However, the rising incidence of slash-and-burn cultivation in Thailand since 1960 exceeds the carrying and regeneration capacity of the forests, thus contributing to their depletion and enormously reducing their economic and environmental values. The establishment of large agricultural land holdings and plantations producing food crops and export crops usually requires the clearing of large forest areas to obtain enough land for extensive agricultural management. Another major source of forest clearing is the industrial sector, for instance, mining and hydropower, and infrastructure services that are linked to these extractive

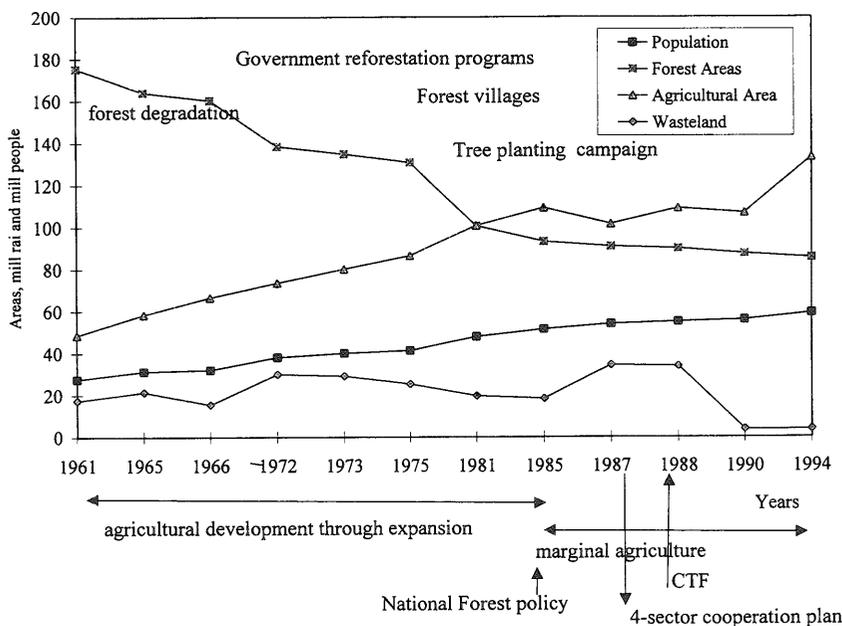


Figure I —1—2 Changes of Land Use and Population
 Source: RFD (1995) and OAE (1994)

industries (see Figure I - 1 - 2).

2. Problem Solving in Deforestation and Forest Degradation

1) Forest Protection

The Government issued a law concerning reservation of forest for the first time in 1938, namely the Forest Reservation and Protection Act, and established field forest offices in various regions to protect the forests. In 1941, a Forest Act for facilitating central governmental forest management was issued. The Government revised Forest Reservation and Protection Act in 1953 and 1954. Another Forest Reserve Act was issued in 1964 and is still used at date. As for intact forests which must be conserved, the National Park Act and Wildlife Conservation Act were announced and area were stipulated.

In 1960, the Forest Police Division was founded to help prevent forest invasion and establish Regional Forestry Offices to protect forests. The Forest Patrol Unit was also founded to prevent forest invasion; unfortunately, it has been ineffective in doing this. The Government has announced policies to solve the problems of forest invasion, such as land classification, accelerating tenurial rights, investigations of dwellers in the forest area, accelerating organization of self-help land settlement units, and organizing cooperative land

settlement units. Government policy allows people to utilize or live in deteriorated permanent forest or national reserved forest in the form of forest villages established by the Government and lets agricultural institutions use plots of land on which forest cannot be restored. The Government emphasizes the notion of forest plantation by the RFD and the FIO giving these two agencies responsibility for fixing areas for people to live in and earn their living in the form of forest villages and providing social security as they are workers employed in establishing forest plantation. They have the right to grow cash crops over the long-term but they will not obtain land rights; this is to prevent land speculators from taking over the land. Dwellers's rights to the land will be inherited by their children only, and the land may be used for housing and farming only.

Nevertheless, deforestation has continued and the loss of a huge area of forest has drawn attention nationwide. The forest area decreased from 27.36 million ha in 1961 to 14.4 million ha in 1978, at the high rate of 560,000 ha per year. The remaining forests have been divided into categories depending on management objectives. In the meantime, reforestation has widely been applied both to produce big timber for the market or for industry and to revive the condition of the forests and improve the environment. However, due to the degradation of agricultural areas and the need for land for agriculture, there are nationwide conflicts concerning land-use which are very difficult to solve.

2) Resettlement of Dwellers in the Forests

To comply with the land policy, the Government issued the Land Code in 1954 to give land-right certificates to the people. People who showed that they had occupied and made use of the land could change the Sor Kor Nung (SK.1⁶⁾) certificate into the Nor Sor Sam (NS.3⁷⁾) certificate. At the same time, intact forests were protected. Despite the issuing of Land Code and Forest Reserve Act, a great number of people still lived and earned their living in forest reserves. Thus, the Government initiated a project for large-scale land and self-help land settlement in various areas nationwide to accommodate all the people living in the forest.

Land use conflict between forestry and agriculture has been increasingly recognized since the Government started reforestation in degraded areas while people required land to live and cultivate. There were many hilltribe people residing in mountainous watersheds, and because the state was aware of their impact on soil and water, a committee was appointed to deal with hilltribe welfare. Four hilltribe settlements were established in Chiang Mai, Tak, Chiang Rai, and Loei Provinces with 8,000 members from six different hilltribe groups. Permanent cultivation was encouraged through incentives such as seeds, fertilizers, infrastructure facilities, and housing, etc.

Although the deforestation for cultivation had developed into taungya and silvopastoral systems, it was still reported that from 1967-1977 a forest area of 300-500 thousand ha was

destroyed through slash and burn. According to this policy, the RFD and the FIO designed a plan and guidelines for forest plantation through forest villages. However, during this period, field crops commanded good price and were in great demand in the international market, and farmers cleared forest to expand agricultural area greatly. Thus, the MOAC proposed a plan to provide land for the farmer in the form of forest villages and agricultural cooperatives. The Cabinet approved the plan to establish forest villages in 1975.

The establishing of forest villages⁸⁾ gathered the people scattered in the forest to live together in a specific area⁹⁾. Villages were designed, water was supplied by such means as building ponds or checkdams, land was allocated for housing and farming, infrastructure was constructed, and the people were moved to the plot of land. Each of them were given an average of 2.4 ha, of which about 0.04 to 0.16 ha was used as a homestead and not more than 2.4 ha for agriculture. The RFD employed these people to grow and revive the forest, allowing them to grow field crops in the forest village following forest regulations on taungya plantations. Thus, the people had their own plot of land to earn their livings and could cultivate crops in forest plantation. Moreover, the Government provided tree seedlings to the villagers to plant on their plot. Therefore, forest villagers were supported in using the land according to an agroforestry system in the home compound, farmland and forest plantation.

3) Reforestation

In the reclamation of forest cover in Thailand, government's measures such as enrichment tree planting, forest plantation, and management of remaining forests have been employed. In 1906, the RFD introduced 'Taungya system'¹⁰⁾, into re-afforestation programs in some parts of Phrae, Lampang, Nan, Chiang Mai, Pitsanulok and Sukhothai Provinces to increase teak yield in abandoned shifting cultivation areas. In 1908, the RFD began to improve degraded natural forests by means of clearing climbers in teak forests of Chiang Mai and Lampoon Provinces and by sowing teak seeds in the empty spaces in forests in Lampoon Province (Siriwan, 1954: p112). In 1910, the RFD widely encouraged forest plantation through its regional forest officers. Empty spaces in the forests were replanted. In 1953, the RFD established four forest watershed rehabilitation stations in Chiang Rai, Chiang Mai, Saraburi, and Nakhon Ratchasima Provinces to experiment with trees suitable to the local climate. Later, seedlings of those trees were distributed to the villagers to grow on idle waste land.

In the late 1970s, the taungya system was incorporated or modified into the forest village system by the RFD and the FIO. The RFD's forest village scheme aimed at helping in resettlement of the landless poor and rehabilitating watershed forest while the FIO's forest village scheme focused on the establishment of economic forest plantations through agroforestry systems. The outstanding agroforestry plantations were the Klang Dong Teak Plantation in Nakhon Ratchasima Province, Somdej Forest Plantation in Kalasin Province, the

Taung Pa Pum Forest Plantation in Kanchanaburi Province, and the Klong Tom Forest Plantation in Krabi Province. This resulted in extending agroforestry techniques into the annual plantation areas of logging concession areas granted to provincial logging companies (Makarabhirom, 1994).

In restoring public land, the village woodlot program was initiated in the government's land resettlement projects in order to solve the shortage of wood. Government departments implementing this program included the Department of Lands, the Department for Public Welfare, the Department for Cooperative Promotion, and the RFD. In 1956, the national land policy declared 20% of the total land resettlement area must be kept as community forests for the use of village members and the public. This scheme was enforced laxly, and so forest for communities in the resettlement areas was scarce. In the late 1970s, RFD initiated 'a multiple-use forest for community' project to allow local villagers and local industries access to wood and small timber. During 1981-1984, the RFD in collaboration with the National Energy Authority of Thailand and the United States Agency for International Development (USAID) implemented the 'village woodlot' project in seven provinces in wood shortage areas in the Northeast. This project had a great effect on the new woodlot project of the Government and the NGOs. In 1987, the 'Land Reclassification' project designated 868 forests (about 16,862 ha) as community forests. The forests have been protected by the Land Code. Village forest was also integrated into the forest reserved rehabilitation and the highland watershed rehabilitation programs through forest village project. Approximately, 200 villages were given supports to establish and maintain forests for their own use. During 1974-1992, some 17 pilot projects related to community forestry were implemented. Some projects are still being carried on; however, deforestation is still going on.

4) Economic Forest Plantation

The RFD started the forest plantation programme in 1906 while the FIO and Thai Plywood Company established their first plantation in 1967 and 1968, respectively. From the inception of its reforestation programme until 1989, the RFD planted trees on an area totaling 522,346 ha of which 287,423 ha were in the North, 104,195 were in the Northeast, 85,881 were in the Central and Eastern Regions and 44,847 ha in the South (see Figure I - 1 - 3). In addition, state enterprises and the private sector planted a total of 36,115 ha in fulfillment of the conditions of logging concession granted to them. Thus, a total of 146,770 ha were reforested by the public and private sectors up to 1989. This is still far from covering the degraded area.

The 5th and 6th NESDPs have set a target to increase reforestation by 48,000 ha annually by putting emphasis on the role of the private sector as planters and the government sector as technical advisors. Eucalyptus cultivation was strongly recommended on infertile soil, high acidity, and high salinity areas as well as on poor cassava fields in the Northeast. The forest

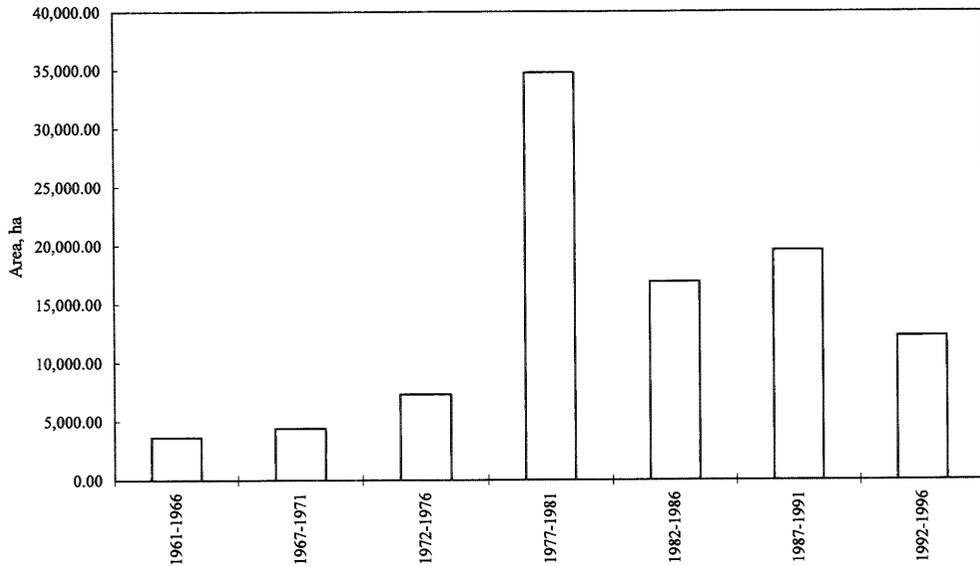


Figure I —1—3 Forest Plantation Areas of the RFD

plantation was rather limited due to conflicts over land for living and farming of local villagers as well as budget supports.

(1) Forest Plantation by the RFD

At first, the forest plantation was implemented by planting teak in the scattered plots of cleared forest. Later, after the RFD established tree species experimental stations, teak trees have been planted as plantations. However, since government land for establishing forest plantation has already been occupied by people, the RFD had to negotiate with local farmers by employing them to plant trees (Chantanee et al, 1991). Since forest plantation program has been put into a permanent form, it is not necessary to move planting units as before. After intercropping in forest plantation was accepted as a practice, the RFD started to issue regulations on taungya plantation in 1965¹¹⁾ to control intercropping in forest plantations. This regulation emphasized motivating farmers to cooperate with the Government to revive forests in forest plantations and allowed them to temporarily grow annual crops and earn income.

The 1965 taungya plantation regulation was revised in 1970¹²⁾ with the emphasis on forest plantation management under the supervision of the officials and founding permanent settlements for the people in deteriorated forests. The regulation 1970 was revised again in 1990¹³⁾ and is currently being used. The regulation on 1990 puts the emphasis on forest establishment and solving the problem of the lack of agricultural land¹⁴⁾. According to this regulation, farmers are allowed to do intercropping in the forest plantation under the

supervision of the forest officials using not over 2.4 ha with the permission of the RFD once a year until the tree canopy expands to make intercropping impossible. According to this regulation, the establishment of forest plantation using the agroforestry system covers slash-and-burn clearing, preparation of seedlings, planting and maintaining trees, as well as looking after the forest plantation, permitting farmers to plant crops and obtain the benefit of crops they planted, during which time the farmers must plant and look after forest plantation under the supervision of forest officials.

(2) Forest Plantation by the FIO

The FIO has established economic forest plantations through its investment policy and commitments to replanting forest in logging concession areas, using the forest village system. They provide land for farmers to earn their living and at the same time employed these farmer to take care of the forest plantation. Most of the land is in the Northern and Northeastern Regions.

The FIO started forest plantations in 1967 in the Northern Region and then in 1975, they began forest plantations in the Northeastern Region. Their forestation can be divided into four schemes, that is, 1) forest plantation using investment funds of the FIO, which started in 1968, 2) forest plantation compensating for logging operations which began in 1973, and according to the conditions of the FIO long-term concession, the expenses of which was derived from harvested timber and replanting areas, 3) forest plantation on provincial logging companies' concessions, some of which were implemented by the FIO, which has continued to care for existing plots since the cancellation of this project, and 4) forest plantation which provincial logging companies planted according to the concessional conditions granted to the FIO by the RFD with the area of about 64,000 ha. Therefore, the total area which the FIO had to plant together with the old plots they had to care for were 72,050.72 ha in 1993 (FIO, 1993). During the period, in early 1980s, the Government promoted private sector investing in forest plantation. The Forest Reserve Act, Section 20, was invoked in granting plantation areas to the companies or individuals. This has resulted FIO in getting permission to establish annual forest plantation. Furthermore, in establishing forest plantation, there have been conflicts with villagers, especially since 1987, as the people occupied forest plantation areas. In addition, there were the problems of illegal logging in forest plantations and fire, and so forest plantations could not be expanded.

After in-land forest concessions¹⁵⁾ were ended by an administrative order of the MOAC in 1989, the Ministry set the policy that the FIO would take care of and maintain plantations according to the conditions attached in their logging concession as well as forest plantations with the concessions of others concession grantees (except the Thai Plywood Company). Later, after the resolution of the cabinet on March 3, 1992 revised by the cabinet's resolution

of March 9, 1992, the FIO could utilize forest plantations established under the conditions of logging concessions. These forest plantations must not be in the protected areas and if any of these forest plantations were planted with reserved trees species, the FIO could have it registered as a forest plantation under the Forest Plantation Act 1992 according to item¹⁶⁾ 4 (5). The total area of FIO's forest plantation is over 10,000 ha (see Figure I - 1 - 4).

Contract reforestation¹⁷⁾ is extensively used in the FIO reforestation scheme. The FIO sets up criteria and conditions for farmers to cultivate in forest plantations with three major conditions: 1) each farmer is provided with about 0.16 ha of land in the forest plantation project area to live on, grow kitchen garden crops, and raise cattle, and another 0.8 ha of land to earn his living permanently, 2) each year the Government provides 2.4 ha or more of land in the forest plantation for each family to farm according to their capability and needs, 3) the farmers must plant and maintain trees belonging to the FIO. Moreover, the FIO set up criteria and conditions for planting fruit trees in the forest plantation such as rubber¹⁸⁾ and cashew trees.

According to the RFD forest statistics, the rapid deforestation process started in early 1960s, and in the late 1980s, deforestation still continued, from 15.09 million ha in 1985 to 14.38 million ha in 1988. This implies that law enforcement together with various aspects of land settlement and rural development programs did not stop deforestation, particularly for the expansion of agricultural land.

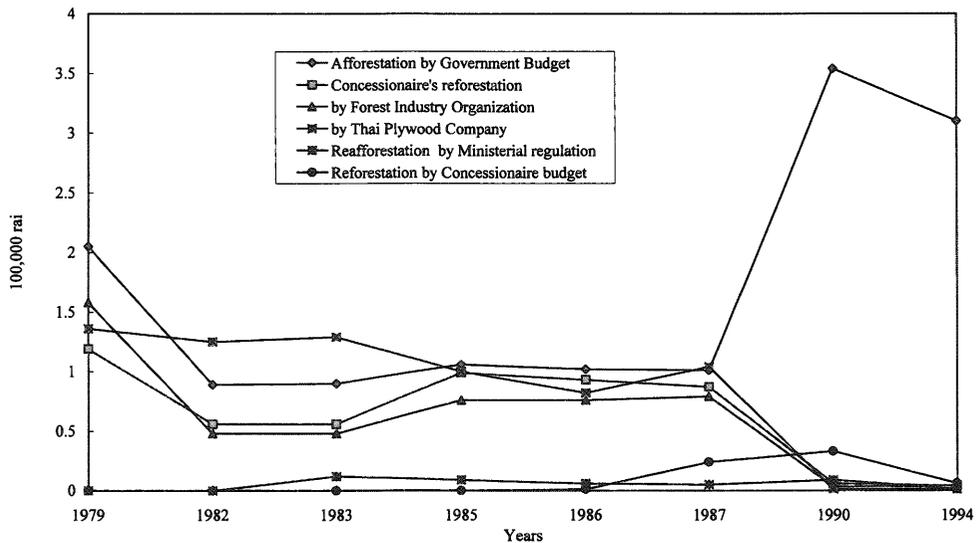


Figure I - 1 - 4 Forest Plantation Areas by Objectives
Source: RFD (1994)

Notes

- 1) One rai is equivalent to 0.16 ha.
- 2) A privately owned lands outside villages on which native and introduced trees are grown and managed.
- 3) The practice of regularly rotating cultivation to different fields in the forest.
- 4) Deforestation refers to the temporary or permanent destruction of forest cover through clearing for agriculture of whatever sort: cattle ranching, smallholder agriculture whether planned or spontaneous, and large-scale commodity crop production through, for instance, rubber and oil palm plantations (Brown and Pearce, 1994).
- 5) Forest degradation is defined as a temporary or permanent deterioration in the density or structure of vegetation cover or its species composition; and the effects of short-rotation slash-and-burn cultivation, in which secondary forest (forest fallow) grows on abandoned plots but never reaches the same biomass or overall quality as mature forest since it is cleared again for cropping after a few years (Arnold, 1992; Grainger, 1993). The RFD defined the deteriorated forest using numbers of large trees, 50-100 trees saplings and over 100 tree seedlings as the indicator of deterioration (RFD, 1989).
- 6) SK.1 is a form reporting land occupation, is issued on oral application as a basis for tax assessment and administration with no rights of ownership, but subject to register land prior to the implementation of Land Code.
- 7) NS.3 is a certificate of development with rights of inheritance and transfer.
- 8) The forest village aims at: 1) maintaining national forest reserve area for timber production and protection of environment of the country in the long-term, 2) rehabilitation of the degraded watersheds and areas unsuitable for agriculture within the forest reserve by means of artificial regeneration for a timely result, 3) resettlement of landless farmers and squatters scattered all over the forest reserve to facilitate government assistance and services, 4) stemming the expansion of forest reserve destruction.
- 9) The RFD planned to grant long-term lease to land allocated to farmers. Regulation on 'Temporary Use of or Residence on National Forest Reserve Land' was issued to facilitate this policy, but farmers did not apply because the permission document could not be used as collateral, for which they needed a land certificate such as NS.3. This resulted in granting usufruct certificate to farmers instead of permission documents by the Forest Reserve Act, Section 16. Although usufruct certificates represented only temporary cultivation rights which could not be converted to land title deeds, they were widely used as collateral in local credit system until these lands were brought under Land Reform Act by the government policy in 1993.

- 10) Taungya, a Myanmar word, means hill cultivation. Taungya system is a type of forest rehabilitation in which short-term crops are incorporated during the early stage of the forest plantation.
- 11) According to this regulation, the size of the land must be over 160 ha. Specified tree species are to be grown. Farmers can plant field crops together with the specified forest trees in an area of not over 8 ha per family. Field crops must be annual ones. Farmers are strictly forbidden to plant crops in the forest plantation plots of over two years old. At the end of the first year, when the farmer has harvested crops, the surviving trees must be counted to calculate the reward money to be paid to the farmer. According to this measure, 15 baht per tree must be paid if 50-70% of trees survive, 20 baht per tree is paid if 70-90% of trees survive, and 25 baht per tree is paid if 90-100% survive. On the other hand, no reward would be paid if under 50% survive.
- 12) The size of the land must not less than 160 ha. The area is divided into 100 ha plots on which farmers are allowed to plant crops unharmed to trees on two ha per family. In the meantime, they have to take care of trees without being paid. The area was fixed to not over 50 farmer families to live, grow garden crops and raise cattle. Each family is given 0.16 ha.
- 13) The regulations on taungya plantation of 1990 emphasized the resolution of land use conflicts with farmers and strictly controlled by the RFD.
- 14) The scope of revised regulation remained strict enforcement to farmers, particularly, in fixing crop species, planting patterns, period of cultivation, etc. Moreover, all the trees farmers grow belonged to the Government without any shares. These discouraged farmers to participate in this program.
- 15) Mangrove forest concessions continued until November 1996, where they were totally canceled by the Government.
- 16) Note of agreement on the utilization of forest plantation established under the conditions of logging concession between the RFD and the FIO on July 8, 1995.
- 17) If the trees they look after are healthy, they would get some money as rewards or compensation, that is, 375 baht for land clearing per ha, 312.5 baht for burning and stump cutting, 156.25 baht per ha for planting and weeding, 156.25 baht per ha per time and if 59% of trees survive, they would get 250 baht in addition, if 85-94% survive, they would get 187.5 baht per ha, if 75-84% survive they would get 125 baht per ha, but if less than 75% survive, they would not be paid. If the farmer plants trees in the plantation continuously, the officer would give them rewards according to their criteria.
- 18) Criteria and conditions for planting rubber trees in between forest trees can be summarized as follows: 1.6 ha or more of land in the forest plantation is given to a member

depending on capability. The farmer must prepare the plot, maintain plants, and apply fertilizer to trees and crops. If the trees are healthy, he receives rewards or compensation according to the criteria set up. Moreover, special rewards are granted to members who have planted rubber and other trees in the plantation continuously for a specific time. The member receives only non-timber products such as latex or cashew nuts. The farmer would receive profit with less costs, that is, 70% of the latex would belong to the member and 30% would belong to the plantation forest, and for cashew trees, 60% of the profits gained would belong to the member, and 40% would belong to the FIO.

Chapter 2

Tree Planting Promotion

1. Tree Planting Program Evolution

1) Traditional and Common Practices

The planting and management of trees by farmers has been practiced for decades. Generally, the household farm was the primary source of food and wood, thus the primary use of the most common species is fuelwood. Indigenous trees which can provide fruit, timber, poles, etc. are planted or retained in the homestead and fields throughout the area. The trees most frequently left in the field are for shading and fuelwood. Fruit trees are planted around house while non-fruit trees are planted on boundaries (Grandstaff et al, 1986; Rathakette, 1993; Prachaiyo, 1993). Tree growing and management by farmers is related to many factors, that is; tenure and rights; agriculture and livestock management practices; rural dependence on forest products and availability of supplies from existing tree stocks; commoditization of tree products, size of markets, access to markets; factor availability and cost to the farmer; cultural and attitudinal factors: stability and risk management; and government and other outside interventions (Warner, 1993; Prachaiyo, 1993).

Traditional management of trees can be directly described based on management objectives such as tree patches, hedgerows, live fences, windbreaks, boundary plantings, homegardens. Most tree patches are arranged within cropland on a piece of land which is unused or relatively unsuitable for crop cultivation. Hedgerows involve tree or shrub species planted in lines. The hedge design can serve a multitude of functions, including producing fodder, mulch, human food, fencing, windbreaks as well as soil erosion control. Through regular pruning, shrubs and trees are managed as a short hedge. Species commonly found in hedgerows are *Leucaena glauca*, *Leucaena leucocephala*, *Cajanus cajan*, and *Gliricidia sepium*. A living fence

involves closely spaced rows of trees where fencing is desired. Trimmings from living fences can be used for firewood. Species commonly found in live fences include *Tamarindus indica*, *Bamboo species*, *Ceiba pentandra*, etc. In boundary planting, trees are planted in single or double rows as borders around cropland, and the homestead. Windbreaks and shelterbelts are another example of multipurpose hedges that are often involve a 'double storey' to slow wind speeds above croplands and protect homesteads. Homegardens combine different species with large trees, shrubs, vines, palms, tubers and crops in various combinations, thus requiring intensive management.

2) Extension Approaches in Tree Planting Program

In greening the rural land areas, two approaches are generally considered: a state-controlled/operated approach, or forestry approach, and a farmer-oriented approach, or farm-based approach. In state-operated approach, the planting program have accounted for a large share of governmental and external budgetary allocations for investments in timber, fuelwood, erosion control and related purposes. It is often argued that the long lead times of state-controlled investment make certain benefits insignificant because of discounting. Government economic forest plantation projects in Thailand and its neighboring countries are the observable cases of this. In the farm-based forestry approach, the planting program can be at higher rates due to farmers' combined labor input, and there are savings in public expenditures, reduced farm costs, benefits to crops and livestock, and greater planting areas and yields. However, these require incentives for investment in tree planting and strong supporting system from the government (Anderson, 1987).

There are many cases which support tree planting program through farm-based approach. In the case of Malawi, tree growing on agricultural land, although currently occupying less than 10% of the land area, provides nearly a quarter of all fuel and is particularly important due to nearness to human settlement (FAO, 1985). Farmer initiatives in increasing tree cover can also be very effective as in central Nepal. Gilmour and Nurse (1991) concluded from a study of changes in tree cover in Jhiku Khola catchment near Kathmandu that there was no significant conversion of common land to agricultural land in this period, despite a population increase of at least 50%. The percentage of tree crown cover on the major agricultural land-use category and the common land showed a significant increase between 1972 and 1989. There are strong indications that the overall landscape is undergoing steady afforestation by farmers to maintain the tree-based farming system. In Indonesia, major obstacles to plantation development relate primarily to risk: 1) the grower cannot be assured that he may harvest the plantation trees, nor of what the royalties might be, 2) concession contract lengths of 20 years are barely long enough for one rotation and do not encourage sequential planting to develop a substantial flow of timber, 3) plantation forestry is expensive, although

rewarding, 4) uncertainty about the performance for the remainder of the rotation. Thus, governments with experience in this enterprise (such as Japan, Brazil, Indonesia, the Philippines) generally provide incentives at the start of the rotation,

Tree planting program in terms of forest plantation was kept for a long time as a government mandate. It was not until the 5th NESDP that the privatization policy was highlighted. It is mainly because the tree planting program extended by the Government could not compensate for the loss of the forest area. From 1906 to 1991, only 99,394.40 ha of degraded forest were replanted but five million hectares of forest area was lost. Thus, from the 5th NESDP (1982), the Government initiated guidelines on forest resource rehabilitation in which the people and the private sector could participate. Incentives for investment in forest plantation, such as forest land and tax exemption were given to the private sector. However, due to the uncertainty of the political situation, the land-lease program for big private forest plantations (mostly industrial plantations) was suspended.

The Government employed many approaches to encourage and promote the people's and the private sector's participating in tree planting. Based on my analysis (see Table I - 2 - 1), five tree planting extension approaches can be identified as follows; 1) general extension, 2) participatory extension, 3) project extension, 4) partnership, and 5) contract agreement.

The general extension approach is widely used to promote tree planting. The target group is people in general. The district and provincial forest offices are the agencies that publicize their projects and plans and provide multiple-use tree seedlings to interested people to plant at their homes and on common land, temple yards, school grounds etc. Moreover, they encourage people to plant trees on important days. The participatory forestry extension approach emphasizes educating farmers and community organizations, encouraging farmers to join together in activities such as protecting forests and planting trees on common lands and fields. The extension officers train villagers to prepare seedlings for planting in places in their community. If they do not have desirable species, the Government might provide them. The project approach emphasizes specific groups of farmers such as farmers in specific target areas or communities where wood is in serious shortage. Extension might be in the form of technical training, techniques of seedling preparation, silviculture, and management. After training, farmers are assisted or permitted to use land or production inputs and marketing. Most of the villagers are farmers and plant trees as windbreaks, woodlots, agroforestry, and so on. The partnership approach emphasizes the cooperation of farmers and extension officers in working together under a cost and profit-sharing system. The farmers share the expenses and work of the project and divide profits according to their agreement. The officers would use the profits they obtain to extend the work to other farmers. This approach encourages farmer to participate and be responsible in doing activ-

Table I –2–1 Approaches in Forestry Extension

Charac- teristics	Approaches				
	General Extension Service	Project	Partnership	Contractual Agreement	Participatory Extension
<i>General characters</i>	General purposes, implement through government mechanism by extension units.	Specific purposes, joint implementation, technical cooperation and assistance by government agencies	Joint operation between tree farmers and company	Specific purposes, technological and financial oriented,	Grass root process based on local situation, Focus on non formal education,
<i>Areas</i>	Forest land, public land private land, small farms	Area specific, smaller farms	Private land, public land, small-medium farm	Private land, larger farms	Public and private land
<i>Target audience</i>	General public	Participants of the project	Engaged individuals or groups	Contacted tree planters, individuals or groups	Interested groups in a community
<i>Extension strategies</i>	Mainly through mass media & communication support system, official leaders in communities, fewer role of extension agencies	Technical assistance through research on-site/on-farm demonstrations, extension programs, use of case farmer, contact farmer	Discuss and create common interests ,arrangement of cost or profits sharing,	Stimulate farmer to plant tree for sale with supports i.e. quality seedlings, credits technical advice, mainly individual support	Public information, facilitation of group setting, meetings, and supporting activities

ities together. The contact agreement approach emphasizes tree planting extension on land to which farmers have rights. The farmers fully authorize whether to plant trees and how trees will be planted. At the beginning the above approaches emphasize farmers, not the private sector.

3) Promotion of the Private Tree Planting Programs

Extension campaigns to plant trees have been continuously conducted so that people realise

Table I—2—1 Approaches in Forestry Extension (cont'd)

Characters	Approaches				
	General Extension Service	Project	Partnership	Contractual Agreement	Participatory Extension
<i>Activities</i>	Public relation, raising awareness of forest and forestry issues, distribution of tree seedlings	Training and material supports, many planting patterns	Group meeting, farm visits, etc , Self supporting by tree planters	Farm visits, meetings, material supports, technical advice	Group meeting, farm visit, study tour, simultaneous tree planting and tending
<i>Tree species focused</i>	Species normally prepared in government nurseries	Species purposely specific by the project	Fewer species mainly for commercial purpose	Single species mostly block planting of fast growing trees	Diverse species locally acquired
<i>Monitoring system</i>	None	By project staff members	Joint monitoring	Joint monitoring	Self monitoring
<i>Practical examples</i>	Regular programs of government agencies	Extension projects, pilot project of GOs and private firms	Extension program of private sectors	Tree farming programs of wood-based industries	Development agencies at grass-root level

the significance to trees and tree planting. During the 4th NESDP, from 1977-1981, more people were encouraged to participate in forest planting and many projects were initiated, that is, Voluntary Tree Planting, Village Woodlot (1977-1979), Fuelwood Supply Village Forest (1981-1984), and Multiple Use Forest for Communities (1984-1986). These projects contributed much to tree planting, and fast-growing tree species were widely planted. However, a great number of native trees, such as *Tectona grandis*, *Pterocarpus macrocarpus*, and *Dalbergia cochinchinensis*, were extensively cut from the forest. Thus, the RFD initiated tree planting by farmers projects with cash subsidies. In addition, there have been fast-growing tree planting projects under the Agricultural Production and Structure Adjustment Project, Projects for Planting Fast-growing Trees in Saline Soil Areas and the Re-afforestation Campaign Project. The main pilot tree planting projects have been established when there has been failure of cash crop cultivation (see changes of price in Figure I - 2 - 1). The failure of sugar cane and cassava plantations due to poor market and the labor shortage has

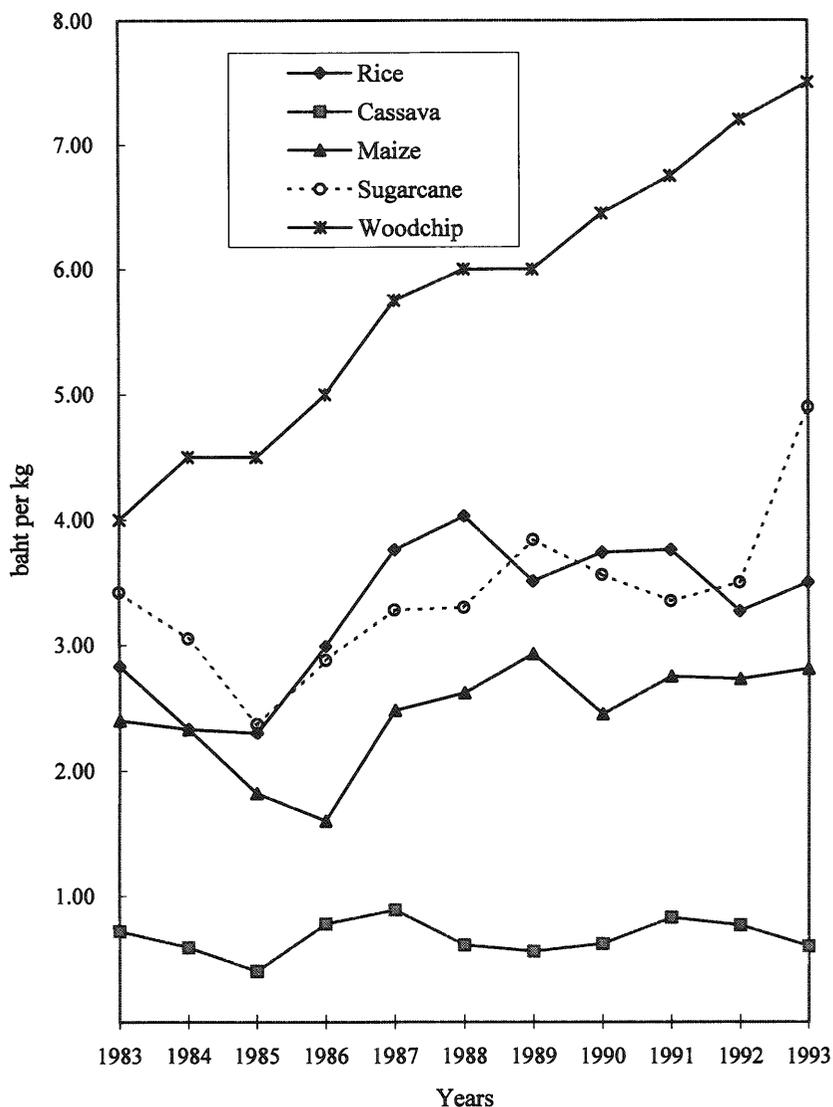


Figure I -2-1 Change of Prices of Some Cash Crops and Woodchips
 Source: OAE (1991) and Thai Plywood Company (1996)

increased the opportunity for commercial tree plantation. Some big private companies simultaneously started establishing their own forest plantations. Makarabhirom [1989 (b)] described various adopted extension techniques and strategies (see Figure I - 2 - 2). Incentives such as free or low-price seedlings and planting materials as well as fixed prices for timber products were also given to encourage farmer to replace their crops with trees. It is important to note that tree planting by the private sector is rapidly expanded.

However, existing laws and regulations discouraging tree planting promotion. For

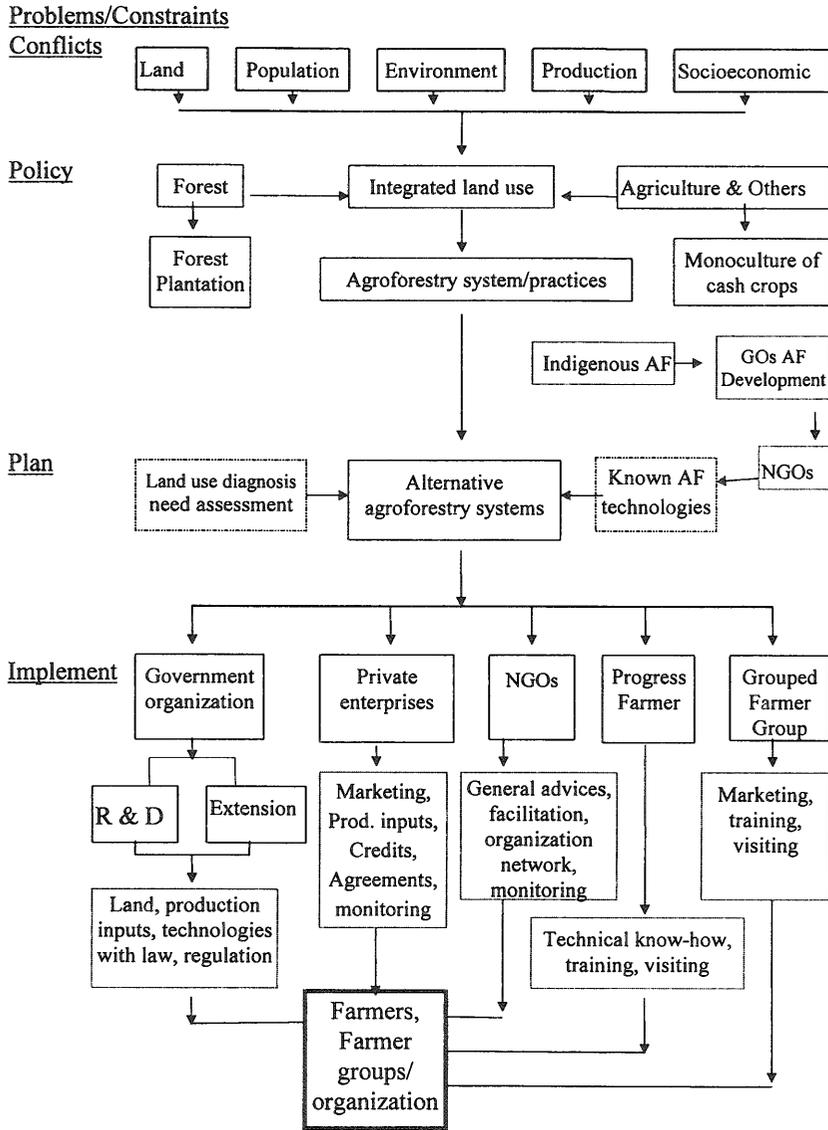


Figure I-2-2 Agroforestry Extension Development Framework

instance, the cutting of trees planted on common lands with government budget could not be done as the trees are considered the government's. If necessary, they must be sold under government regulation. The money obtained belongs to the government. When money is needed, financial arrangements must be made with the relevant government agency (Department for General Account, 1994).

Furthermore, the cutting of fast-growing trees on private forest plantations for commercial use, which has been widely practiced, is illegal. Thus, the RFD requested approval in

principle from the national forest policy committee so that any plot of land planted with any kind of trees could be registered as a forest plantation according to the Forest Plantation Act 1992. At present, this request is under the consideration of the Office of Juridical Council. If farmers want to plant non-reserved trees on their own land, they need not ask for permission. However, if reserved tree species are to be planted on land belonging to any governmental agencies which obtained land permission from the RFD, the farmers must ask permission for planting from that government agency. For example, if they want to plant trees on a plot of land belonging to the army, they must request permission from the Army. In any case, for cutting, they must still ask the RFD's permission according to the Section 11 of the Forest Act of 1941, Ministerial Rule No. 24, since land belonging to the army was classified as forest land according to the Forest Act 1941. Thus, in such cases, the farmers could cut the trees they planted only after they obtained the permission. After that, they must ask the regional forest officer to mark logs with transport labels and pay royalty at the provincial forestry office. If they want to transport this wood elsewhere, they must ask for transport documents at the local district or forest check point.

Logging of reserved tree species requires permission from the local District office. The District investigates and marks the logs with labels for permission to cut for free sale. However, when timber is transported to the first forest check point, a timber transport document must be shown. To plant reserved trees in a forest reserve, the planters must ask for permission to use the area due to the National Forest Reserve Act, Section 20. When the tree reach cutting age, they must ask for logging permission according to Ministerial Rule no. 1106. If trees are on private land, logging can be conducted freely (RFD, 1996).

2 . Policy Advocacy and Law Amendment

1) Amendment of Existed Policies and Laws

Though the Government has established policy, measures and incentives to encourage farmers and the private sector to implement forest plantations, such as land measures and tax measure, there are still many obstacles especially with regard to logging, wood processing, wood utilization and wood related business according to the forest act. To facilitate this, national forest policy has been established.

The National Forest Policy (RFD, 1985) stipulates the area of woodlot or economic forest for planting trees for economic use to 25% of the country' total area. The 7th NESDP reduced this to 15%. In addition, it allows the private sector to take part in managing or developing forest resources together with the government to increase the forest area to the specified target, to promote private forest plantation for industrial and international commercial purposes, to encourage communities to plant forest, to promote forest planting on

state land and small areas of private land on farms. It is also clearly specified that the Government will encourage the private sector to establish forest plantations by such means as promoting paper pulp factories, revising laws so as to facilitate tree planting and harvesting for self utilization, and providing incentives to promote forest planting by the private sector.

In September, 1987 the cabinet approved the Land Policy which was clearly underlined the role of the private sector in economic development of forest land, especially the establishment of forest plantation. Some laws such as the Forest Act and the Forest Reserve Act were revised. A new act, the Forest Plantation Act, was issued to facilitate the management of trees on the forest plantations and solve many problems.

Forest Act: In the Forest Act of 1941 the Government had much authority in controlling logging in natural forest. Thus, it set up controlling steps from cutting, transporting, processing and marketing. This act classified reserved species into two types: a) common reserved species, and b) special reserved species. Dipterocarp trees and teak trees belong to the first type. Therefore, this act did not promote forestation either in natural forest or on private land.

Forest Reserve Act: The Forest Reserve Act of 1964 is the major act covering reserved forest land management. This act has as a main objective setting aside land as national reserved forest and protecting these forests, stating that no one was permitted to occupy or possess this forest land, to construct any building, or harvest forest products in the reserved forest unless permitted by the officers. Reserved forest could be rehabilitated by declaring it to be 'deteriorated forest' according to Section 16. People were permitted to enrich such forest and plant trees according to Section 20. Officers implementing Government reforestation projects had to follow Section 19.

In 1984, Section 20 of the third version of Forest Reserve Act was revised to state that if any reserved forest was deteriorated, the RFD's Director General authorised by the Minister could permit anyone to maintain the forest or to establish forest plantations or permanent trees in that forest if it was not within the boundary of watershed class-1A, within a stated period and under certain conditions. However, the Director General could give permission for not more than 2,000 ha and not longer than 30 years, in which case, the Minister's permission would have to be secured. In December, 1986, an announcement was made by the MOAC that the compensation rate paid to the Government by the forest plantation or tree grantee would be at the rate of 62.5 baht per ha. In 1987, the RFD issued a regulation governing permission to establish forest plantation or plant trees within the national forest reserves stating the permission details, inspection criteria of forest to be permitted and regulations were revised for seven times, that is, in 1978 (twice), 1980, 1981, 1982 and twice in 1985. Thus, it can be said

that the Government has continuously encouraged the private sector to utilize forest reserve land for forest plantation.

Moreover, concerning permission to establish forest plantation in reserved forest, the RFD issued two regulations in 1979 and 1987 inviting the private sector to rent reserved forest to establish economic forest plantation. According to the Cabinet's decision of May 9, 1989 the criteria of deteriorated forest was improved using only big trees as an indicator without taking into account the amount of regenerated seedlings.

Land Reform Act: According to the Land Reform Act, the MOAC got the permission to conduct land reform for agriculture in the 326 forest reserves (with 11,800 thousand ha in 46 provinces) which are considered as economic agriculture zone. Forest plantation is expected to be established in the new land reform area if the farmer is properly encouraged.

2) Formulation of New Policy and Law

Forest Plantation Act: The forest plantation program was complemented when the Government enacted the Forest Plantation Act in 1992. This act was issued to rectify limitations of the Forest Act of 1941 which neither assisted nor protected rights over logging reserved tree species derived from forest plantations. Its objective is to encourage the private sector to establish forest plantation extensively and especially to promote the planting of reserved tree species which were listed in the Forest Act of 1941. However, not many people were interested in it as it permitted the private sector to plant reserved tree species (teak and dipterocarp trees) on private land but the Government still controls every step from planting to cutting and transportation. And the establishment of wood processing factory has to comply with the complicated procedure of existing forest laws.

According to the Forest Plantation Act, land for forest plantation was more clearly specified so that the degraded forest land can be leased to farmers and the private sector. The existing occupants are encouraged to lease the land in accordance with Sections 16 and 20 of the Forest Reserve Act. Moreover, exemption is granted from government fees in connection with the planting, harvesting, and transporting wood product.

On the logging, the Cabinet's decision of January 25, 1989 approved establishment of pararubber wood processing factories. The Cabinet's decision of January 25, 1994 permitted establishment of wood processing factories to process a further 13 species of trees: *Eucalyptus camaldulensis*, *Azadirachta excelsa*, *Casuarina equisetifolia*, *Casuarina junhuhniana*, *Acacia auriculiformis*, *Acacia mangium*, *Leucaena leucocephala*, *Cocos nucifera*, *Tamarindus indica*, *Bouea macrophylla*, *Baccaurea sapida*, *Samanea saman* and *Borassus flabellifer* using permission criteria similar to those of rubber trees.

Presently, the problems in reforestation for wood production in degraded forest have been partially solved. The success of the forest plantation project or program will then depend

more on the land ownership and agreement with local villagers. From the time the Forest Plantation Act was issued in 1992 to the present (1996), only 1,509 private plantation owners registered plantations with a total area of about 3,200 ha.

Policy on Private Reforestation Promotion: The national forest policy of 1985 encouraged the private sector to invest in forest plantation on deteriorated forest reserve land by allowing them to manage and utilize forest reserves as well as by supporting the establishment of relating industry. However, some studies and media reported that under this program some intact forests were cleared to plant fast-growing trees so the Government cancelled the policy regarding the utilization of forest reserve land for forest plantation. Subsequently, the land right documents were given to those occupying such areas through the Land Reform Project.

As for the private land, though Forest Plantation Act of 1992 and decision of the Cabinet of September 8, 1992 created the conditions for establishing forest plantations, only a few forest plantations with reserved tree species were established. Reasons for this might be that it takes a long time for local trees to grow to cutting size as well as uncertainties about wood production, wood quality and the market. On the other hand, growers are certain of an existing market for fast-growing trees. The result has been increasing pressure on paper pulp companies, whose production capacity has been rapidly increasing, to find new source of woody material. Thus, forest plantation on private land has been encouraged since there is not sufficient land for the big forest plantation companies. At present, according to regulations on the cutting of fast-growing trees from private forest plantation for commercial use, which has been widely practiced, is still illegal. Thus, the RFD requested for the permission from the National Forest Policy Committee so that any plot of land planted with any kind of trees could be registered as a forest plantation according to the Forest Plantation Act. At present, this request is under the consideration of the Office of the Juridical Council.

3. Supporting Programs

1) Pilot Project on Participatory Forestry Extension

With the support from UNDP/FAO, the 'Participatory Forestry Development Through Extension Project' was launched in 1987 with four objectives as follows: 1) to establish effective forestry extension capabilities and services at the center, the territorial offices and institutions of the RFD, 2) to integrate community forestry methodologies into the RFD extension system, 3) to accelerate reforestation by small farmers, school children and through production of seedlings and technical advice, and 4) generation of information and capabilities within the RFD to promote investment by small-scale wood-based enterprises as a demand incentives for tree growing (RFD, 1989 and 1990). During 1987-1991, seven Forestry

Extension Demonstration Centers, 10 Forestry Extension Mobile Units, and 100 District Forestry Extension Units were set up and operated. Fast growing trees were widely planted on farm land in the target areas of 47 provinces. The Office of Forestry Extension was set up to handle forestry extension activities.

2) The Re-afforestation Campaign

The Campaign aims to expand the forest cover in the shortest period by way of planting many species of plants on approximately 800,000 ha (5 million rai). The Reforestation Campaign plans to plant forest trees in the following areas: along 50,000 km of the roadsides; around the school premises, governmental offices and religious places, parks, recreation areas, dams, reservoirs, riverside etc., and in existing deteriorated forests. The main activities of the RFD is to prepare 1,098 seedling units for the support of plantation. The campaign target area is divided into 1,345 replanting areas, which consist of approximately 480,000 ha of the watershed area in the North, over 160,000 ha in the Northeast, and 23,040 ha in the Central, Eastern and the Southern Regions.

With regard to the campaign funding, the Government has granted 4,340 million baht spread over three years. The first year budget covers public relations, preparation of seedlings and training programs. The people or institution participating in the project may carry out the tasks themselves or contribute in cash to the Fund under the Ministry of Finance. The expense is 18,750 baht per ha. As for the trees to be planted along the roads and in various premises, the cost is 30 baht per tree (RFD, 1994). According to the RFD, approximately two thirds of degraded forest were rehabilitated.

Although a number of tree planting programs have been promoted by the Government, the result has not much succeeded. The key factors in successful implementation of farmer's tree planting are: first, the smallholder secures tenure of his land, changing his status from landless to land owner, and second, there is a guaranteed market for the woods at guaranteed minimum price. If these two conditions are met, tree planting will be greatly encouraged. Therefore, tree farming by farmers and private sector will be reviewed for better understanding in a tree farming development process in the next chapter.

Chapter 3

Tree Farming

1. Integration of Tree Farming

1) Tree Farming for Local and Industrial Uses

As common lands diminish, and the natural resources on them recede or are degraded, farmers everywhere have sought to shift the production of outputs of value to their own land by protecting, planting and managing trees of selected species (Arnold, 1992). Tree farming is being increasingly emphasized by Third World governments and donor organizations as a way to supplement fuel supplies and add to farmer income (Office of National Energy, 1986). Private initiative by farmers has three advantages: 1) land preparation and weeding are ensured because they are part of annual cropping activities, 2) fire threat is reduced because of the agricultural activities, and 3) intensive management by farmers allows the trees to grow to maturity. However, farmers face many problems, among them are poor marketing and extension systems, lack of species diversity, and inferior seed quality (Van del Beldt et al, 1994). Saxena (1992) argued that woodlot planting of Eucalyptus emerged as an attractive option for landowners facing management and labour problems in western Uttar Pradesh, as tree farming allowed saving in family labour time and permitted greater flexibility in the timing of operations. About 60% of the total trees planted were by this category. Factors influencing farmers to growing trees are seen in Figure I-3-1.

The growing timber shortage and the market demand for raw materials to replace this shortage, has led many farmers to grow trees on their farms. Initially, trees are planted according to the demand for fuel, for raw material of local industry and for paper pulp in place of scarce agricultural raw materials such as kenaf, sugarcane, and bamboo. Paper mulberry is planted for paper production, *Ceiba pentandra* and *Sesbania grandifolar* for mushroom cultivation, and pine trees for fuelwood. At first, casuarina was planted for fishery tools and construction poles. Then fuelwood was produced to supply ceramic factories. In coastal areas, *Rhizophora macrocarpa* is planted for charcoal and construction poles.

As for planting for the wood industry in Thailand, eucalyptus was first used to produce woodchips for export. Eucalyptus was first introduced and planted in Phrae Province in the North in 1946. The planted area was gradually increased, and the area began to expand rapidly once the 1985 National Forest Policy was adopted.

In 1970, Thailand changed from being a net exporter to being a net importer of timber products. The RFD designated seven zones for promotion of tree planting by the private sector in Tak, Khon Kaen, Surin, Chachoengsao, Ratchaburi, Surat Thani and Songkhla

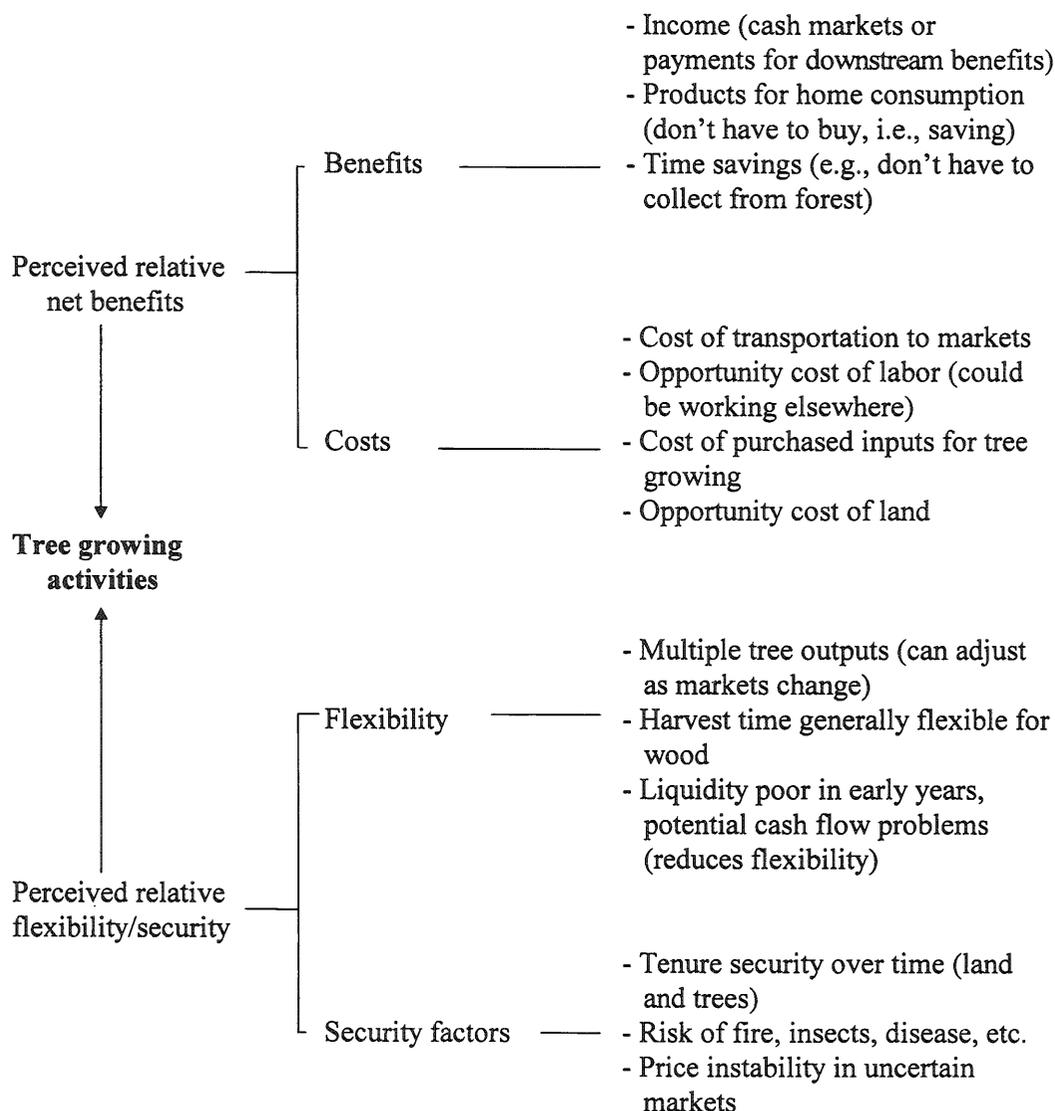


Figure I —3—1 Factors Influencing Farmer's Incentives to Grow Trees

Source: Modified from Gregersen et al (1989)

Provinces. In 1978, Tak Province launched the project of Tak Rom Ruen to promote the eucalyptus cultivation extensively throughout the province. Four years later, in 1982, the Tree Farmer's Association was set up as a private company to promote re-forestation projects. This encouraged government agencies to produce wood chips for export and financial institutions to invest in re-forestation on a contract farming basis, either by individuals or groups.

In 1984, Udon Thani Province launched "The Eucalyptus Tree Planting Project" as a

substitute for sugarcane cultivation in fourteen districts in reserved forests. In 1986, the Office of Private Reforestation and Extension (OPRE) was temporarily established in the RFD. In 1987, the "Working Committee to Solve the Problem of Reforestation Extension by the Private Sector" of the Parliament suggested that the Government officially establish the Office of Reforestation Extension to handle the Reforestation Act and to facilitate procuring funds, markets and land for reforestation programs by the private sector (RFD, 1987).

In 1986, the Suan Kittii Reforestation Company was granted promotional privileges to plant eucalyptus and other fast-growing trees in Chachoengsao Province. In June, 1987, the Minister of the MOAC announced a plan to emphasize the four regional plans and issued an administrative order to set up a sub-committee on promotion of forest plantation by the private sector chaired by the Permanent Secretary of the MOAC. In 1988, the MOAC declared a main policy of the Forest Policy Statement No. 8 on Extension and Promotion by the private sector to participate in agricultural development especially in forest plantations, concerning which progress was lacking and initiatives were ineffective.

Since 1989, the Asian Development Bank (ADB) has given technical support to the Thai government to develop an action plan for private tree farming during the 6th NESDP. It aimed at building mechanisms which will ensure an expanded role for the private sector in the planting of fast-growing trees for industrial use. This plan suggested implementation of private tree farms in an area of 500-600 thousand hectares for a five-years period in the Northeastern and Eastern Regions. Key issues addressed were legalization of lands occupied by smallholders in forest reserve areas, establishment of a framework for land management, installation of mechanisms for participation by the private sector, cultivation of fast-growing species in block plantations on land suitable for tree crops, and establishment of small-scale rural wood-based industrial facilities, etc. The recommended fast-growing species for private tree farm development were *Acacia auriculiformis*, *Acacia mangium*, *Anthocephalus chinensis*, *Azadirachta indica*, *Casuarina equisetifolia*, *Casuarina junhuhmiana*, *Dendrocalamus asper*, *Eucalyptus camaldulensis*, *Eucalyptus degrupta*, and *Leucaena leucocephala*. The local industry center model was proposed on the basis of the four-sector approach to development in Thailand. The four sectors include local farmers, concerned government agencies, credit or financing institutions, and private sector firms. Currently, this program is being actively implemented.

In 1993, the Government approved the budget for the Promotion of Tree Planting by Farmers Project for five years from 1994 to 1999 with a target of 160,000 ha. The Government would give the farmers 18,750 baht per ha per five years. The supporting money would be divided from the first to the fifth years as follows: 800, 700, 600, 500, 400 baht, respectively. The trees planted are reserved tree species on the land with land right certificates or land

reform areas with an area of not less than 0.8 ha and not over eight hectares.

To organize tree farmers, the Tree Farmer Association of Thailand was established, previously an agri-business operated agricultural products for export. The Association started by promoting eucalyptus planting in Chachoengsao, Chon Buri, and Rayong Provinces. The Association requested promotion of eucalyptus planting projects from the MOAC. It also established forest plantation companies in eight provinces (Chon Buri, Chachoengsao, Lop Buri, Nakhon Sawan, Nakhon Ratchasima, Buri Ram, Yasothon, and Surin Provinces) encouraging farmers to plant trees on areas with land right certificates and to register their groups as Tree Farmer Cooperatives. The target was to plant trees on an area of 920 thousand hectares. The companies were to sell tree seedlings, give advice to farmers, and assist farmers in getting soft loans from credit institutions for the establishment of tree farming. However, this project was not supported by the Government.

The Association has coordinated with some governmental agencies to secure governmental support of their eucalyptus plantations. At last the MOAC accepted this project as a part of four-sector cooperation. However, this project is not yet in operation. Later, the Association together with other companies established the Siam Tree Development Company to produce woodchips for export at Tambol Plu Ta Luang, Sattahip District, Chon Buri Province.

In the implementation of tree farming the RFD, in 1985, reported that private tree planting of about 24,100 ha of fast-growing trees was established during 1966-1985, starting from *Rhizophora apiculata* for charcoal and pole productions (a long time before the survey); *Casuarina Junghuhniana* in 1972 and *Casuarina equisetifolia* in 1974 mainly in the Central Region for poles using to make tools for coastal fishery and for building construction; *Acacia auriculiformis* for firewood and charcoal, *Anacardium occidentale* for fruit and firewood in 1975 mainly in the Northeastern and Central Regions, and *Eucalyptus camaldulensis* for fuelwood, construction poles and woodchips in 1978 in the Central and Northeastern Regions and so on. The Central and Eastern Regions constituted the largest area of private tree planting, accounting for 64.48% of the total planted area. The Northeastern, Northern, and the Southern Regions, accounted for 22.7%, 11.62%, and 1.2%, respectively. The sizes of most planting plot were 0.16-1.6, 1.7-3.2, 3.3-4.8, 6.6-8.0, and 4.9-6.5 ha, accounting for 47.64%, 15.12%, 9.57%, 6.27%, and 4.06%, respectively. The land which farmers planted most was privately owned land (Title Deeds, NS.3, SK.1, etc.) and land reform areas. Some 9% planted in forest reserves under RFD's land allotment programs (RFD, 1985).

Estimates¹⁾ of private tree planting area by concerned officers of the RFD were about 96,000 ha in 1988 and 95,000 ha during 1989-1993, resulting in the total area of approximately 300,000 ha in 1996. Tree farming was established around 1975, initially, in the Eastern and Central Regions (including the Western Region) to fulfill local wood consumption needs, and since

the 5th NESDP (1982-1986), many woodchip factories and other wood-based industries were established, for instance; the Rich Forest, Vana Phan, Siam Agrotec, and Siam Forestry Companies), and so tree farming was promoted more. The most progressive provinces are: Chachoengsao and Sra Kaew Provinces in the Eastern Region, Ratchaburi and Kanchanaburi Provinces in the Western Region, Kamphaeng Phet and Uthai Thani Provinces in the upper Central Region, and Udon Thani, Nakhon Ratchasima, and Khon Kaen Provinces in the Northeastern Region. Among these, Chachoengsao, Ratchaburi, Uthai Thani, and Khon Kaen Provinces are among the first and foremost provinces in developing contract tree farming systems (Pausajja, 1995; Ungpakorn, 1996; Visuphakarn, 1995).

2) Characteristics of Trees in Tree Farming

The Government has for several years been encouraging the private sector to participate in reforestation. One of the major problems is to find the types of trees which are suitable for replanting in denuded forests and, at the same time, generate income for the investor and rural villagers. The trees proposed include *Hevea brasiliensis*, *Anacardium occidentale*, *Pinus kesiya*, *Leucaena leucocephala*, *Acacia auriculiformis*, and *Eucalyptus sp.* (ADB, 1989). The followings are tree species mostly grown on farm for commercial use.

(1) Eucalyptus (*Eucalyptus camaldulensis*)

Eucalyptus has been claimed to have the most economic potential as it grows very rapidly and needs less care as well as having market availability. Eucalyptus logs are bought mainly for making chips, cement board, fuelwood, charcoal, and for shipment overseas as logs for manufacturing. Among these, chipwood making ranked first. It is now in great demand, as it can be widely used as an industrial raw material.

According to the study of Rativanich (1987), wood from *Eucalyptus camaldulensis* has short fibres and high cellulose content. Pulp gained from eucalyptus can be used for kraft paper production as well as for printing and writing paper after being bleached. The properties of paper produced from pulp obtained from eucalyptus are higher than the standard for kraft paper set by Thailand Industrial Standards Institute with respect to tearing strength, bursting strength, and strength. It was also found that eucalyptus gives the highest output of pulp at the age of three years.

The study of Songanok (1990) found that a maximum tree yield of 144.38 tonnes per ha was realized when the trees were spaced 3×3 m and felled at four years old. The financial analysis showed that the 3×3 m tree planting space give maximum return. An experiment conducted at Ratchaburi showed that trees at spacing of 4×8 m gave highest results in both diameter (DBH) and height. Stem, leaves and total above ground biomass were greatest at the spacing of 1×1 m while the 4×4 m spacing plot had the greatest branch biomass of 3.3

tonnes per ha (Bunyavejchewin and Puriyakorn, 1985). In a study conducted at the Agroforestry Research and Demonstration Plots in Si Sa Ket, stands were planted at four different spacings: 2×4 m, 4×4 m, 4×6 m, and 6×6 m. The yields of biomass were 63.04, 96.17, 126.63 and 152.87 kg per tree and main stem volume of 0.09, 0.19, 0.20 and 0.22 m³ per ha, respectively. The total biomass was 75.52, 57.89, 49.89, 42.50 tonnes per ha and total stem volume of 109.02, 84.28, 72.89, and 62.27 m³ per ha, respectively (Sahunalu, 1995).

Regarding environmental aspects of eucalyptus, the Thailand Institute for Scientific and Technology Research (TISTR) reported in 1986 that eucalyptus leaves contained chemical substances that had negative allelopathic effects on three cash crops tested, particularly in dry areas where there was insufficient rainfall to drain away those substances. However, other studies on government forest plantations in Si Sa Ket Province by Petmak et al, (1987) and in Rayong by Witthawatchutikul and Jurasuktaveekul (1987) disputed this finding, reporting that the eucalyptus had little harmful effect on soil productivity (Petmak et al, 1987) and no negative allelopathic effect on germination rates of the three cash crops, *Vigna radiata*, *Vigna mungo*, and *Impomoea reptans*, tested. Comparatively, eucalyptus had less harmful effects than cassava (Working Group on Eucalyptus and Cassava, 1990). However, the OAE (1987) suggested that soil groups, that is, groups number 14, 15, 18 and 19 (mostly poor soil, high acidity, dry, and slope area) should be recommended for eucalyptus plantations. The OAE (1987) also recommended suitable conditions for eucalyptus based on soil and rainfall data at specific sites (poor soil and low rainfall). In allocating land for eucalyptus plantation, it is also recommended that leases of forest land should be over 320 ha and that the area for privately owned businesses cover not more than 25-30% of the total land area with the rest being given to landless poor or laborers residing or working in the area to be leased. At present, there are no clear cut policies that indicate the specific conditions and locations where eucalyptus is suitable or unsuitable.

(2) Bamboo

Bamboo, a perennial grass, is not only important in everyday use in traditional and rural cultures but is also heavily relied upon as a raw material for industrial use. The common bamboo species used in pulp and paper industries are *Thyrsostyctcus siamensis* (Phai ruak) and *Dendrocalamus asper* (Phai tong). Planting space for small bamboo such as *Thyrsostyctcus siamensis* is 4×4 m and for large bamboo (*Bambusa arundinaceae*, *Bambusa natan*, *Bambusa blumeana*, *Dendrocalamus asper*) is 8×8 m. The harvesting methods is selective cutting of three-year-old culms which are too old and no longer producing shoots.

3) Socioeconomics of Tree Farming

Tree farming is being focused on by governments as a way to supplement wood and fuel

supplies and add to farmer income. The factors encouraging tree farming are the severe shortage of timber supply for local industries such as the ceramics industry, match industry etc.; the promotion of wood energy as conventional energy; the increasing demand for wood material for industrial use; and government policy to utilize marginal agricultural wasteland.

Due to the change in wood demand and market price, tree farming can also be stimulated and be rapidly increased. Sinden (1970) argued that tree farming could be a valuable activity if capital and knowledge were available. Employment will be less in the short term, but in the longer term would increase. In an area where rice and other crops are culturally and economically important, the farmers are reluctant to plant trees, and the existing crops grown in a field must also be considered as a factor in the inclusion of trees. In low land areas where rice is predominantly cultivated, land adjustment to suit exotic trees should be avoided. Experiences in early tree farming program has shown the need for more precise, situation specific analysis of the optimum role of trees in a particular farming system, the nature and reason for divergence from this optimum, and the scope for removing or diminishing any impediments that this may disclose (Arnold, 1992).

Generally, small farmers' plantations are less than eight hectares while private companies' plantations range from 160 to 1,600 ha. Jeeranantasin (1987) conducted a comparative economic analysis of *Eucalyptus camaldulensis* plantations, some of which were intercropped with maize, and some pure eucalyptus monoculture, based on FIO plantations with five year rotation in the West of Thailand. The results showed that the cost of agroforestry systems was lower than that of traditional plantations. The average cost per hectare under agroforestry systems was US\$ 646.48 with 43.44% IRR. The non-agroforestry system costs were US\$ 712.23 with 25% IRR. People's participation was considered to be a major factor affecting the stability of agroforestry systems. Income gained only from intercropping products might be inadequate for living, thus there should be appropriate sharing of benefits from planted trees between farmers and the state enterprise.

Ratthaket (1987) reported on the *Eucalyptus camaldulensis* planting practices of small farmers in Khon Kaen. She found that the farmers chose to plant trees along the sides of fields, water sources, and roads, rather than in special woodlots. The planting of eucalyptus was generally restricted to separate areas since the farmers didn't want to lose their agricultural land to tree planting. After planting, most farmers could not afford the time to look after the planted seedlings due to other more important duties in earning a living. Survival and growth of eucalyptus was mostly influenced by the amount of rain received, soil conditions and browsing by livestock. Farmers were not very committed to planting eucalyptus; they actually preferred native species, such as *Azadirachta indica*, *Sindora siamensis* and *Cassia fistula*. However, in general the practice of tree planting in the agricultural fields was

still restricted to a small number of farmers, primarily so-called community leaders and their direct followers.

2. Tree Farming System

1) Definitions and Characteristics of Tree Farming

Clepper (1967) discussed the concept of tree farming as a means to establish forest crops by private land owners while Beard (1952) described that tree farming as the growing of trees on a short rotation as a full-time occupation. Tilley (1944) generalized tree farming as a popularized term for forest management, applied particularly in areas dedicated to timber production under certain specified conditions. He suggested that in having the area accepted and registered the owner must undertake to maintain and manage the area for sustained yield of forest crops and provide periodic information on his progress, future plans, and improvements in fire protection and cutting practices.

In this paper, tree farms are defined as farms whose owners intended to become full-time tree farmers, whose income was characterized by a large percentage of forestry income in the farm's total income and by a large proportion of delivery sales of timber. Tree farming is interchangeable with farm forestry, which is defined as farmers growing trees on their own land for economic return, thus, tree farming can be a means of establishing forest crops and can be a multi product operation by private land owners (Beard, 1952; Clepper, 1967; Koistinen, 1989; Van del Beldt et al, 1994). The terms "farmer," "grower", "member", and "contractee" are used interchangeably to denote the person planting and/or tending to the tree crop on a farm. The terms "company", "promoter", and "contractor" refer to the wood business firm negotiating the contract with the farmer.

2) Tree Farming System and Management

(1) Tree Farming Systems

In general, the farmers usually plant one kind or many kinds of trees for consumption for food, for household use, for shade and so on. If there is some economic motivation such as local markets or outside dealers coming to buy products, they plant trees for sale. The most common on-farm site for tree growing were home compounds or crop fields. The main objective has been high yields of wood on a short rotation. Tree farming inputs were farm area, human labor, cash operating expenses, and tool and equipment expenses (Bote, 1984). The costs of farm forestry include the establishment of nurseries; the training and use of agricultural extension agents to disseminate ideas and practices related to farm forestry; various management, research, and monitoring costs; and the costs to the farmers (Anderson, 1987). The farmers manage trees according to the objectives of planting and the specific

requirements of the market. Based on my analysis the systems of tree farming can be categorized as follows 1) Single-Species Woodlot, 2) Multi Species Tree Farming, and 3) Tree Farming (see Table I-3-1).

Table I —3—1 Tree Farming Systems in Thailand

Characteristics	Systems		
	Single Species Woodlot	Multi-species Tree Farming	Tree-based Farming
<i>Management objectives</i>	Woody materials i.e. fuelwood, small pole, small timber	Multiple tree products from several tree species	Multiple products from diverse trees, crops and animals
<i>Planted areas</i>	Public land, marginal land,	Private farm	Private farm
<i>Nature of farm</i>	Small-large holdings	Medium holdings	Small holdings
<i>Species planted</i>	Fast growing tree species e.g. eucalyptus, Acacia mangium, Casuarina equisetifolia, etc.	Fast-growing trees, high-economic value trees or fruit-bearing tree species, ie eucalyptus, neem Dipterocarpus spp, Acacia species Azadirachta excelsa mango; jackfruit, rubber tree,	Many species of trees, for household use and for sale e.g. Dipterocarp spp, Bamboo, other local species, and associated crops e.g. rice, beans, root crops, and animals e.g. cattle
<i>Planting patterns</i>	Block planting with high-density tree spacing	Block planting with alternate lines or strips of fast-growing and high economic value slow-growing trees	All patterns; border, line and block planting
<i>Tree tending and management</i>	Fire protection, tending tree stands, thinning, clear cutting	Thinning, Selective cuttings or clear cutting in alternate lines or strips	Weeding, pruning, selective cuttings
<i>Practical examples</i>	Village woodlots, energy plantations, tree farming by contract	Private tree farming, farm woodland	Agroforestry land-use, multiple land-use, integrated farms

In a single-species woodlot, the farmer plants the same kind of tree as a woodlot in specific areas when he needs a specific species to be grown for sale. In this case, the farmer plants the trees needed by the market or plant them according to an agreement made in advance with a wood-buying business or a factory using that wood as raw material. Woodlot management mostly emphasizes the management of trees for wood products, which might be fuelwood, charcoal, construction poles, building wood, or raw material for the paper pulp and paper industry. Therefore, trees are often planted in blocks with close spacing for more woody biomass. Fertilizers help the trees grow constantly with more woody material. Woodlot areas are commonly found on privately owned land with land right certificates, in degraded areas, and on deserted common land.

In Multi Species Tree Farming, the farmers plant two or more species of trees together in the same plantation. Most farmers grow fast-growing trees along with high-economic value tree species, for instance, *Azadirachta indica* with *Tectona grandis*; *Pterocarpus macrocarpus*, *Dipterocarpus alatus* with *Eucalyptus camaldulensis*.

The Tree-based farming is a system of trees management on a farm in which long-lived trees are planted as the main trees together with multi-purpose trees. Trees are managed for multiple products. The main trees are used when they are old. This practice is often used on small plots of fertile land so the farmers can plant agricultural crops for short-term income. This system encourages the extension worker to take a holistic perspective of the farm family and consciously to take into account the links between the farm and the home in assisting the family to achieve its goals. Small holdings may be better suited to tree farming.

(2) Tree Farming Management

Most of the farming units in a tree farming system are small-scale, with both subsistence and market objectives varying in intensity of management according to the resource base of the farmer. However, farm households are more dependent on several contractors because they do not have sufficient labor to carry out work. In managing trees on farms, priority should also go to solutions which emphasize raising the number and productivity of trees grown in combination with agricultural crops and on all tracts of land that are not reserved for other productive uses (Warner, 1993; Shepherd, 1989).

In the promotion of tree farming, the questions that such farmers always ask extension officers are: how much income will they get? how much timber have they got? how fast is it growing? how much ought they to cut each year? and, how can they get the best price? These are all questions that can be answered by a working plan, or a management plan, once developed. Interim yields to sustain the farmer's income until the final crop is harvested could also be achieved by developing the forest crop as a agroforestry system. The main factors farmers consider in determining the relative net benefits and the relative security of tree

growing in a farming system are diverse. Those are the factors that outside interventions intended to change incentives for tree growing can influence (Gregersen et al, 1989). In addition, marketing are very important to tree farming. It can help the farmers make their decision to plant and manage trees commercially. Marketing is something which is not a common practice for the farmers. If there are markets for wood locally and internationally, tree farming would develop very fast and would be more secure than if there were only one market, such as the domestic market only or the export market only, as this would be risky for the farmers. Credit is also important for tree farmer. The productive use of credit has to be carefully considered, for instance, to determine the kind of existing enterprise and the new enterprises that will be introduced on the farm. Decision on the type of enterprise should depend on technical and biophysical evaluation. Financial needs could be medium-term or long-term. These process require the assistance of the multidisciplinary extension team work, including agronomists and foresters.

Farmers will not abandon short-term, exploitative land management unless they are given sufficient control over the land and its products. One of the best ways of mobilizing people is to utilize market mechanisms. Market forces are good in that they improve productivity without the need for external, coercive actions. However, they are so powerful that the strong eliminate the weak very effectively, and they can also transform a traditional rural landscape of great diversity into a simple one in a short period of time. Given the circumstances of land scarcity prevalent in many areas in the Third World, it is probably unacceptable to displace local people from forest reserves and to establish large-scale monocultural plantations on these lands (Kumazaki, 1994).

3) Agroforestry as an Alternative to Tree Farming Management

There have been attempts since the early 1980s to find viable management options of a combination of trees and crops. For instance, potential productivity and financial returns from selected agroforestry systems and traditional monocropping systems, for example, combinations of *Leucaena leucocephala*, *Acacia auriculiformis* and *Eucalyptus camaldulensis* intercropped with cash crops such as cassava, peanut and beans were studied in the Phu Wiang Watershed Management Project in Khon Kaen Province. Parameters considered were tree growth, charcoal production and crop yield. Evidence from trials at short (three years) rotations demonstrated that early supplementary and complementary relations between some system components can produce real financial gains. Although these biological interactions become competitive over time, in this case, the gains should be sufficient to make early adopters consider agroforestry (intercropping) systems financially preferable to traditional monocrop (Wannawong et al, 1991). Another case in Somdej Forest Village, Kalasin Prov-

ince, revealed that the crop cultivation activity of the villagers was more economically important than reforestation activity for the inhabitants of these forest villages. *Manihot esculenta* was the main cash crop and was cultivated widely in the fields both under the forest and outside the forest. Concerning these trials, Takagaki (1991) suggested that this agroforestry system must be changed to a more complex system for a sustainable agroforestry system to be achieved, and other kinds of crops must be introduced to the system. But other studies disputed this. The promotion of tree planting on farm land has been very difficult if markets for crops are available. Farmers will plant more crops and thus reduce space for tree. However, in dry and degraded areas where common field crops such as maize, cassava, sugar cane, kenaf can hardly survive, trees are planted, basically on a small part of a farm, or in lines as shelterbelts. When farmers harvest the first crops of tree and can sell it properly, they will plant more trees.

Agroforestry in various forms have been introduced on agricultural land in order to get full utilization for more production and diversification of their products and income from their own land. Agroforestry requires intensive labor, and is suitable for small farmers with little cash, unable to obtain loans, conscious of an uncertain environment, adverse to risk, and generally facing uncertain or remote markets (Simmonds, 1985). Prommasaan (1990) argues that one constraint of integrated cultivation, may be the problem of attitudes to production, as integrated production requires strength, knowledge and understanding of how one process can support another.

In 1906, agroforestry in a form of Taunga was implemented in the state forest plantations. It was widely practiced at early stage. Later, there were some problems due to the regulation of forest plantation management which did not allow trees to be cut according to technical advice. Thus, trees grew up so densely that farmers could not cultivate the crop. As a result, the farmers started to cut trees so as to cultivate crops. In 1965, the RFD, set up regulations on taungya forest plantation, and these were improved twice in 1970 and 1990. In 1977, the FIO applied agroforestry practice to its forest plantations and in 1982, it accepted extension of tree planting such as the planting of rubber trees, cashew nuts, etc. as associated crops. In 1982, agroforestry was applied to private forest plantations (by provincial logging companies). In 1990, NESDB studied the pilot project of provincial agroforestry. However, the results was not implemented.

Agroforestry is one of the technical components of the forest village system and other types of community forestry activities through which the farmers are convinced to be more cooperative with forestry programs. The Government has established many agroforestry demonstration plots which are combined with various forest plantations. In the private sector, there are about ten non-government agencies which combine agroforestry in their

rural development programs. Now, agroforestry is widely known and accepted as a type of farm-based land-use management, especially in highland and sloping land areas (Makarabhirom, 1991 and 1993).

3 . Policies and Extension Programs

1) National Policy and Plan

The Forestry Policy of 1985 and the Land Policy of 1987 promoted private tree farming in forest areas. The National Forest Policy of 1985 encourages the government and private sectors to plant trees to be used as energy resources as well as to motivate the private sector to engage in re-afforestation. It is estimated that in 1988, big entrepreneurs of wood-related industries, about thirteen big companies, needed 2.2-3.6 million ha for forest plantation (TDRI, 1989). These policies led to some accusations that the RFD illegally permitted private forest plantation firms to degrade intact forests. These accusations led to cancellation of the policy to encourage the private sector to establish forest plantations which grow fast-growing trees in forest reserves. However, shifting related government policies may also cause apparent shortfalls of the raw material supplies, resulting in a stagnation of plans for forward wood-related industries. Prompt formulation of specific policy on promoting forest plantations on private land is suggested as a solution to the problem. This should be fair to the interests of both the farmers and the private concerns.

Since the 5th NESDP, the Government has emphasized the promotion of large-scale efforts to reforest denuded areas. The RFD was assigned to replant trees at a rate of 48,000 ha per year and encourage state and private enterprises to plant fast-growing trees to supply their own wood factories. Under the 6th NESDP, covering 1987-1991, a long-term target was to increase forest areas to 40% of the country's total land area. Local people and organizations were encouraged to participate in the forest development programme. Supports such as laws and regulations, maps and data systems, were improved. Forest areas were clearly divided into conserved forests and economic forests. The 7th NESDP focused on the increase of production efficiency and the adjustment of agricultural products and high value-added products in accordance with the market.

2) Thailand Forestry Sector Master Plan (TFSMP)

In the master plan, the promotion of land use and forest plantation are planned on agricultural land, leased forest land, and economic forest land. Private forest areas were planned at 3.68 million ha, or 7.2% of the total planned forest land. Medium-rotation crops of fairly fast-growing native species suitable for sawn timber and short-rotation crops of fast-growing exotics suitable for poles and pulpwood are recommended for planting in alternate

strips so that the farmers can get short- and long-term profits and also conserve the soil. Incentives to forest leasees such as a provision of financing is recommended. The TFSMP also suggests that the MOAC should promote tree farmers' associations, organized in district, provincial, regional and national federations. The associations' functions are proposed to be: 1) to act as intermediaries in the marketing of land rights, 2) to act as guarantors for mortgages, 3) to act as channels for information and assistance to farmers, and 4) to protect the farmers from exploitation.

3) Extension Programs

(1) Four-Sector Cooperation

During the 5th NESDP, the Government promoted joint ventures of the state and the private sector. The Cabinet's decision of January 20, 1987, approved the four-sector cooperation plan. Many projects were promoted but have not succeeded due to some constraints. Later, in 1993, the original cooperation plan was revised with the focuses on the following issues: 1) changing the agricultural credit measures from offering compensation to offering low-interest loans and 2) improving agreement methods and agricultural sales contracts between the private sector and farmer.

The agricultural products promoted in this project are those which 1) increase production and farmers' income, 2) have potential for export, 3) can replace imported agricultural products, 4) are new products, 5) are raw material for agricultural industry upcountry. As for the trees which are categorized as industrial raw material, it was stated that 'They should be fast-growing trees to supply the paper pulp industry and other wood-based industries'. Some trees such as *Eucalyptus camaldulensis*, *Acacia mangium*, *Azadirachta excelsa*, and *Casuarina species* are recommended for planting within 150 km of a factory.

At present, this program is being reviewed under the Project for Commercial Forest Plantation Promotion. ALRO is taking a leading role in coordinating the program in a land reform areas, while provincial offices coordinate the program in the non-land reform areas.

(2) The Project of Forest Plantation by Farmers

The project aims at producing wood for domestic use on a small areas of farm land. The Government, through the RFD, would encourage farmers to plant more trees, especially on plots of land for which they hold land certificates. The Government would give capital support and other necessary production inputs. The farmers must have their own land with a land-right certificate or holding rights and wish to plant not less than 0.8 ha of trees but not over 8 ha. The trees planted must be local species.

The Project is to last for five years (1994-1998). Its targets are to promote tree planting by farmers of 160,000 ha of farm land and to give five-year-support for the expenses to the

farmers. In the first year each farmer is to be paid 5,000 baht per ha for planting expenses, and from the second year to the fifth year 4,375; 3,750; 3,125, and 2,500 baht per ha, respectively, is to be paid for maintenance expenses, that is, replanting, fertilizing, weeding, tilling, and establishing fire lines. An application form for farmers is seen in Table I-3-2.

(3) The Project for Agricultural Structure and Production Adjustment

The project aims to increase alternatives for farmers and to decrease dependency on land-based production system. Four specific crop cultivated area, that is, rice, pepper, cassava, coffee, with problems of marketing and drought, are targeted. The Government provides partial support. Fast-growing trees are highly recommended to replace cassava in 41 provinces and to replace rice in inappropriate areas of 46 provinces. The RFD is responsible for this Project with a target of 68,800 ha. The Government supports this program by 1) providing 2,750 tree seedlings per hectare and instructing the farmers on how to plant and maintain them, 2) providing 125 kg of fertilizer per ha, 3) giving loans of 28,718 baht per ha through the BAAC at an interest rate of 5%, and the rest (from 5% to the normal rate of about 13%) to be repaid by the Government.

(4) The Project for Alternative to Farming on Problematic Soil

The RFD is responsible for this project with a target of 40,000 ha per year. In 1994, fast-growing trees were planted on 16,000 ha, in 1995, the target of 40,000 ha was all planted. As for the year 1996, fast-growing trees were to be planted on an area of 36,800 ha (Ungpakorn, 1995).

(5) The Project for Economic Community Woodlots

Government policy promotes community-based forest management of forest patches of villages outside the forest. So the community would have wood for household use and for sale to obtain some money for maintenance costs and development of the community.

In summary, various forms of tree farming, particularly, single-species woodlot, are being promoted by the private sector through the support of the government. Factors contributing to a tree farming include the shortage of wood for local and international industries and the government policy to re-utilize marginal agriculture land. Two species, eucalyptus and bamboo, are commonly grown in tree farming systems to produce wood for industrial uses. The Government issued the National Forest Policy, the Thailand Forestry Sector Master Plan, and Four-Sector Cooperation Plan to promote tree farming. However, due to the rapid increase in wood demand, many government projects such as "The Project for Forest Plantation by Farmers", "The Project for Alternative to Farming on Problematic Soil", and "The Project for Community Woodlots" were launched to accelerate the tree farming development process. Contract tree farming has fully been promoted through tree farming programs which will be reviewed in the next chapter.

Table I—3—2 Application Form for Farmer to Join the Government Tree Planting Program

Application Form for Farmer to Join the Project for Promotion of
Fast-Growing Tree Planting in Substitution of Rice/Cassava
under the Project for Agricultural Structure and Production Adjustment

Written at

Date, Month....., Year.....

Dear Chairman of(through the District Forestry Officer)

My name is (Mr., Mrs., Miss) age..... years, Nationality ... Home address (no.) ..., Moo....., Tambol..., District..., Province..... At present, I grow rice/cassava on an area of ...rai.

I would like to participate in this project with the objective to grow fast-growing trees to replace rice/cassava on an area ofrai. In such case:

1. I would like to ask for the support of production inputs, i.e., seedlings and fertilizers according to the project criteria.

2. I would like to ask for a loan from the Bank of Agricultural Credits according to the project criteria with the following guarantors:

2.1 Four guarantor, that is;

(1) Mr, Mrs, Miss)of house no. ... Moo..., Tambol..., District..., Province.....

(2) Mr, Mrs, Miss)of house no. ... Moo..., Tambol..., District..., Province.....

(3) Mr, Mrs, Miss)of house no. ... Moo..., Tambol..., District..., Province.....

(4) Mr, Mrs, Miss)of house no. ... Moo..., Tambol..., District..., Province.....

2.2 Assets.....

2.3 Land right certificate,

which are enclosed herewith and which I consent to let the bank keep as guarantee for the loan until I pay it back.

3. In case I do not follow the project's conditions, I consent to return all cash subsidies and production inputs to the governmental agency within 30 days after being informed by the governmental agency. As for the unpaid loan, I consent to be fined at a rate of interest equal to the bank's normal of interest rate for farmers.

I fully understand all details and conditions of the project and consent to strictly follow the stipulated conditions of the project.

..... Applicant

..... Guarantor

Qualifications of Participating Farmers

1. Thai citizen
2. Age equal to or above legal majority
3. Reside and make a living in the project implementation area
4. Hold their own land with an official land right certificate
5. Must plant fast-growing trees to replace rice/cassava on at least 5 rai of land

For more information contact: 1) District Forestry Office, 2) Provincial Forestry Office, and 3) Division of Private Forest Plantation Promotion, Royal Forest Department.

Notes

- ¹⁾ There are no official surveys or records on private tree planting/farming since 1985. The estimation of private tree farming was made on the basis of interviews of concerned RFD's officers and Concerned private companies.

Chapter 4

Contract Tree Farming

1. Contract System Evolution in Agriculture and Forestry

1) Contract System Evolution

A system of contract farming has long been used with agriculture crops and poultry. Contract farming was initiated in Thailand in 1967 in the tobacco business. According to the Tobacco Act of 1966, Thai farmers growing tobacco must sign contracts with the tobacco dryer, and the dryer must sign contracts with the company. This system is practiced in many provinces of the Northern Region. Later, it was used in field crop enterprises, for instance, pineapple plantations in Prachuap Khiri Khan, and poultry farms in Chon Buri Provinces (Tosanguan 1980; The Center for Applied Economics Research, 1984). Contract farming was successful and made 33,840 million baht in 1984 (Ministry of Commerce, 1988). Thus, it was accepted and put in the 6th NESDP with the aims of solving problems of decreasing prices for agricultural products caused by high competition and market obstruction by other

countries; and of uncertain income of the farmer. Moreover, it is expected that contract farming will be able to expand widely in Thai agriculture, that is, from rice, rubber, maize, cassava products to other cash crops, such as asparagus, cashews and eucalyptus.

As a result, the organization and institutions connected with this trade has evolved over the decades in response to the market pressure and the traders' own needs. The elaboration with which the marketing institutions have evolved varies across different commodities and depends on certain factors connected with the processing technology, the perishability of the products, and the requirements imposed by the final consumers (Siamwalla 1978). Most major commodities are traded down the chain, starting from the farmers through middlemen through processors and so on to exporters or final consumers.

There is little understanding of the reasons for the emergence of contract farming in any given branch of agriculture. Without a careful analysis of the situation, introduction of contract farming runs a severe risk of failure. Some businesses have thought they could imitate the arrangements prevalent in successful industries, but suffered from contract defaults by the farmers. In more recent times, a number of questions regarding the burden of risk borne by farmers have been raised, particularly in the case of exotic crops or new technologies introduced by the contracting firms.

Contract agreements have long been adopted in the forestry sector as an incentive for farmers to participate in government reforestation programs. During the 4th NESDP, the Government implemented a policy of encouraging the private sector to take part in reforestation programs. The Ministerial Regulation on Contract Reforestation was drafted to facilitate this policy.

The contract agreement used in forestry depends on the purposes, such as contract tree planting, contract reforestation, forest plantation insurance contract, forest management agreement, etc. in line with policy directives and in order to improve production forests. In forestry operations, many contractual systems are applied. Carroll (1977) described three types of contract between the land owner, that is, the provincial government, and private timber companies; these are: the forest management agreement (FMA), the quota agreement, and the timber permit. The FMA is a long-term contract for a large area of land, in which the company has the right to enter the lease area for the purposes of managing, cutting, and removing timber and for incidental operations, such as camp and road construction. In a quota agreement, the quota holder has a long-term, renewable contract on a smaller area of land and is allocated an annual allowable cut. Timber permits are issued for one year on timber stands which are not managed under quotas or FMA's. In all cases, provincial regulations ensure that companies pursue sound forestry practices to sustain yields and conserve water and soil resources. Jackson (1977) defined four structural components of

contract related to forest tenures; these are clauses specifying performance obligations of contracting parties; clauses allocating risks between contracting parties; clauses defining the physical unit of measurement for exchange; and clauses defining contract duration. The effect of varying each of these components is discussed in terms of the economic benefit to the provincial government. Alvarez and Toha (1968) explain that reforestation agreements are a credit system by which the government service can finance reforestation projects by private individuals or cooperatives. The appendices contain a specimen "Reforestation Agreement" (draft contract between the individual and the Service), and outlines of the "Working Plan" and "Budget Statement" which must be prepared for each project.

2) Contract Farming Characteristics

Contract farming is agricultural activities in which the farmer signs contracts with an agri-business company to produce and sell his products to the company. It does not matter if the agreement is made orally or in writing. However, there must be a specific condition allowing the company to control the producing process and marketing (Gover and Kusterer, 1990). Roy (1963) categorized contract farming into two types: 1) limited management contracts and 2) full management contracts. In the first, the farmer enters into contract with a credit giver, buyer, or processor, but is not guaranteed any fixed payment for what he might produce. This kind of contract permits the farmer to make all production decisions and restricts him only in a limited manner. Contracts termed "specification buying", "quality control" and "open account" come under this category. Under the second, the farmer contracts with a business firm and is guaranteed so much per production unit upon his fulfilment of the contract. In such cases, the farmer must follow the rigid schedule set up under the contract and must allow close supervision of his activities. On the other hand, the farmer is relieved of many risks and is able to have greater economic security while engaged under such a contract. Contracts termed "flat fee", "feed conversion" and "profit sharing" among others, come under this category. They are stricter and more specific than contracts of the first type. For instance, the broiler producer relinquishes to the contractor the function of providing most of the operating resources, such as chicks, feed, and medicine. The contractor owns the commodity being produced and is responsible for its sale. The producer is paid on the basis of quality of output etc. The contractor assumes the additional risk of losing his investment in supplies, Because of this, he usually controls production closely and claims most of any profits.

Contract farming has six important features: 1) An agreement between the company and the farmer must be made to buy and sell in advance, 2) Production inputs, for instance, fertilizers, chemicals, seedlings and technical information must be provided to the farmer,

3) Principles and management must be strictly used so as to obtain products complying to the market needs in quality and quantity, 4) The company and the farmer share the risk with each other. The company must accept market risks while the farmer takes the production risks, 5) It aims at building bargaining power for the farmer, and 6) Activities are related systematically by relating inputs, production process, processing, preservation and marketing together.

The business company is interested in contract farming because: 1) It lawfully allows the company to control the producing process and how the farmer manages the marketing, 2) The farmer is obliged to rent the land instead of the company, 3) The company does not have to employ any workers. Thus, it does not have to be concerned with social security or labour problems. If needed, the farmer takes care of such problems instead of the company, 4) It is very beneficial in production requiring close and careful care for a long period of time, and 5) The company has marketing security and secure inputs. At the same time, it helps expanding the company's inputs. As for the structure and forms, contract farming can be divided into three categories: 1) In the two-sector form of the company and the farmer, the company takes care of marketing, credit, technical knowledge, and inputs for the farmer, whereas the farmer takes care of the production process for the company, 2) The three-sector form consists of the private company, the financial institution and the farmer, and 3) The four-sector form has the government sector, the private company, the financial institution and the international organization providing financial aids, and the farmer.

The form of contract farming accepted in government policy is the four-sector one as seen in the Four-Sector Cooperation Plan for Agricultural and Industrial Development of 1988. The private sector is obliged to 1) provide technical and personnel supports throughout the implementation period, 2) provide quality inputs for the farmer, e.g., fertilisers, chemicals, seeds and tractors, and 3) find markets for the farmer's products. Financial institutions provide agricultural credits for the farmer or farmers' institution in cash or kind to implement the project; cooperate with the Government and private sector to specify the project area; select farmers to participate in the project; and cooperate with the Government and private sectors to manage the project as well as follow up its progress.

The Government role is: 1) to advise on how to do the project, 2) to cooperate in selecting farmers to participate in the project, 3) to support the project in many ways, for instance, designating the project area and providing agricultural information, and 4) to supervise production according to the production plan and strictly follow conditions of the project agreement. In terms of cooperation, there are eight criteria to be agreed: 1) The farmer must not be forced to make the decision to participate in any project initiated by the private sector, 2) Projects jointly initiated by any private company must have certain objectives, that is, to

increase the farmer's income. It must also have production and marketing plans which will be able to help increasing the farmer's income continuously and regularly, 3) The participating farmer must not be the one who loses his land or his right to farm land to the private sector. Besides, he should not lose his right to the government assets and facilities, and 4) The private sector cooperates with the Government in providing credit to the farmers, prepares quality inputs to sell to the farmer at fair prices, and shares the risk of natural disaster, for instance, drought or flood, 5) The private sector will jointly implement with the Government transfer of modern agricultural technology to participating farmers regularly, 6) Projects in which the private sector participates should encourage farmers to form their own groups to join in implementation with the private business, 7) Joint projects proposed by the private sector must not be a monopoly or obstruct other private companies. It must also encourage free competition among private businesses, and 8) Joint projects proposed by the private sector should have plans to utilise farm products to encourage the agricultural by-products industry and create farm jobs (Manarungsun, 1990; RRAFA, 1993; Tosanguan, 1980). Details of agreement between farmers and the project are seen in Tables I-4-1 and I-4-2.

Table I —4—1 Example of Agreement to Buy or Sell Agricultural Product

<p>Agreement to Buy/Sell Agricultural Product</p> <p>between</p> <p>Private Party (specified) and Farmer of Farmer Institution</p> <p>Project.....</p> <p>Under the Project of Four Sector Cooperation for the Development of</p> <p>Agriculture and Agricultural Industry</p>
--

Written at the Office

Date ...

This agreement is made between a private party (specified), by whom Mr./Ms..... is authorized, whose office located at (Sub-District, District, Province) who will be termed the 'buyer' and Mr./Ms.(specified farmer's name or farmer's institute), address;. house No., Village no., Sub-District, District, Province who will be named as a 'seller'.

The two parties have made an agreement as follows;

1. The seller agrees to plant or produce the commodity (specified) of the

type of species the 'buyer' and/or the government agencies recommended or procured in a number ofrai/plants which will be planted or produced on the date of at the place of (Sub-District, District, Province)..... which intends to sale the product to a 'buyer' in an amount of

2. The 'buyer' agrees to buy the entire amount of the product the seller intends to sell at the current market price but not less thanbaht per.....

Nevertheless, the product to be purchased has to meet with the quality standards, specified in advance by the buyer, at the point of sale. In case the product's quality is below the standard, the buyer will buy at a price lower than the agreed price.

This agreement is made in duplicate, each copy with the same content. The two parties have read and fully understand the agreement and fix their signature agreement. Each party shall hold one copy of the agreement.

Signature Seller, Signature Buyer
Signature Witness, Signature, Witness.

Table I —4—2 Memorandum of Understanding between Farmers and the Project for Commercial Fast-Growing Tree Promotion

**The Memorandum of Understanding
under the Project for Commercial Fast-Growing Tree Promotion
in Land Reform Areas**

Written at ...

Date ...

This MOU is agreed among three parties: 1) the Office of Agricultural Land Reform, represented by Mr. Prasertpan Phipattanakul, the secretary of the Agricultural Land Reform Office termed in this memorandum "Sor Por Kor"; 2) the Bank of Agriculture and Agricultural Cooperatives (BAAC) represented by Mr. Suwan Traiphol, the Manager of the Bank termed in this memorandum "Tor Kor Sor; and 3) The Agrolines Company represented by Mr..... Position of the Company termed in this memorandum "Company". The three parties agree to cooperate under the Project for Commercial Fast-growing Tree Promotion in Land Reform Areas, termed in this agreement "the Project". Every document concerning the Project prepared by the Sor Por Kor including

appendix of the project documents is a part of this memorandum and are termed in this memorandum the "Project Document". The three parties agreed to:

1. Sor Por Kor shall

1.1 Promote procurement and maintenance of basic factors necessary for implementation of the Project and other activities requested by the project administrative sub-committee so that the Project might reach its objectives and targets.

1.2 Find budget and officers sufficient to administer, follow up, give advice to, and supervise farmers participating in the Project so that regulations of the Project are followed from the first year till the end of the project's implementation period.

1.3 Cooperate with other concerned agencies so that the Project reaches its objectives and be beneficial to the farmers participating the Project.

1.4 Follow the Memorandum of Understanding between Sor Por Kor and Tor Kor Sor dated May 4, 1993 which permits the farmers who obtain land rights from agricultural land reform to apply for credit from the Tor Kor Sor.

2. Tor Kor Sor shall

2.1 Select the farmers applying to participate in the Project who pass the area selection and are qualified to participate in the Project

2.2 Provide credit service to the farmers participating in the Project according to the agreements of the project and the BAAC's regulations.

2.3 Follows up, supervise, advice, and inspect loan payment so that every farmer participating in the Project uses loans according to the regulations and objectives of the Project

2.4 Cooperate and coordinate with other concerning agencies so that the implementation of the Project reaches its objectives and targets.

2.5 Allocate money from the sale of wood by the farmers which the Company transferred to the Bank to pay the farmers' debt to the Bank and the Company (for cutting and transporting expenses) and deduct money from the sale of wood of the farmers to deposit in the project fund for the farmers at the rate of 20 baht/rai.

3. The Company shall

3.1 Provide fast-growing trees such as *Eucalyptus camaldulensis* and/or *Acacia mangium* propagated by cutting and/or tissue culture through modern technology to sell to the Project's participants at 3 baht/seedling. At this price, the Company shall deliver the above-stated fast-growing tree seedlings to the participants at the extension office of the Company in each area or at the center of the village which the participants selected

depending on agreement between the participants and the Company.

3.2 Provide sufficient officers to control, advice, and supervise the participating farmers so they follow the regulations of the Project from the first year till the end of the Project.

3.3 Buy all fast-growing trees from the Project's participants using the documents for advance buying/selling of product which the project administrative sub-committee specified, at the market price but guaranteeing buying at a rate of not less than 850 baht per ton in front of its factory at Sri Maha Bhothi District, Prachin Buri Province. The diameters of the said trees must be not less than 2.5 inches including bark. The Company shall deposit not less 10 percent of value of products it expects to obtain from the fast-growing trees in each operation cycle for the whole project operation period or request guarantee documents such as amount of money from other commercial banks to guaranteed the buying such products from the participants. The company must complete this process before the Project starts.

3.4 Provide the service of cutting and transporting fast growing trees to the Company's factory. The service charge shall be according to the rate specified by the project administrative sub-committee. The Company must pay such service charge in advance. After the Company receives the trees from the farmers, the company must transfer all money from wood sale to BAAC within 7 days. BAAC shall allocate the money from wood sales to repay the debt to BAAC and the company (for cutting and transporting service). The rest of the money shall be transferred to the farmers within 7 days.

3.5 Deposit money in the Project Fund at the rate of 80 baht.

4. In addition to following this MOU, the three parties to agree follow the Project documents.

5. This memorandum is effective from (date) onwards until every participating farmer has repaid all his loan from BAAC under this project.

2. Development of Contract Tree Farming

1) Definition and Characteristics

Contract tree farming is a collective process and arrangement of tree planting programs on a farm in which a farmer and a contract maker (usually a wood-based entrepreneur) benefit from wood products and income in a sustainable manner. Contract tree farming evolved from two distinct experiences: contract farming and reforestation contract. Considering related factors, that is the management objective, target areas, contractors, nature of agreement, and contracting parties, contract tree farming can be divided into three main categories, 1) Tree Planting or Tending, 2) Reforestation Contract, and 3) Tree Farming. In

tree planting and/or tending systems, the focus is on tree planting activities with some maintenance on a short-term basis. The reforestation system is a medium-term agreement with the objective to establish medium- to large-scale forest plantations for government agencies. In tree farming systems, the contract can be based either on incremental yield of standing trees or real products to be harvested with a long-term agreement, at least the time to first cutting. The contract agreement, in general, covers registration for membership and a buying and selling agreement. Additional agreements will be on credit and activities related to tree farming operations. Roy (1963) gave an example of contract tree farming in the USA in which the purchaser has to make payments in advance of cutting. The agreement also covers the payment by purchaser to repair damage caused by logging to ditches, fences, bridges, roads, trails and to other improvements damaged beyond ordinary wear and tear. Furthermore, in case of dispute over the terms of the agreement, both parties have to accept the decision of an arbitration board of three selected persons as final. Each of the contracting parties will select one person, and the two selected will select a third to form this board. My analysis of contract systems in tree establishment is seen in Table I-4-3.

There are arguments on key factors for successful implementation of tree planting by farmers: first, the smallholder secures tenure of his land, changing his status from landless to land owner, and second, there is a guaranteed market for the pulpwood at a guaranteed minimum price. If these two conditions are met, tree planting will be greatly encouraged. Kumazaki (1994) characterized contract tree farming as an economical method. He observed that tree farming can be a multi-product operation and could be a valuable activity if capital and knowledge are available. The market plays a key role in tree farming, and in cases of uncertain supply of tree products, contracts will be used as a means of an agreeable solution for production and selling as well as resolving conflicts. Some critics have alleged that private outgrower schemes are of little value as instrument of development because they rely on large rather than small farmers. In addition, there is some criticism concerning non equity forms of investment, including subcontracting, that are widely and perhaps increasingly used in a wide variety of sectors. The companies provide farmers with an integrated package of services and inputs (some produced by the company's affiliates) and deduct the cost from payments to the farmer at harvest time. There are two sources of credit in the tree farming areas: informal sources, such as relatives, landlords, money lenders, and merchants, and institutional sources, such as banks and cooperatives. Some money lenders do not explicitly set interest but are involved in marketing the produce, which the farmer has no options but to sell to one buyer. Therefore, the tree farmers are definitely forced to bear the brunt of risks and demand fluctuations.

Table I —4—3 Contract Systems in Tree/Forest Establishment

Charac- teristics	Categories			
	Tree Planting or Tending	Reforestation	Tree-farming	
			Incremental yield	Real products
Management objective	To operate tree planting activities	To establish medium - large forest plantation	Encourage establishment of farm woodland	Encourage establishment of farm woodland
Target areas	Public land e.g. roadsides, embankments, catchments	State reforestation areas, medium- large private farm	Private farms	Private farms
Contractors	Qualified individuals or general firms	Qualified individuals or forestry firms	Landed farmers	landed farmers
Nature of agreement	Short term	Short-medium terms	Long term	Long term
Contracting parties	2 parties	2 parties	2-4 parties	2-4 parties
Practical examples	General tree planting programs of the government agencies and private sectors	Government reforestation programs, or private reforestation programs of off- site farmers, absentee landlords	Small and poor farmers requiring short- term regular income	Tree farming of small to medium farmers

2) Evolution

Agricultural production shifted from rice, and rubber to oilseeds, horticulture, fast-growing trees, livestock and aquaculture in the late 1970s. Some of these commodities are import substitutes, and some are inputs for manufactured goods. To support this shift, the BoI revised its Investment Promotion Acts in 1972 and 1977 to promote capital-intensive processing on a broad scale (Christensen, 1992). Among the first industries promoted by the Investment Act of 1972 were feedmilling and vegetable oils. When the Act was revised in 1977, BoI promotion was authorized for fish storage and canning, fruit and vegetable canning,

oil palm crushing and refining, dairy farms, and poultry processing. Wood-based industries have been promoted by the Investment Act since the late 1980s. In line with this, forest land zoning was implemented and the forest policy and laws were revised. Companies which had already implemented contract farming systems started their tree planting program with their contract farmers. Degraded forest land areas were also sought for nucleus forest plantations to supplement wood products from farmers. At the early stage of the new business, wood production was mostly for export. The apparent need for more commercialization has been raised and large-scale wood-based companies are encouraged to accelerate this process. This view is related to a broader initiative known as the "Four-Sector Cooperation Plan" which envisions close collaboration among farmers, private firms, the state, and financial institutions. But there is debate over the land for tree farming planting and tree species to be

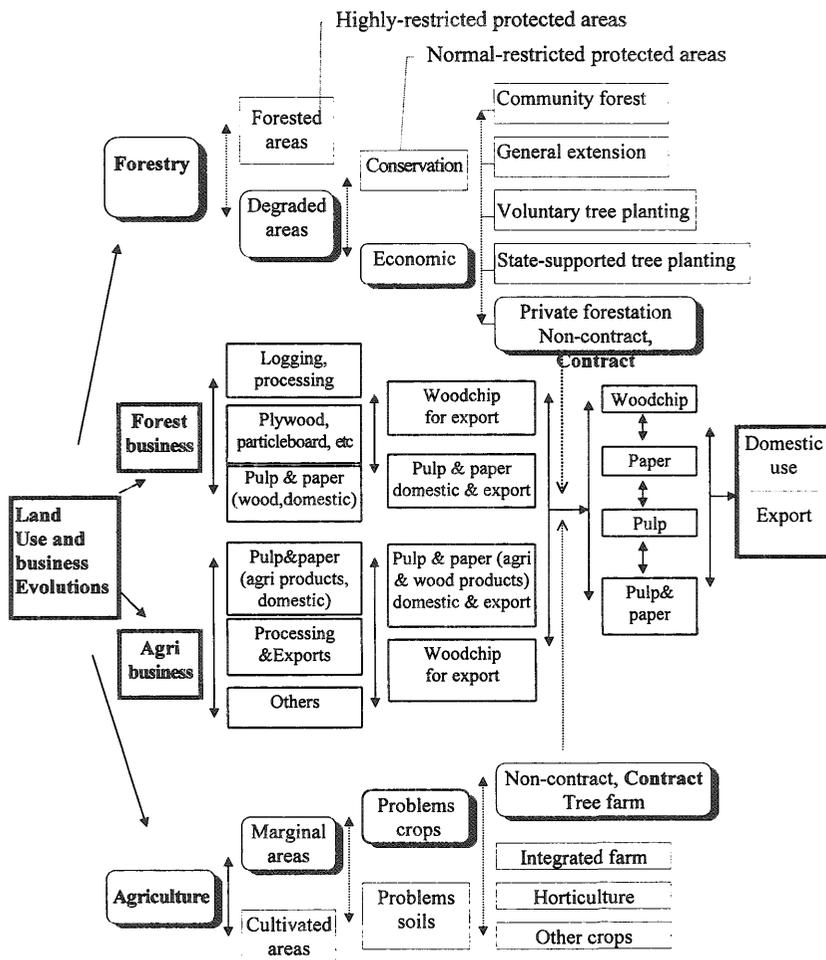


Figure I-4-1 A Framework for CTF Development

planted (see my analysis on the development process of contract tree farming in Figure I-4-1).

From 1987 on, there have been many contract farming projects under the Four-Sector Cooperation, including tree planting promotion programs, for instance, the eucalyptus planting promotion project implemented by VP. Eucalyptus Co. Ltd. from 1987 to 1992; the bamboo planting for paper pulp program implemented by Phoenix Pulp and Paper Co. Ltd. from 1988 to 1991 and the cashew planting promotion implemented by Maboonkrong Sirichai Cashew Co. Ltd. from 1987 to 1992.

In 1993, the Government revised Four-Sector Cooperation in line with the Agricultural and Industrial Development Plan proposed by the MOAC; particularly, the means of agricultural credit promotion was changed from the compensation of the farmer's interest to the low interest rate loan. In addition, methods of agreement and contract making between the private sector and the farmer to buy and sell agricultural products were improved and used from 1994 onwards. The project aims to develop agriculture and agricultural industry as follows: 1) It promotes the adjustment of farmers' agricultural structure from older troublesome types of production to newer types of production in which farmers can gain higher income for goods, and 2) It increases the efficiency of agricultural production of both old and new products especially through buying the farmers' goods at a minimum fixed price in advance. Under the guidelines on implementation, promoted goods include goods with more export opportunity, materials and goods for industry including fast-growing trees and especially wood for paper pulp and other wood products, for instance, *Eucalyptus camaldulensis*, *Acacia mangium*, *Azadirachta excelsa* and *Pinus spp.* Planting areas should be within about 150 km of the industrial plant. Technical, economical, and environmental feasibility as well as proposals and the project managing plans are considered before the project is implemented.

For instance, in 1994, ALRO together with BAAC and other concerned agencies established the project of commercial tree farming in land reform areas of Chachoengsao, Prachin Buri, Sra Kaew and Nakhon Rachasima Provinces. Agrolines represents the private sector in the Eastern and lower Northeastern Regions while the Siam Forestry represents the private sector in the upper Central and the Western Regions. These companies buy the produce at minimum guaranteed prices. The project set the duration for encouraging farmer participation in the Project at five years (the whole operating period is 15 years). In the agreement, farmers must take and repay to the BAAC for the loan¹⁾ including the interest in the 5th, 10th and 15th of the project according to the period which the farmers get the income from the products.

3) Involvement of Business in Contract Tree Farming

Business involvement in tree farming is rather new as compared with cottage industries carried on by people in the Northern Region which developed long before the paper pulp industry was initiated. A small paper mill was first established in Bangkok by the Army Mapping Corps in 1935. Some four years later, an integrated pulp and paper mill with a capacity of 10 tonnes per day started operations in Kanchanaburi, where bamboo, the main raw material, grew in abundance. But the first mill of commercial scale and with modern equipment and manufacturing process was first established in 1958 at Bang-Pa-In, about 100 km north of Bangkok, and commenced operations in 1962. This, again, was an integrated pulp and paper mill based on rice straw and *Penisetum pedicellatum* with a production capacity of 40 tonnes per day. In 1962, there were six paper mills with a total production capacity of 18,000 tonnes per year.

In 1973 and 1974, there was a financial and crude oil crisis, causing imported paper pulp and paper pulp in the country to become a lot more expensive. As a result, manufacturers of paper began to produce paper pulp for their own use. The production of paper pulp for sale in the country began in 1982. At first, paper pulp was produced from field crops such as sugar cane, kenaf, or straw, but these are no longer much used at present due to many factors: the kenaf area in the Northeastern Region has decreased; some sugar factories have moved out of the Central Region; straw is used for other purposes, such as mushroom cultivation. In the meantime, paper pulp factories expanded their production capacity, and thus the factories have had to use fast-growing trees such as eucalyptus, acacia, bamboo as raw material instead of field crops. There are very few producers or sellers in the paper pulp market. Most of them produce paper pulp as raw material to supply paper factories of the affiliated companies, such as the Siam Cement Group. At present, there are three or four producer/sellers. Thus, production is insufficient to meet domestic demand and so marketing policy cannot be freely made. In addition, marketing policy is under the control of the Government.

After the Government began to promote the paper industry, paper factories began buying domestic pulp in 1982. However, the price was still not competitive with that of imported pulp, mainly from Brazil and Portugal. Thus, the Government used a tax measure to protect the paper pulp industry since 1982 by increasing the import tax from 1% to 10%. The importer of paper pulp had to be responsible for the 10% import tax, a 15% commercial tax, a special premium of the Ministry of Commerce, which is 0.5% of import prices (C.I.F.), 10% municipal tax, and a 20% BoI special premium (Thai Farmer's Bank, 1994). Due to this measure, the domestic paper pulp industry was able to compete with the imported paper. Nevertheless, these measures increase the price of paper and do not encourage improvement of production capacity to meet competition and variation of the international market.

Paper pulp is a commodity under export control according to Announcement Number 26 of the Ministry of Commerce issued in 1983. In the year 1993, some paper pulp was exported. The important export markets are Korea, Japan, Taiwan, and India. Pressing problems of the paper pulp industry include the shortage of raw materials, and marketing problems, since the price of the paper pulp depends on overseas price. The paper pulp industry is essential and is related to business and other industries in terms of forward linking effects especially in the paper industry using the paper pulp as raw material for such products as kraft paper, printing paper, hard paper, newsprint, and sanitary napkins. All of these are related to the packaging and printing industries, which use paper as raw material. However, at present, the paper pulp supply in the country is still insufficient. Thus, increased investment in the paper pulp industry is highly attractive (Paritass, 1993). The important raw materials used in the paper pulp industry are kenaf, bagasse, eucalyptus, bamboo, pine trees, straw, *Penisetum pedicellatum*, banana trunks, and waste paper (Industry Center of the North, Possibility of Paper Industry Investment).

There are about 1.60 million ha of rubber trees. Old trees, which yield less latex, are used as material for paper pulp. At present, old rubber trees are cut down and replaced with the young ones on about 48,000 ha each year. However, the trees deteriorate easily and there are also other industries using rubber trees as raw materials, such as the furniture industry. Bamboo has been used for paper pulp production at the beginning. At present, bamboo planting is being promoted in the Northeastern Region as raw material for paper pulp. During 1994, about 16,000 ha of *Dendrocalamus asper* died after flowering and, thus, bamboo could not be used as raw material for paper pulp for a period of time. Eucalyptus was first used as raw material of paper pulp about 10 years ago and is in increasing demand. Eucalyptus plantations can be found in every region. Most of them belong to the private sector. Yet, they cannot meet the demand of the paper pulp factories. Currently, most pulp factories use eucalyptus wood as raw material. The wood is chipped for export or for local production of wood products. Thai Plywood Co. uses *Eucalyptus camaldulensis* in the production of plywood and fibreboard and other hard wood in the production of particle board. Viva Industries Co., which was granted promotional privileges by the BoI in 1984, uses eucalyptus wood in the production of wood cement board. The company has a daily production capacity of 18-20 m³, or 720-800 sheets, of wood cement board, or 4,000-6,000 m³ annually.

There are currently many chipwood factories with promotional privileges from the BoI. One is the VP Eucalypt Chipwood Co., with an annual production capacity of 240,000 tonnes. The factory, located in Bangpakong District of Chachoengsao, is a joint venture between Thai and Taiwanese businessmen. The other two promoted firms are Siam Agrotex Co. and C. Nakhon International Co. The former is located in Chachoengsao and has a total produc-

tion capacity of 561,000 tonnes per year. The latter is located in Chon Buri and has a capacity to produce 150,000 tonnes of wood chips annually.

For supplies of raw material in a wood-based industry, particularly pulp and paper factories, a company cannot rely only on large-scale company forest plantations. Thus, small-scale tree farming is planned to assure a continuous supply. So an increase in areas planted with eucalyptus trees has been highlighted to ensure sufficient supplies of raw material for pulp factories. The early promoters of fast-growing tree cultivation were: Rich Forest Co. (July 1984 at Nakhon Nayok), Siam Agrotex Co. (Aug. 1984 in Ayutthaya), Vanapan Co. (Aug. 1984 in Chachoengsao), Suan Kitti Co. (Aug. 1986 in Chachoengsao), Siam Vana Forestry Industry (Nov. 1986 in Chachoengsao), Siam Forestry Industrial Co. (Nov. 1986 in Chachoengsao), and NR Eucalyptus Agriculture Co. (Jan. 1987 in Phetchaburi) (BoI, 1990). Most of the companies are located in the Eastern and Northeastern Regions. Promoted eucalyptus chipwood factories are: VP. Eucalyp Chipwood Co.; Bangpakong, Chachoengsao; C Nakorn International Co.; Chon Buri; Siam Agrotex Co. Siam Vana Forestry Industrial Co.; Suan Kitti Co.; Siam Forestry Industrial Co.; NR Eucalyptus Agriculture Co., Phetchaburi; Thai United Chipwood, Chon Buri; Thai Vitawat Corp., Surin; Thai Wood and Pulp; and Thai Paper Factory Commercial, Nakhon Ratchasima (Bangkok Post, 1987; BoI, 1990).

Currently, fast-growing trees have been widely promoted. More projects have been initiated, especially in the land reform areas in Uthai Thani and Ratchaburi Provinces. The farmers of Uthai Thani formed a cooperative group to supply their produce to affiliated companies of the Siam Cement Group to produce paper pulp and paper. At present, the farmers alone bear all risks of the project. The bank asked for a 10% deposit from the company as a guarantee that all the farmers' produce could be sold. Ungpakorn (1996) suggested that in solving this problem, crop insurance would be used with three insurance guidelines on how to compensate, and the payment for insurance would be considered by the RFD. First option: the farmers possess the trees/wood. The compensation would be according to the ratio of cost on the damaged date. In years one to five, the compensation would be 110, 125, 150, 175, and 225%, accordingly. In such case, the payment for insurance would be 40, 48.13, 56.25, 62.50 and 64.38 baht per ha. The second option is that 60% of the remaining trees belong to the insurance company, and 40% of substituted value belongs to the farmers. The insurance fee for five years is 712.50 baht per ha. If this method is used, some remaining might be left while some were completely destroyed. The third option is appropriate for the well-established farmers because the insurance fee is high, the rights to remaining trees belong to the company solely. The insurance fee is 1,093.13 baht per ha for five years. The farmers would get the highest benefit of 78 times of the insurance fee. And if there is any damage, the farmers must not be held responsible for selling remaining trees.

3 . Forest-Related Industry

1) Demand Incentive in Tree Products

Trees and tree products are used in Thai society in many ways, for instance, fruit, edible leaves, firewood, timber, fibre, and so on (Corvanich, 1992). At present, wood is still a basic raw material and is used for building construction, industrial poles, furniture, handicrafts, etc. However, a reduction in timber output to 500 thousand m³ in 1990 occurred due to a general nationwide cancellation of all timber concessions imposed by the Government in 1989; thus the nation's wood supply can only be secured by import, and local wood supply can be happened on a small scale.

Despite the fact that there are more than 500,000 ha forest plantations under the RFD and another 80,000 ha of forest plantations under the FIO, social and environmental conditions do not allow the Government to do extensive commercial logging. At present, the need of wood is rising. The RFD (1993) estimated that about 500,000 tonnes per day of trees with the diameters of 12-15 cm are needed for use as fuel and poles and at least 2,000 tonnes per day of trees with the diameters of 4-5 cm for general uses. In addition, an average of 22 kg per person per year of wood is needed as raw material for paper. A great amount of wood is imported (Subrungrueng, 1995).

Total fuelwood consumption, including household charcoal, household fuelwood, and industrial fuelwood, was estimated at 26.45 million tonnes in 1997, of which the industrial sector takes a major part. Consumption of fuelwood is expected to decline because of replacement of wood as an energy source by other fuels. Some analysis revealed that energy plantation would not be profitable at present fuelwood prices, thus fuel will be a by-product of industrial plantation. Approximately 1.9 million m³ of poles are used in the residential and industrial construction sectors. However, due to the shortage of wood supply, other materials such as concrete and steel are being substituted for poles. The absolute demand for wood poles may remain at the present level, or even decline in the future because of substitution.

Consumption of sawn hardwood is also very high. The demands for sawn hardwood and sawn rubberwood are expected to grow at the rates of 4% and 2% per year, respectively, and both will reach over 10 million m³ in the year 2017. The consumption of plywood and veneer, mostly used in construction and furniture manufacture, is also expected to grow at the rate of 4.3% and to reach about 1.28 million m³ in 2017. Consumption of wood-based panels, fibreboard and particle board is estimated at about 0.59 and 1.86 million m³ in 1997 and 2017, respectively. Consumption of furniture and joinery products within the country is steadily increasing. The expansion is export driven. The manufacture of rubberwood furniture and parts accounts for 80-85% of total wooden furniture exports.

The consumption of paper and paperboard was 1.14 million tonnes in 1990. The Thai paper,

mostly kraft paper, and paperboard industries have expanded fast due to high demand which is influenced by economic growth. In 1997, the total paper demand is estimated at 2.2 million tonnes, and this will increase to 7 million tonnes in 2017. Total fibre consumption in 1990 was 0.95 million tonnes, of which 71% was from waste paper and 29% was virgin fibre pulp. The future demand for paper-making fibre is expected to depend on the development of the

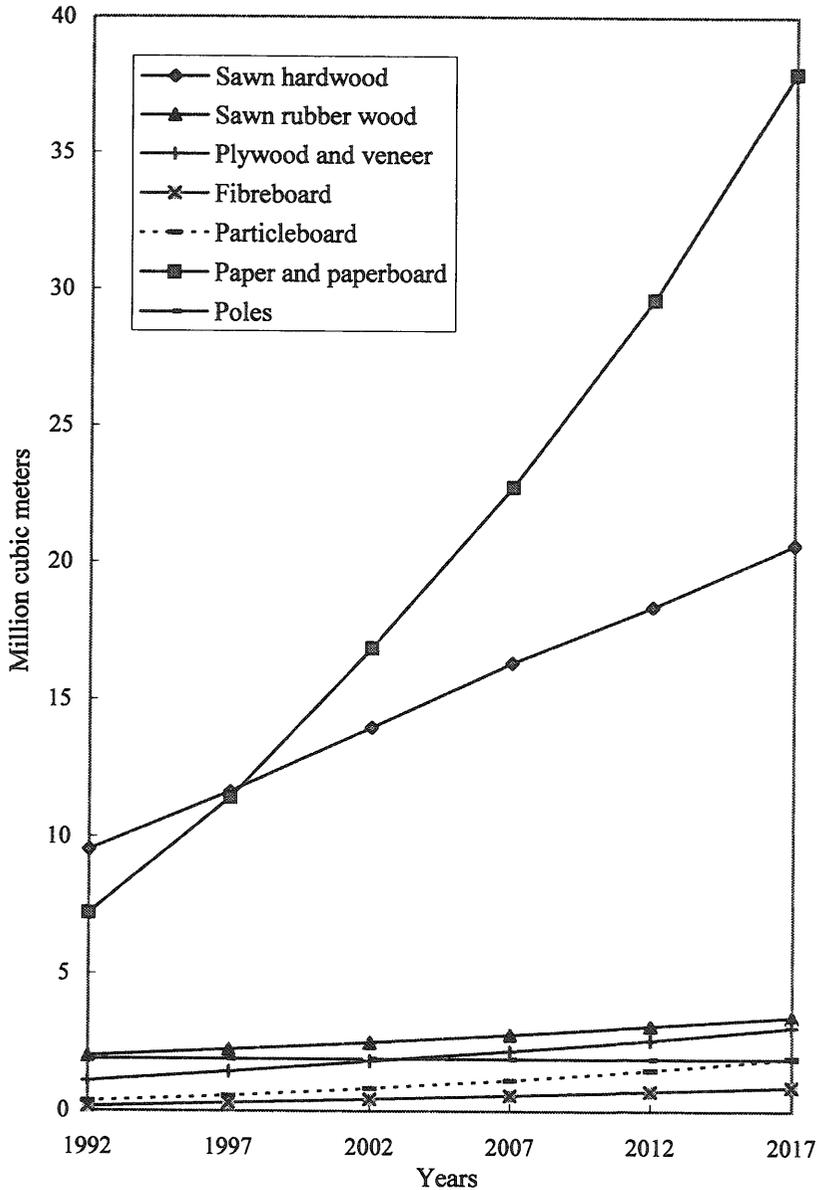


Figure I—4—2 Roundwood Requirements for Various Wood Products
Source: RFD (1993)

domestic production of paper and paperboard and exports. Projected consumption of paper making fibres on the basis of current trends, constant capacity, is about 2.5 thousand tonnes per year between 1997 and 2017 (see Figure I-4-2).

The Paper and Paper Pulp Association reported that 250,000 tonnes of wood of fast-growing trees was used in 1995, and this will increase to 475,000 tonnes in 1996 and 565,000 tonnes in the year 2000. In 1999, the need for paper pulp in Thailand will be about 403,000 tonnes, and in the year 2004, about 1,284,000 tonnes per year. However, due to the availability of foreign markets, the existing pulp and paper factories may increase their production capacity and new factories may be established (RFD, 1993).

2) Wood-based Industries

According to MOAC estimates, Thailand currently consumes about 3900 thousand m³ of timber per year. To acquire part of this, Thailand spends almost 5,000 million baht annually importing about 180,000 tonnes of paper and 80,000 tonnes of paper pulp. (Budga, 1995; FAO, 1994). Statistics on wood manufacturing factories in 1993 revealed that there were 26 plywood factories producing veneer; 14 factories producing fibreboard; five factories producing particle board; and 63 factories producing paper pulp. Of the pulps factories, four used

Table I—4—4 Some Selected Companies, Production Capacity and Input Materials for Thailand's Paper Pulp Industries in 1993

Companies	Year Which the Production Commenced	Production Capacity, tonnes/year	Materials Consumed
Phoenix Pulp and Paper Co.	1982	100,000 (to be increased to 200,000 in 1994)	45-50% eucalyptus, 45-50% bamboo,
Siam Pulp Co.	1982	44,000	100% bagasse
Siam Cellulose Co.	1992	55,000	50% Eucalyptus 50% Bamboo
Bang-Pa-In Paper Factory	1945	10,000	Rice straw 100%

Source: After Suwanmena, P. 1994. AFTA's Impacts on Thailand's Paper Pulp.

eucalyptus, miscellaneous wood and bagasse as raw materials (RFD, 1993). The total production capacity of the country's wood-based factories is 1.4 million tonnes per year which is four times greater than existing woodchip production. Thus, there is a great demand for timber for processing by the existing production capacity of wood-based factories. A list of selected wood-based companies and pulp and paper companies with BoI promotion is given in Tables I-4-4 and I-4-5.

3) Company Involvement in Tree Farming/Contract Tree Farming

Despite the arguable impact on land fertility, eucalyptus plantations have been increasing steadily. The BoI, in 1987, granted promotional privileges to seven companies to grow some 8,000 ha of eucalyptus trees. Those companies are Rich Forest, Siam Agrotex, Vanapan, Suan Kitti, Siam Vana Forestry Industrial, Siam Forestry Company and NR Eucalyptus Agriculture. The plantations were in Chachoengsao, Nakhon Nayok, Phetchaburi, Ayutthaya, and Pathum Thani Provinces.

The Union Agro-Industry Co., which is an affiliated company of the Sahaviriya Group, has already planted some 800 ha of *Eucalyptus camaldulensis* in Chachoengsao. The Company plans to plant a total of 8,000 ha of the trees in the Eastern Provinces in order to supply wood to VP Eucalypt Chipwood Co., an affiliated company producing eucalyptus wood chips for export. The Union Agro-Industry Co. also plans to set up a pulp factory using eucalyptus wood as raw material.

The Shell Company of Thailand applied for promotional privileges from the BoI in 1987 for its project, with 1,200 million baht for a nursery, to grow eucalyptus for the production of wood chips for export. The company sought approval from the RFD for a 30-year concession of 20,000 ha of degraded forests in Tha Mai District of Chanthaburi Province. The company planned to use 17,600 ha for planting eucalyptus, while the other 2,400 ha would be used to set up a community for existing settlers to be employed under the project. According to the company, 3,520 ha of eucalyptus would be cut annually after the third year of operations to produce 900,000 tonnes of wood chips in its own factory to be set up in the Mab Ta Phud Industrial Estate in Rayong. The RFD approved the proposal, but the MOAC halted the plan due to strong arguments and opposition from local people and environmentalist groups.

The Siam River Kwai Pulp Co. plans to invest 500 million baht in planting 16,000 ha of eucalyptus in Bor Phloi and Lao Khwan Districts of Kanchanaburi Province. The eucalyptus wood will be used as a raw material in a pulp factory to be set up in an area straddling Kanchanaburi and Suphanburi at an estimated cost of 3,000-4,000 million baht. It will take about three years to complete the construction of the pulp factory and this will coincide with the first cutting of the eucalyptus trees. The company is waiting for approval from the ALRO

Table I — 4 —5 Wood Pulp and Paper Companies Promoted by the BoI

Name	Production Capacity tonnes/year	Products
1. Asia Kraft Paper Co. Ltd.	68,000	Kraft, Linerboard, Corrugating Medium
2. Cellox Paper Co. Ltd.	14,000	Sanitary paper
3. Hiang Seng Fibre Container Co. Ltd.	270,000	Kraft, Printing, writing paper
4. The Industrial Krungthai Co. Ltd.	28,000	Kraft, Printing, writing paper
5. Kimberly-Clark Thailand Co. Ltd.	19,000	Sanitary Napkins, Tissue paper
6. Siam Kraft Industry Co. Ltd.	260,000	Kraft
7. Siam Paper Co. Ltd.	15,000	Printing, writing paper, Photocopying paper
8. Teppattana Paper Mill Co. Ltd.	14,000	Kraft, Printing, writing paper
9. Thai Card Board Co. Ltd.	23,000	Duplex board, Chipboard
10. Thai Development Paper Co. Ltd.	72,000	Kraft
11. Thai Paper Co. Ltd.	172,000	Printing, writing paper
12. Thai Scott Paper Co. Ltd.	21,000	Toilet paper, Facial tissue, Sanitary Napkins
13. Thai Union Paper Public Co. Ltd.	70,000	Kraft, Printing, writing paper
14. Central Paper Industry Co. Ltd.	65,000	Printing, writing paper
15. The Eastern Industrial Co. Ltd.	47,000	Kraft, Printing, writing paper
16. Hi-Tech Paper Co. Ltd.	33,000	Printing, writing paper
17. Patoom Dhanee Paper Factory Co. Ltd.	20,000	Kraft
18. Shin Ho Paper (Thailand) Co.Ltd.	100,000	Newsprint
19. Tenma Paper Mill (Thailand) Co. Ltd.	36,000	Duplex board
20. Tong Long Thai Paper Co. Ltd.	10,000	Printing, writing paper
21. Victory Paper Co. Ltd.	4,000	Sanitary paper, Toilet tissue

Table I —4—5 Wood Pulp and Paper Companies Promoted by the BoI (cont'd)

Name	Production Capacity tonnes/year	Products
22. Arpachai Co. Ltd.	2,400	Kraft
23. Bānglane Paper Co. Ltd.	30,000	Paper board
24. C.A.M. Paper Co. Ltd.	600	Core paper, Chipboard
25. Capital Paper Manufacturer Co. Ltd.	6,000	Duplex board, Grey Chipboard
26. Charoen Chai Co. Ltd.	3,600	Kraft
27. Inter Paper Co. Ltd.	7,200	Printing, writing paper
28. Mahachai Kraft Co. Ltd.	2,400	Kraft
29. Pad Riew Paper Co. Ltd.	5,000	Kraft
30. Panda Paper Co. Ltd.	3,000	Kraft
31. Panjapol Paper Co. Ltd.	277,000	Kraft, Linerboard
32. Siam Paper Co. Ltd.	19,800	Kraft
33. Sirisak Paper Co. Ltd.	9,000	Printing, writing paper
34. South East Asia Co. Ltd.	4,000	Duplex board, Chipboard
35. Sunny Pulp&Paper Co. Ltd.	3,500	Sanitary paper, Toilet tissue
36. Supattanakorn Co. Ltd.	36,000	Paper board
37. Thai Cane Paper Co. Ltd.	100,000	Kraft
38. Thai Charoen Co. Ltd.	3,600	Duplex board
39. Thai Kraft Paper Co. Ltd.	260,000	Kraft
40. Thai Pad Riew Co. Ltd.	10,000	Kraft
41. Thai Product Co. Ltd.	15,000	Kraft
42. Thai Union Paper Co. Ltd.	76,000	Coated duplex board
43. Thanatarn Paper Co. Ltd.	9,000	Toilet paper, Recycled tissue paper
44. United Paper Co. Ltd.	99,000	Kraft
45. Wattana Co. Ltd.	1,500	Kraft

Source: Thai Pulp and Paper Association (1995)

to grow eucalyptus in the two districts and the Board of Investment's approval for promotional privileges. It will acquire technical support from overseas firms.

The Siam Cement Group has also promoted eucalyptus tree farming for wood to feed its pulp factory. The group has already approached the ALRO for 3,200 ha of land in Bor Phloi District of Kanchanaburi Province. Recently it received approval to expand the new project, which is divided into three phases: growing trees, pulping, and paper production.

The Thai Plywood Co. has planted more than 1,920 ha of eucalyptus trees in Chachoengsao, Uthai Thani, Phetchabun, and Chumphon Provinces. Most of the trees planted are of the species of *camaldulensis*, which the company uses in the production of fibreboard. The Company has also planted *Eucalyptus deglupta* which, although more difficult to plant compared with *Eucalyptus camaldulensis*, is a better material for the production of particle board.

In 1990, the Government planned to encourage the private sector to establish newsprint and paper pulp factories in the Northeast. According to government policy, the two projects are part of the "Green Northeast" project. The Government has already conducted a survey on a pilot project to turn some 64,000 ha of poor land into eucalyptus plantations with the expectation that there will be sufficient supply of raw material for newsprint and pulp factories (Bangkok Post, 1987, 1989 and 1990).

4) Overview of Four Selected Companies' Promotion Areas

Tree farming has largely been developed in a marginal land, since 1975, particularly in the repeated cultivation-damaged areas in the Eastern, Western, upper Central, and the North-eastern Regions. Furthermore, the area in the Eastern Region faces a critical lack of farm labor. The Western Region faces labor problems as well as land problems since 26% of farmers have to rent agricultural land. The upper Central Region faces the infertility of land and variation of the climate. The Northeastern Region faces deteriorated land and drought. The problems of the four areas are the main factors leading farmers to decide to plant fast-growing trees for sale instead of other crops.

Tree farming started differently in each region. In the Eastern Region, tree farming began in Chachoengsao Province and has been expanded gradually to Prachin Buri, Sra Kaew, and Chon Buri Provinces, the wood being sold to wood-based forest industries and building construction business. Contract tree farming was started recently in specific areas in the Plang Yao and Sanam Chai Khet Districts of Chachoengsao Province. In some parts of Prachin Buri, Sra Kaew and Chon Buri Provinces, contract tree farming is also gradually being introduced, but at present on a small scale. The companies of the Saha Viriya Group and the Suan Kitti Group are pioneers on CTF in this area, but the Saha Viriya Company

shifted its focus to other businesses while the Suan Kitti Company keeps promoting and expanding CTF to other areas. Therefore, the study of the long experience with contract tree farming in Plang Yao and Sanam Chai Khet Districts of Chachoengsao Province under the promotion of Suan Kitti Company will be useful for understanding and further discussions on the future development and expansion to other areas in this region.

In the Western Region, tree farming is extensively practiced in the upland dry areas; these are Chom Bung and Suan Pueng Districts of Ratchaburi Province, and Dan Makam Tiea and Lao Kwan Districts of Kanchanaburi Province. Contract tree farming began specifically in upland areas of Chom Bung and Suan Pueng Districts of Ratchaburi Province under the promotion of Siam Forestry Company and has been gradually expanded to other upland areas in the region. Suan Pueng was the first area in which contract tree farming was established. Thus, the study of the long experience with contract tree farming in the Suan Pueng area under the Siam Forestry Company will definitely be useful for understanding and further discussions on operational promotion in potential tree farming areas in the region, particularly in areas where sugar cane plantations have been gradually given up.

In the upper Central Region, industrial forest plantation with some local tree species was tried, but did not succeed. Tree farming was established on a small scale in Saraburi, Lob Buri, Nakhon Sawan and Uthai Thani Provinces, mainly in areas where previously maize and beans were cultivated. Contract tree farming has been established in some specific areas of Lan Sak, Huay Khot, and Ban Rai Districts of Uthai Thani Province by the Forest Plantation Unit of the Thai Plywood Company. According to the Company's policy, the development of contract tree farming has been slow but has potential to expand since the Company launched a new factory recently which requires a great deal of raw material. Therefore, the long experience with contract tree farming of the Thai Plywood Company in the Lan Sak area will be useful for understanding and further discussions on the future development and expansion in Uthai Thani and other provinces in this region.

In the Northeastern Region, tree farming has been extensively developed, particularly in the lower and the middle parts of the region around wood-based industrial factories, for instance, the Phoenix Company in Khon Kaen, the Thai Paper Company in Nakhon Ratchasima, and the Thai Vittawat Company in Surin. Some forms of contract system in forestry, such as tree planting and maintenance contracts, reforestation contracts, and harvesting contracts, have been implemented. However, contract tree farming was initiated in specific areas under the promotion of the Phoenix Company in Ubolratana and Nam Pong Districts of Khon Kaen Province and is currently being expanded to provinces in the upper part of the region: these are Udon Thani and Nong Khai Provinces, where wood-based factories have recently been established. In some areas of Ubolratana District, where land

was allocated to farmers under the Self-help Land Settlement Project of the Department of Public Welfare, and where contract tree farming of fast-growing trees and bamboo was first began under the promotion of the Phoenix Pulp and Paper Company, farmers have longer experience in taking part in this tree farming system than those in other areas. Thus, the experience in specific areas of Ubolratana District will be useful for understanding and further discussions on the future development and expansion of contract tree farming in other areas in the region.

Notes

- ¹⁾ The system is being reviewed by the MOAC. In existing system, BAAC extends soft loans to farmers, farmers are obliged to buy production inputs from the contracting firms. The firms in turn buy the produce from them at a pre-determined price in the contract. The new system, or the cost-sharing system, private firms will take soft loans from BAAC or other commercial banks at 5% interest and transfer the cash to farmers or provide them with equipment and production inputs. Besides, the firms have to deposit cash with BAAC amounting to 10% of the value of the produce. This money will be used to assist farmers if they have crop failure.

PART II

CASE STUDIES ON CONTRACT TREE FARMING

Chapter 5

An Analysis of Contract Tree Farming by the Agrolines Company The Case Study of Baan Moo Song, Chachoengsao Province

1 . Features of the Company

The Suan Kittti Company is a subsidiary of the Kaset Rungruang Group of companies exporting agricultural commodities. The Company is located at Khao Hin Sorn Sub-District of Panom Sarakham District, Chachoengsao Province. The business of the Suan Kittti Pulp and Paper Company includes a large-scale tree nursery in Panom Sarakham District, the

Advanced Agro Pulp and Paper Company, whose production capacity is 175,000 tonnes per year, located at Tatom District of Prachin Buri Province, and the Suan Kittii Reforestation Company at Panom Sarakam. The Agrolines Company, located at Panom Sarakam, was established as part of the Suan Kittii Reforestation Company to handle the tree planting promotion project, including CTF with general farmers and farmers under the Four-Sector Cooperation Program. The Company entered into the pulp and paper business in 1982, when there was instability in agricultural business, with the planting of forest trees on the firm's own lands. In 1986, the Company began to investigate a more comprehensive program, including research on nursery techniques and cultivation practices (Puu Chad Karn Rai Duan, 1990).

The company's initial objective was to produce 50,000-60,000 tonnes of woodchips per year for export. The Company began to produce paper in 1995 from imported pulp. Since 1996, paper has been produced from pulp made by the company from eucalyptus wood. The Company requires about 32,000 ha of land area (200,000 rai) to produce 900,000 tonnes of woodchips per year to meet the paper pulp production target of 300,000 tonnes per year.

The Company is able to procure raw materials in three ways: 1) the company's forest plantations in Sanam Chai Khet District and other provinces, 2) direct purchase of wood from farmers or traders at the factory and 3) making contract agreements with farmers. The company's plantations were established in an area of about 32,000 ha in six provinces on the company's purchased land and on rented forest land in Chachoengsao and Sra Kaew Provinces. In direct purchasing of wood, the Company buys at the factory. The tree planting is promoted by selling seedlings to interested people at the price of 3 baht per seedling. As for the CTF, the Company makes contract with farmers through its field units.

Two extension programs are being implemented: the company-managed program and the four-sector cooperation program. The former has been operated since 1990 with 1,206 farmers in Chachoengsao, of which 217 participating farmers were in Plang Yao District. The latter is being developed in cooperation with ALRO, BAAC, RFD, and farmers. Extension areas for tree farming have been focused on the Eastern, that is, Chachoengsao, Chon Buri, Prachin Buri, Sra Kaew, and lower Northeastern Regions, that is, Buri Ram and Nakhon Ratchasima, within 100km from its factory. The Company founded its extension office in February 1991. Each extension office has 4-5 staff members and 40-50 extension workers who work with farmers from the time the trees are planted till they are cut. There are four branches. The one at Sanam Chai Khet District handles extension activities in the Chachoengsao area, the office at Bor Tong District is responsible for the Chon Buri areas; the Wattana Nakhon branch at Sra Kaew Province is responsible for Sra Kaew and Prachin Buri Provinces, and the extension branch at Pak Thong Chai, Nakhon Ratchasima Province is

responsible for provinces in the lower Northeastern Region, which launched operations recently, in 1994.

2 . Contract Agreement and Its Characteristics

The Company has one contract form, namely “Contract agreement on fast-growing tree planting”. This contract was prepared by the Agrolines Company to be used in the project of fast-growing tree planting promotion in which the Company is the promoter and the farmer is the member. The contract consists of two major elements: 1) the Company sells tree seedlings to the participating farmer and 2) the participating farmer sells wood produced to the Company (see details in Table II-5-1).

The conditions for buying tree seedlings from the Company are as follows: 1) the farmers must buy tree seedlings from nursery of the Company at the factory 2) the Company sells seedlings to the member for three baht per seedling with no tree selling condition. The farmers can sell their trees to anyone, 3) if farmers buy seedlings at two baht per seedling, they must sell the trees back to the Company. The contract does not mention a date of expiration. To enter into the contract, farmers must have land with or without land right certificates, including Por Bor Tor 6¹⁾. The farmers must buy tree seedlings from the nursery²⁾ of the Company at the factory at Khao Hin Sorn, Panom Sarakham District. The Company agrees to buy the wood produced from the participating farmers at the market price and guarantees a minimum price of 850 baht per tonne at the factory. Each year, farmers buy tree seedlings from the company nursery to plant in an area of 6,400–8,000 ha.

As the competition in wood buying in this region is increasing, the demand for tree seedlings, specifically high quality ones, is also increased but cannot be met by the current supply. Thus, quality seedlings are in demand and easily sold. The contract agreement concerns only the selling of quality tree seedlings to the contracted farmers. The Company's extension units will be responsible in the provisions on tree planting, maintenance and management. The trees planted by participating members have to be managed in such a way that the wood requirements of the factory can be met. Other investment inputs such as fertilizers and chemicals are sold separately for cash or on credit by a company in Suan Kitti Company group. The Company will advance the expenses for cutting and transporting wood to the factory.

While promoting CTF, the Company is doing more investment in a company's own plantation in terms of research and development in tree breeding and management in order to increase yields per unit area as well as buying more land for the establishment of forest plantation. This implies that current CTF promotion of the Company is a short-term wood procurement strategy for its recently established factory and the promotion system very

Table II— 5 — 1 Agreement of The Agrolines Company, Form SS. 10 (2)

Contract Agreement on Fast-Growing Tree Planting
Contract Agreement No. ...

This agreement/contract is made at Agrolines Co. Ltd. on(date..) between the Agrolines Co. Ltd. by, acting on the behalf of the Agrolines Co. situated at 903 Moo 2, Tambol Khao Hin Sorn, Panom Sarakam District, Chachoengsao Province, which will be termed “promoter”; and (Mr./Mrs./Miss) of, Moo....., Tambol, District, Province, whose i-d. card no. is and will be termed “member” in this agreement/contract. The two sides agree to:

1. The promoter agrees to accept the member and the member agrees to participate in the project of fast-growing tree planting promotion. The membership number is
2. The promoter sold and the member bought the high quality eucalyptus seedlings for the amount of which cost baht (..... baht)
3. Should the member want to buy more eucalyptus seedlings in addition to those in No.2, he/she must state the amount and the cost of the seedlings he/she bought in addition in the amount and price list of eucalyptus seedlings enclosed with the agreement/contract of No.2.
4. The promoter will give technical advice of how to plant and take care until the eucalyptus grows up and could be cut.
5. If the eucalyptus bought by the member are damaged or lost in any case, the member promise to inform the promoter, as soon as possible, so the promoter would give technical advise to prevent or cure them.

Numbers and Prices Lists of Eucalyptus Seedlings Enclosed with the Agreement Copy

Number DateBetween The Agrolines Co. Ltd. and (Mr./Mrs./Miss)

Number of Membership ...

Date of receiving additional seedlings	No. of seedlings	Cost of seedlings	Signature of promoter	Signature of member

much emphasizes the selling of tree seedlings and farm inputs as it did in the contract farming. In the future, when wood produced by the company's forest plantations is sufficient, the procurement of wood by direct purchasing and CTF may be significantly reduced to a small quantity, and this will definitely affect the selling of wood produced by CTF farmers after the first tree cutting, when contract agreements expire. Farmers will also face difficulty in changing from tree farming to other commodities since the cost of uprooting tree stumps is high. In the present contract agreement, farmers bear all production risks and perhaps share some risk on marketing from the second rotation onward.

It is likely that the contract agreement of the Agrolines Company presents a mid-term economic incentive to tree farming without any kind of subsidy but with technical supports. The CTF of the Agrolines Company has four functions contributing to the agriculture, forestry, and industrial sectors: 1) It encourages mid-term to long-term land utilization on idle farm land and marginal cassava fields, 2) It encourages the development of wood resources on private farm land, 3) It secures inflow of raw material to the Company's factories, 4) It encourages the development of a forestry extension system at the farm level, and 5) It is a response to the governmental policies on "the development of wood resources to substitute for imported wood", "private re-forestation", and "the adjustment of agricultural production structure".

3 . Area Analysis-Baan Moo Song

Baan Moo Song is located approximately 60km southeast of the Chachoengsao Province. It is accessed by car by traveling from the provincial town on the Chachoengsao-Kabinburi road to Bang Khla District, and then from Bang Khla to Baan Moo Song through Plang Yao District (Figure II-5-1).

The land use in the Nong Mai Kaen area was previously forest and was mostly cleared by people migrating from Chon Buri Province and Min Buri District of Bangkok, as well as many provinces in the Northeast, for field crop cultivation since the 1970s. This village is a part of Nong Mai Kaen Sub-District, which was established in 1982. In analysing regional situation, land use, agricultural situation, and socioeconomic development related to CTF of the Agrolines Company in Chachoengsao Province is reviewed as below.

Chachoengsao Province covers the area of 542,200 ha, of which 56.35% is under agriculture and 22.41% is under forest. The western side of the province is fertile lowland suitable for paddy cultivation. Therefore, paddy fields in this low land area, and some parts have been made into fruit orchards. The eastern side, covering Panom Sarakham, Sanam Chai Khet and Plang Yao Districts, is elevated land. Most land is used for field crops and livestock raising. In some areas, rubber trees and eucalyptus are also planted.

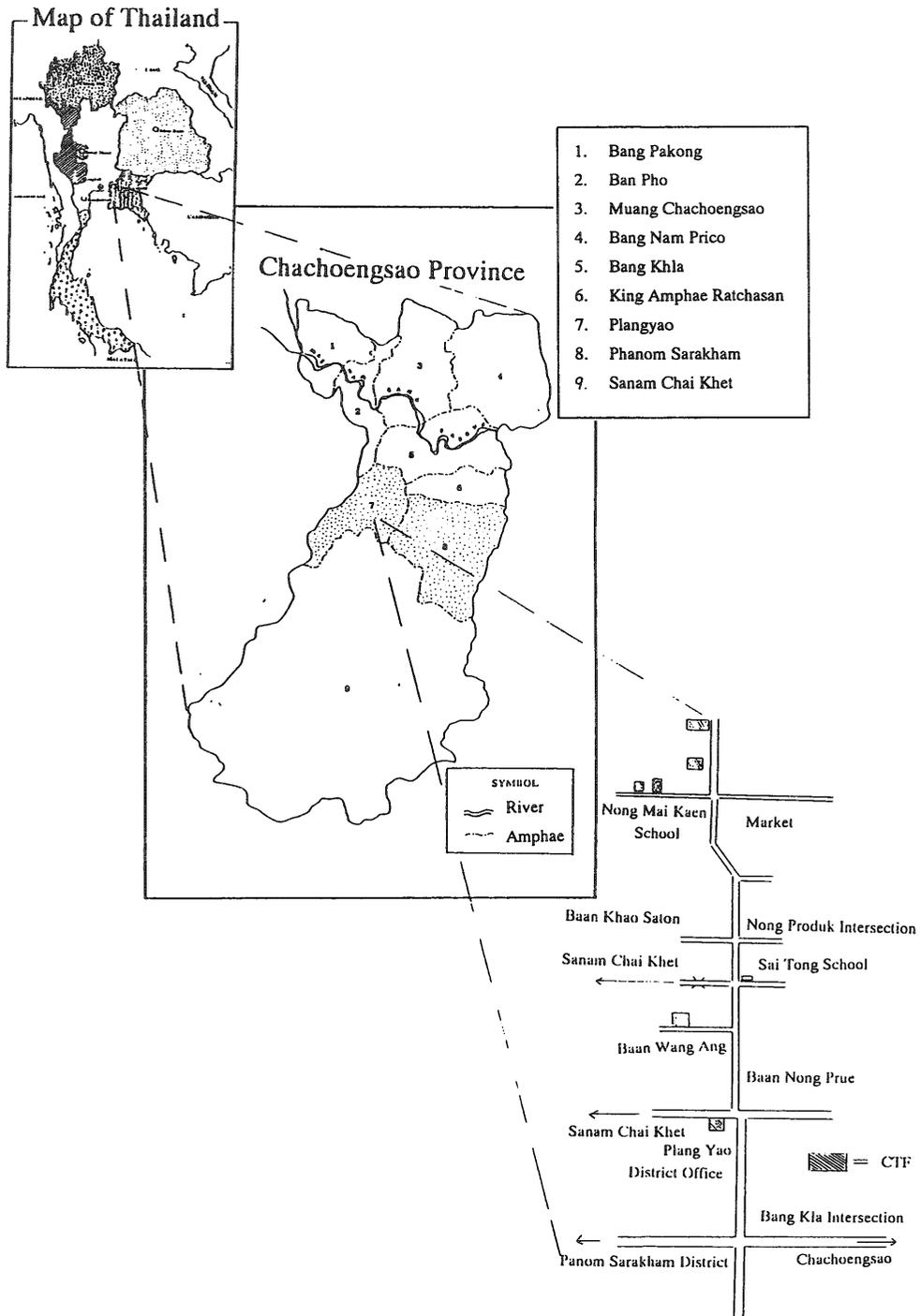


Figure II—5—1 Location of the Study Area in Chachoengsao Province

The forested areas account for 24.54%, or 131,298.08 ha. Intact forests, which were designated as the Aung-rue-nai Wildlife Sanctuary, cover the area of about 14,076.01 ha, or 16.43%, in Panom Sarakham and Sanam Chai Khet Districts. About 118,056.96 ha, or 22.10% of the land, which was identified unsuitable for agriculture, such as steep slope or mountainous areas with a high content of stone and pebbles in the soil, was designated for reforestation. The deteriorated forest reserve areas of 118,880 ha were distributed to farmers through the agricultural land reform project, particularly in Plang Yao and Sanam Chai Khet Districts.

Chachoengsao Province consists of nine districts, 91 sub-districts and 786 villages. The total population is 586,424, of which 52.43% are male and 47.57% are female, the average population density is 107 per km², and the population growth rate is 1.56%. About 65,000 households are engaged in agriculture. The agricultural land holdings increased during 1975-1979; that is, in 1975, 1976, 1979 the agricultural land holdings were 35.56%, 37.55% and 38.63%, respectively. This number decreased to 37.30% in 1981 and to 36.43% in 1986. About 70.87% of the agricultural land is used as rice fields, 49.96% as plantations, 10.80% as grassland and 6.48% for permanent trees.

According to the Agricultural Census of 1993, the total number of agricultural holdings was 46,427, covering an area of 215,991.36 ha. About 94.93% of the total were holdings with cropland and 5.07% were holdings with no cropland. In the latter case, most farmers raise livestock. The major portion (57.88%) of the agricultural area was planted with rice, followed by field crops and permanent crops, accounting for 21.39 and 10.06%, respectively. The size of land holding was averaged between 3.2-6.24 ha, or 20-39 rai. The number of holdings having an area less than 6.4 ha (40 rai) was 76.07%. The number of holdings of large size (6.4 ha and over) occupied 23.93% of the area, of which 1.26% was holdings with the area of 22.4 ha, or 140 rai, and over. The majority of holding (87.28%) was under one land tenure form.

As for employment, 50.84% of the total holding employed agricultural workers, of which 48.23% were holdings that occasionally employed workers. As for the age distribution, members of a family under twenty five years of age were the majority, that is, 43.15%. About 58.47% of members aged from thirteen years old engaged in agricultural work conducted by their families, only 24.23% engaged in their family's agricultural work as well as other works, only 6.51% did not engage in the family's agricultural work. This indicates that agricultural practice is partly depended on occasional wage labor and some portion of the farmers' income came from off-farm activities.

In forest extension, the Government has attempted to implement reforestation policy by promoting tree planting on private farm land. Forest tree seedlings distributed to farmers

free of charge are *Eucalyptus camaldulensis*, *Azadirachta indica*, and *Cassia siamea* and those planted to rehabilitate protected forest are *Leucaena leucocephala*, *Acacia catechu*, and *Tamarindus indica*. According to the provincial forestry statistics, there are six wood processing factories and fifty four timber and furniture enterprises.

Nong Mai Kaen was established as the latest Sub-District of Plang Yao District, in 1985. The sub-district has an area of 5,000 ha (31,250 rai) of which 4,950 ha, or 98%, is under agriculture. Of this agricultural land, 65.62% is under field crops, and 31.44% is under fruit trees. Tree crops such as pararubber, cashew, bamboo, eucalyptus are extensively planted, accounting for 66% of the total agricultural land area. Actually, Baan Moo Song has two cluster villages, namely Baan Nong Mai Kaen, and Baan Nong Soi Ting. This study concentrates on Baan Nong Mai Kaen, where tree farming was started.

Baan Moo Song has 232 households and 959 people, of which 452 (47.13%) are male and 507 (52.87%) are female. About 74% of the total population have completed the compulsory-level education or higher but have no further study. Some (17.22%) are studying at a level higher than the compulsory level; of these, 16.12% are in the high school, 0.83% are at a level higher than high school. Vocational training activities were not available. Water sources for drinking and households uses are available to all households. Generally, people drink water from shallow wells in the village. The sources of water are ground-water and shallow wells. None of the households has access to water for farm uses. Therefore, the cultivation depends solely on rain water. Basic public services available were religious places, secondary schools, village reading places, village meeting places, and public libraries. Some important basic services related to occupational promotion such as rice banks, common places to collect agricultural products, cooperative stores, information dissemination houses etc. were not available. However, services lacking in Baan Moo Song are available in Plang Yao Sub-District, about 23 kms from the village (CDD, 1995).

The total area of Baan Moo Song is 3,688 ha (23,050 rai), of which 3,472 ha (94.14%) was under agriculture, and more than 97% of the agricultural land is being used. Nearly all (218) households engaged in agriculture. Sixty four households had homegardens. Only fourteen households grew paddy once a year, on the area between 0.16-0.8 ha, or 1-5 rai. One-hundred-and-twenty-five households grew field crops on an average area of 2.4 ha, or 15 rai. The long-term field crop was cassava with 125 growers. Short-term field crops were not cultivated. Most people owned land: 212 households owned land and six households both owned and rented land. There were 49 tree crop growing households, of which 21 households grew eucalyptus, 5 rubber trees, and 23 bamboo. None of the farm households rented all their land for cultivation. Some of young people work outside the village as wage labor in factories.

Two natural calamities occurred in 1985 and 1986 which caused hardships to all people in

the sub-district. The serious drought in 1985 destroyed the whole sub-district's field crop cultivated area of 1,435.36 ha, or 8,971 rai. The big flood in the following year, 1986, destroyed the whole sub-district's field crop cultivated area of 1,401.28 ha, or 8,758 rai. This resulted in a big losses and had a very significant effect on the change in the agricultural production structure of this area.

4 . Farmer Side Analysis

The study of the OAE in 1993 revealed that financial returns from cash crops were fairly low, that is, from 3,631.25 baht per ha, or 581 baht per rai, for cassava to 7,476.81 baht per ha, or 1996.29 baht per rai, for cashew. However, the production of crops in some areas faced labor shortages, low yields and low prices, resulting in lower profits or losses. Furthermore, severe drought in 1985 and flood in 1986 destroyed all crop yields for the two consecutive years. Some large areas in Sanam Chai Khet, Plang Yao and Panom Sarakham Districts have changed to fast-growing trees, mostly eucalyptus and casuarina, and some farmers made contracts to plant and sell trees to the wood-based company.

Most eucalyptus plots were formerly planted with cassava (40%), sugar cane (40%), and other crops (20%), such as maize and peanut. Few cashew plantations and very few rice fields and rubber tree plantations were replaced with eucalyptus. At present, the common fast-growing tree species is eucalyptus with two common spacings: 3×3 m and 3×2 m, planted in a block pattern. All tree farms used fertilizers, of which 96% were chemical and 4% were manure. Some farmers cultivated associated crops, i.e., cassava and beans during the first year. All farmers knew how to manage their own tree farms. The farmers used the clear cutting system leaving the trees to reshoot. Some sprouts are cut when strong enough, leaving 2-3 sprouts to grow. Most of the farmers planned the first cuttings when the trees reached the age of five years without intermediate cutting. Only about 10% of farmers planned the first cutting when trees are four years old. An estimate of costs and profits of CTF is seen in Table II-5-2.

The study found that farmers have made contracts to grow fast-growing trees with the Company since 1990. All of them have primary level of education. Most (96%) CTF farmers had been settled there for more than twenty years. The farmer possessed an average of 11.97 ha of land, of which about 95% of the area was used. Most of the land (85%) was owned by farmers and 15% owned by a family member. The farmers did not rent land to implement contract tree farming. Most tree farm land (92%) has Land Reform Certificates. The rest of the lands have NS.3 and Por Bor Tor 6. The farmers shifted to fast-growing trees because they were not successful in cultivating field crops especially cassava, sugar cane, pineapple, and maize. Most of the farmers faced losses due to low yields (caused mainly by deteriorated

Table II—5—2 Costs and Profits Estimation of CTF, Chachoengsao Province

Items	First Cutting						Second Cutting						Third Cutting					
	1	2	3	4	5	Total	6	7	8	9	10	Total	11	12	13	14	15	Total
1. Land Preparation	740	160	100	30	0	1,030	160	0	0	0	0	160	160	0	0	0	0	160
-Land clearing	440	0	0	0	0	440	0	0	0	0	0	0	0	0	0	0	0	0
-Row tilling	240	160	100	30	0	530	160	0	0	0	0	160	160	0	0	0	0	160
-Staking	60	0	0	0	0	60	0	0	0	0	0	0	0	0	0	0	0	0
2. Cost of seedlings	534	0	0	0	0	534	0	0	0	0	0	0	0	0	0	0	0	0
3. Weedings	140	0	0	0	0	140	0	0	0	0	0	0	0	0	0	0	0	0
4. Fertilizers	138	178	178	178	0	672	178	178	178	0	0	534	178	178	178	0	0	534
5. Labor cost for fertilizing	61	28	28	28	0	145	28	28	28	0	0	84	28	28	28	0	0	84
6. Firelines	10	10	10	10	10	50	10	10	10	0	0	30	10	10	10	0	0	30
7. Cutting climbers& weedings	0	15	15	15	0	45	15	15	15	0	0	45	15	15	15	0	0	45
8. Sprout thinning	0	0	0	0	0	0	60	60	60	100	0	60	60	60	60	0	0	60
9. Cut & transport to factory	0	0	0	0	3,750	3,750	0	0	0	0	3,750	3,750	0	0	0	0	3,750	3,750
Total Cost	1,623	391	331	261	3,760	6,366	451	291	291	100	3,750	4,663	451	291	291	0	3,750	4,663
Total revenue	0	0	0	0	12,750	12,750	0	0	0	0	12,750	12,750	0	0	0	0	12,750	12,750

Remarks: Estimated yields at 5th, 10th and 15th years are 93.75 tonnes/ha (15 tonnes per rai); Wood price is fixed at 850 baht per tonne for the whole period.

Source: The Agrolines Company (1995)

soil), low prices and labor shortages. Therefore, they planted fruit trees and fast-growing trees instead of crops. At first, cashew and casuarina were planted. Later, eucalyptus was planted while the rest of the land was still planted with crops. Some of the interviewed farmers (8%) sold most of their land to clear debts in agriculture. The CTF developed on farmer owned land. Those with small holdings established tree farms on about a half of the area as did farmers with medium-size holdings (2.4–6.4 ha or 15–40 rai), while farmers with large holdings established tree farms on about one-third of their land. Background of the farmers and their decision making in joining CTF are seen in Figures II-5-2 and II-5-3.

The merits of CTF can be described in terms of minimum financial return, a certain market for wood products, technical advice and extension services. Farmers, most of whom had never planted trees for sale, certainly believed in the financial return in the CTF (based on the agreed minimum guaranteed price). The CTF helps households with insufficient investment inputs, specifically labor, to maintain cultivation on their land with trees. Some CTF operations are seen in Figures II-5-4 to II-5-5. However, by adopting CTF, only eucalyptus can be planted. Farmers have no choice to plant other tree species associated with eucalyptus on their farms. This results in farmers' bearing high risks as they ever had in monoculture of field crops. Wood selling is also limited only to the Company. If other wood buyers offer better prices, farmers will miss the best marketing opportunities. Furthermore, the contract makes farmers lose the opportunity to get extension services provided by government departments, particularly in seedlings and fertilizers free of charge of the RFD's

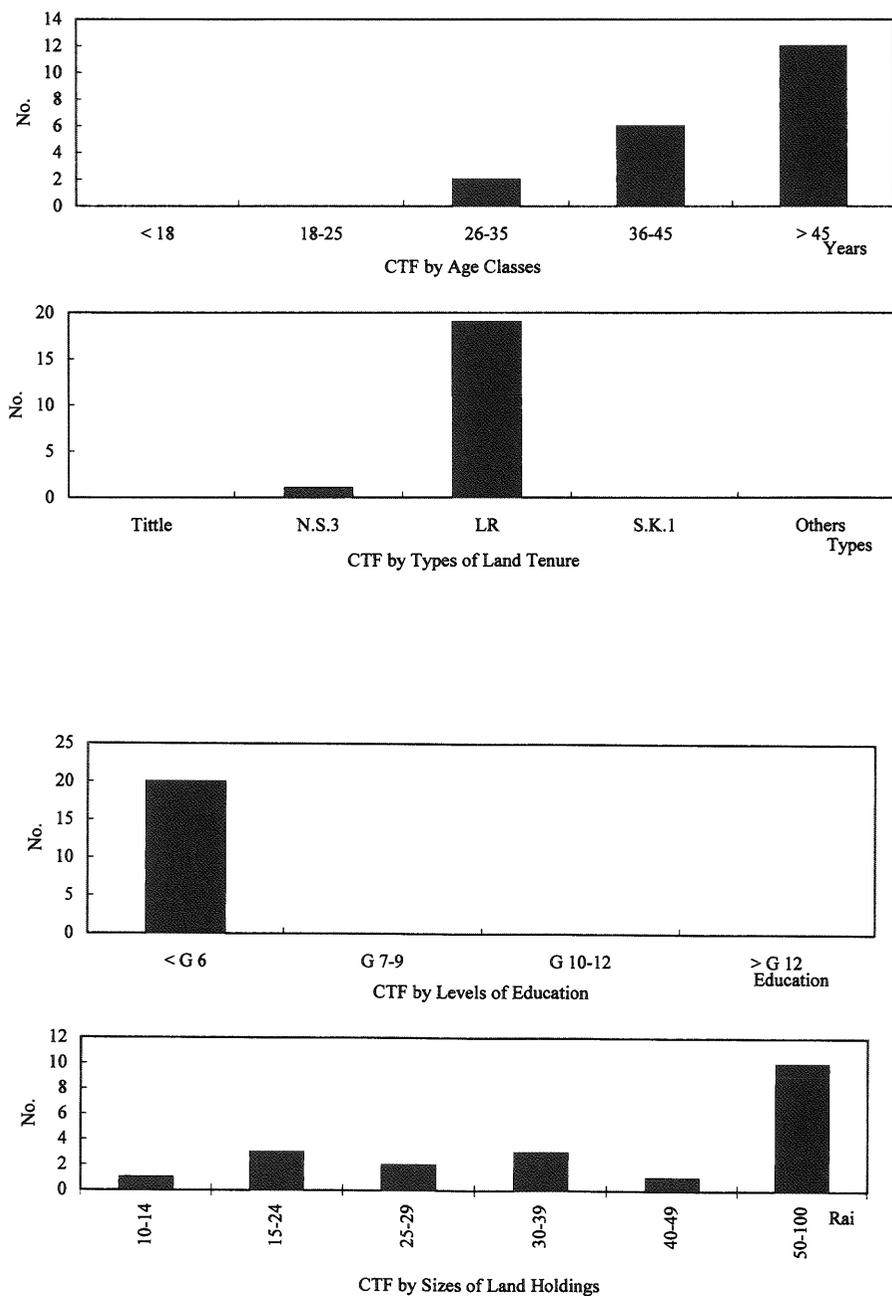


Figure II— 5 — 2 Contract Tree Farmers by Age Classes, Education, Land Tenure, and Sizes of Land Holdings, Baan-Moo Song, Chachoengsao Province

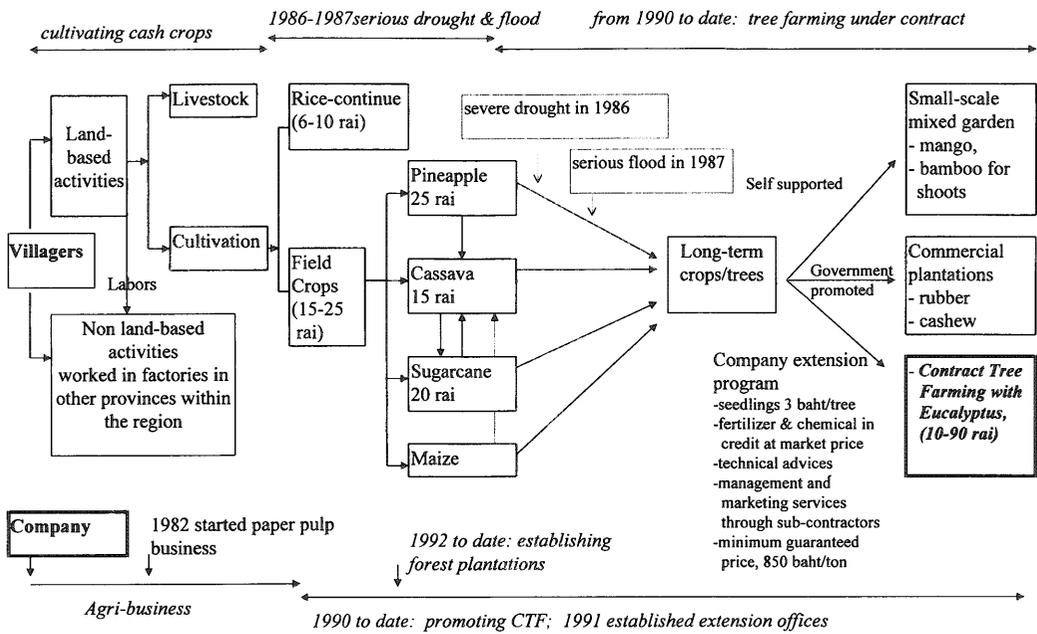


Figure II— 5 — 3 Processes of Contract Tree Farming Development in Baan Moo Song, Nong Mai Kaen, Chachoengsao province

forestry extension project namely “The Promotion of Small Scale Tree planting by Farmer” and other agricultural extension projects.

5 . Problems and Prospect

At present, CTF is an important source of raw material for the Company. Thus, the Company, in implementing its own CTF program, has to invest more in extension services, including field extension staff, to give advice to the farmers as well as managing tree harvesting and transportation for CTF farmers. However, such costs will be reduced as the number of participating farmers increases. In the near future, wood produced from the Company’s forest plantation will be significantly increased and become a major source of raw material for its factory. CTF in the future will be less important source of raw material as it does at present.

Although CTF is estimated to give a positive financial return, farmers have been facing many problems in every step of the operation, particularly in tree cutting, wood yield estimating or weighing, and transportation, in which farmer are unable to negotiate for a reasonable cost, only receive payment after all costs incurred are deducted.

The Company did not provide loans or credit for subsistence living to farmers. Thus,



Figure II—5—4 Contract Tree Farming at Sanam Chai Khet,
Chachoengsao Province



Figure II—5—5 Tree Harvesting at the First Rotation, Chachoeng-
sao Province

farmers borrowed short-term loans from agricultural cooperatives at the normal interest rate of 12% per year and must pay some money back every year. In CTF establishment, farmers bear the high cost of tree seedlings, thus raising the cost of tree establishment to

about a half of the total cost. In management, farmers have to bear on risks incurred during the whole implementation period of CTF, specifically in fire protection. This may cause farmers to violate contract agreements, and lose asset or land in order to pay for loans or credits. At the time of the study, the CTF totally neglected crop and livestock components, thus result in discouraging diversification of farm products and income, and this result in increasing the number of off-farm tree farm owners.

Despite the fact that the Government policy on forest development put the emphasis on the private sector, including farmers, there is little data and information on CTF and CTF farmers. Thus, the CTF situation, particularly CTF farmers, does not reach the administrators or policy makers, resulting in difficulties in appropriate government intervention. It is suggested that, CTF under the Company promotion requires some level of government intervention in terms of profits and risks management. Policy to protect farmers from losing their land in case of their failures in CTF should be promoted. CTF farmers' groups should be organized and their capability in managing CTF should be strengthened. Furthermore, agriculture and forest extension services should be promoted to help farmers, diversify their farm products and earn short-term income while waiting for the returns from tree selling. In supporting this, information on local wood markets and agricultural products should be acquired and be easily accessible by farmers.

Notes

¹⁾A receipt for the local land tax, which people use as a basis to claim land.

²⁾Most farmers have their own pick-ups and can carry 7,000–8,000 seedlings each time. If they rent a pick-up, they would pay expenses of 350–400 baht per trip (350 baht at Plang Yao and 400 baht at Sanam Chai Khet).

Chapter 6

An Analysis of Contract Tree Farming by the Siam Forestry Company The Case Study of Baan Moo Sam, Ratchaburi Province

1 . Features of the Company

Siam Forestry Company is part of a Siam Kraft Paper which is located at Wang Sala Sub-District of Ta Muang District, Kanchanaburi Province. The Siam Kraft Paper Company is a member-company of the Siam Cement Group, which is under the Office of Royal Assets,

Ministry of Finance. The pulp and paper industry is one of the big business divisions within the Siam Cement Group, consisting of five companies manufacturing many kinds of pulp and paper products such as paper boxes and writing paper. The original project of the Company produced kraft paper by mixing imported kraft pulp with locally-produced bagasse pulp and some recycled waste paper (Sila-On, 1978). The member companies of the Siam Cement Group consuming paper pulp for manufacturing products are Siam Kraft Paper Co., the Siam Paper Pulp Co., the Siam Container Co., the Thai Paper Co., and the Thai Union Paper Co. (Pholsheewin, 1988). At present, the Siam Cement Group handle pulp and paper business through its company: the Siam Kraft Paper.

The Siam Kraft Paper has been in operation since 1988. It has a 200-tonnes-a-day kraft paper and paper board mill, and a pulp mill with a capacity of 21,600 tonnes per year based on sugar cane bagasse, at Ban Pong District, Ratchburi, 86 km from Bangkok, and the Siam Cellulose Company at Ta Maka District, Kanchanaburi Province. The Company produces paper pulp using fast-growing trees and bamboo as raw materials at a production capacity of 55,000 tonnes per year. The Siam Kraft paper pulp factory at Ban Pong used only bagasse and had a production capacity of 50,000 tonnes, while the Siam Cellulose factory at Ta Maka used only eucalyptus and had a production capacity of 55,000 tonnes per year. Thus, about 285,000 tonnes of woodchips are used. The critical problem is the lack of raw materials since there are only about 7,200 ha of eucalyptus plantations. The company's medium-term target in tree planting is 112,000 ha. To meet the target, approximately 40 million seedlings will be produced each year. The Siam Cement Group intends to manage tree farming to produce wood for the domestic use for paper pulp. Tanchit (1995) elaborated that the farmers were encouraged to establish tree farm in the infertile or deteriorated land so that they might obtain more income. The produce would be sold to the Siam Cellulose Company.

The Siam Forestry Company was established to undertake forest management and research in nursery production and tree breeding, promote fast-growing tree cultivation, and handle all raw materials procurement for all companies concerned with pulp and paper within the Siam Cement Group (Pholsheewin, 1988). The factory used eucalyptus, bagasse and bamboo as raw materials. The raw materials mostly used are bagasse and eucalyptus. Only about 20% bamboo is used because of its scarcity and hard pulp. The supply of bagasse is limited since the sugar cane plantations have been decreasing and the amount of bagasse is uncertain. Thus, woodchips are increasingly important as raw material in pulp and paper production of the Company.

As wood demanding is getting higher by many local industries and the Company raises its production target, the amount of wood inflow to the company's factories became insufficient. However, raw material supply has a tendency to decline. The company, therefore, sought a

new option for raw material procurement with the aim of increasing the quantity and the security of raw material produced by farmers. Actually, in the early period of operation, the Company planned to establish its own large-scale plantation by leasing degraded forest land of about 16,000 ha in Kanchanaburi and Ratchaburi Provinces from the Government and buying some private land. This policy was canceled due to high land prices and government policy at that time in canceling the lease of degraded land for large-scale reforestation. Thus, the Company encouraged farmers to plant fast-growing trees instead.

At present, the Company procures raw materials in four ways: 1) direct purchase of wood from tree growers or traders at the factory at Wang Sala Sub-District, 2) importing paper pulp and used paper from overseas, 3) collecting wood from existing company-owned forest plantations in Chachoengsao Province and 4) making contract agreements for planting trees with and buying wood from farmers, or contract tree farming. Before 1995, the focal areas for contract tree farming were within 150 km from the factory at Wang Sala Sub-District, that is, Kanchanaburi, Ratchaburi, Suphan Buri, Nakhon Pathom, Uthai Thani, Phetchaburi, Prachuap Khiri Khan, Nakhon Sawan, Chai Nat, and Nakhon Ratchasima Provinces. From 1996 onward, areas in the provinces of Kamphaeng Phet, Phichit, and Lop Buri will be promoted, to achieve an annual target of 9,600 ha and a total of 104,000 ha by 1999.

At the early stage of promotion, the company provided seedlings to farmers without charge. The company produced seedlings from seeds in foam trays and plastic bags. Then, they were raised in the temporary nursery of tree farmers. However, the trees were not of good quality. Thus, some nursery techniques were developed and a laboratory for tissue culture was established (Visuphakarn, 1995). Seedlings are now grown from root cuttings and tissue culture. New techniques in cutting and tissue culture have been applied since 1994 to solve the problem of the slow growth rate in tree establishment. The Forest Experimental Unit at Saraburi was also established to test plus trees from various sources.

According to Tanchit (1995), the Company has extension staff members at 30 locations who take care of the first 30 groups of contract tree farmers. The trees of these 30 groups of farmers were all cut because they were in need of money. About 7-8 tonnes of woods/ha were obtained from the 3-4 year-old trees. If the farmers had waited till the trees were five years old, the company expected that they would yield 75-95 tonnes per ha (12-15 tonnes per rai). If they planted the improved variety the company promotes at present, it is estimated that they would have obtained 125-156 tonnes per ha (20-25 tonne per rai). In the future, seedlings will be sold to the farmers at a low price. In selling trees, the farmers could cut and transport them on their own or have the buyers cut and carry to the factory. In practice, the company suggested that a sub-contractor would cut and transport the woods to the factory. The raw material department of the factory would pay the money to the farmers directly

after deducting costs for cutting and transportation.

2 . Contract Agreement and Its Characteristics

The contract is relatively simple, describing seedlings acquisitions, selling and buying wood. The contract agreement is called “The Eucalyptus Promotion Agreement” with an attachment on a promotion criteria (see Table II-6-1). This contract is made between the Company’s manager and farmers and lasts for six years or after completion of the 1st cutting.

Table II— 6 — 1 Promotion Criteria and Agreement of the Siam Forestry Company

Promotion Criteria

Planting and Maintenance

1. Plough with ploughing device no. 3 and no. 7 until the soil is well broken and appropriate to be planted
2. Plough to get rid of weeds in the first and second years then does it once a year
3. Apply fertilizer at the rate of:
 - 1st year: 25 and 50 grams/seedling at the age of 30 and 45 days
 - 2nd year: 100 and 150 grams/seedling at the beginning and the end of the rainy season
 - 3rd year: 150 and 150 grams/seedling at the beginning; and the end of the rainy season
4. Plant trees at a 3 × 3 m spacing
5. Other suggestions of the company

Requisitioning the Seedlings

1. The plot of land must be inspected and the project approved.
2. The member find his own transportation to pick up the seedlings at the company. He must also prepare his own net to cover seedlings.
3. The company will select seedlings appropriate to the land and make an appointment with the member to pick them up at the appropriate season.
4. Not over 5% of re-planting seedlings would be provided within the planting season of that year.

5. If the member violates the conditions, the company would give up seedling distribution. In such case, he cannot make to a claim the company for the compensation.

Eucalyptus Promotion Agreement No ...

This agreement is made between (Mr., Mrs., Miss) member No. who shall be called "Promoted farmer" and the Siam Forestry Company by (Mr., Mrs., Miss) who has been fully authorized by the company and shall be called 'promoter'. Both parties consent to make the following agreement:

1. The promoted farmer agrees to join the Eucalyptus Promotion Project of the promoter and consents to follow every condition.

2. The promoted farmer promises that he will not sell or offer the seedlings provided by the promoter to other people. If so, he consents to be fined five baht per seedling for the total number of seedlings provided to him.

3. The promoter promises to buy eucalyptus from the promoted farmer when they reach the age of three years and have a diameter not less than two inches at the small end of the log and a length of 2.0 - 2.5 m at the market price at that time but not less than 750 baht per ton. In the case that the promoter is requested to cut trees, the cost of tree cutting and transportation shall be subtracted from the money paid to the promoted farmer.

4. The promoted farmer promises that he will sell eucalyptus trees grown from the seedlings provided to him back to the promoter or one authorized by the promoter only when they grow up to the stated size in the first harvesting. He must also notify the promoter not less than 15 days in advance of harvesting. If not, the promoted farmer consents to be fined at the rate of 20 baht per tree for the total number of the provided seedlings.

5. The promoted farmer consents to allow the promoter or the promoter's officers inspect and collect information in his eucalyptus plot. The promoted farmer must arrange sufficient facilitation for inspection.

6. This agreement is made on Month, Year, and is effective from the day it is signed to the first cutting but not over six years.

This agreement was made in two copies with the same content. The two parties have read and fully understood it and fix their signatures to it.

Signature	Promoted farmer	Signature	Promoter
(.....)		(.....)	
Signature	Witness	Signature	Witness
(.....)		(.....)	

The promotion criteria attached to the contract covers the planting and maintenance and the requisition of seedling. According to the promotion criteria, the Company inspects land for tree planting and if accepted, gives the full number of seedlings required for planting in their plots to farmers at the nursery with no more than 5% extra seedling for replanting.

To become a member of CTF project, interested farmers applied directly to the extension units of the Company, submitting a land use certificate, i.d. card, a sketch map of planting area and a completed application form. Farmers would make an appointment to survey the area with the company staff. If the applications are approved, they must apply for membership cards for seedlings in order to fix a date to get seedlings. The farmers are requested to prepare their plots before they get the seedlings. The understanding is that seedlings will be distributed free of charge to farmers with land available for planting, however, this is not mentioned in the contract. If a farmer sells the seedlings to another person, he will be fined five baht per seedling. In this agreement, the minimum guaranteed price is at 750 baht per tonne for trees not less than 2 inches in DBH and 2-2.5 m in length.

The contract agreement of the Siam Forestry Company seems to present an incentive to the establishment of tree farming with some kinds of subsidy and technical service. In terms of development, covering agriculture and forestry extension and industrial sectors, CTF has four functions: 1) it encourages medium- to long-term utilization of marginal farm land, particularly sugar cane and cassava fields, 2) it encourages small-scale tree farming/ reforestation on private land by farmers, 3) it secures inflow of wood to the local industrial factories, and 4) it is response to the governmental policies on “the development of wood resources to substitute for imported wood”, “Private re-afforestation” and “the adjustment of agricultural production structure”.

3 . Area Analysis-Baan Moo Sam

Baan Moo Sam is a village in Rang Bua Sub-District of Suan Pueng District, which was formerly a sub-district in Chom Bung District of Ratchaburi Province (Figure II-6-1). Rang Bua was recently established as a sub-district in Suan Pueng District, formerly it was under Chom Bung administration. In analysing regional situation, land use, agricultural situation, and socioeconomic development in Ratchaburi Province is reviewed as below.

Ratchaburi has an area of 519,646 ha. The land in Ratchaburi is flat (29%), undulating to gently sloping (40%), and hilly (30%). The hilly area is in the west in the Suan Pueng and

Chom Bung Districts, which have a large area of 166,968.48 ha. The irrigated area is about 23.10% of the whole area of the province and is in the eastern part of the province. The central and western parts, i.e., Chom Bung and Suan Pueng Districts must rely on rainfall. Administratively, Ratchaburi Province consists of nine districts, 103 sub-districts and 865 villages. The total population is 691,619 and the population density is 128 per km². The population growth rate is 1.13%. About 75% of population is engaged in agriculture, 12% work in the industrial sector, 10% in commercial business and services, and 3% do other jobs. According to the statistics of 1982-1986, the value of agricultural produce fluctuated and kept decreasing at the average rate of 4.69% per year. The decrease was mostly in crops. The non-agricultural production increased during the same period at an average rate of 3.5% per year, especially in the stone mining industry and business services.

The forest area is for 98,200 ha, or 18.89%. There are seven forest reserves in Ratchaburi Province, covering 186,500 ha, or 35.89% of the whole area of the province (RFD, 1994). The forest land is mainly under deciduous or bamboo forests and cover the hilly areas in the west and southwest parts of the province, in which Suan Pueng, Chom Bung and Pak Tor Districts are located. According to the forest statistics, the forest area decreased from 336,800 ha, or 64.81%, in 1961 to 133,674 ha, or 25.72% in 1991, at the rate of 6,770.86 ha per year. This greatly expanded agricultural land, but caused deforestation and forest degradation at an alarming rate.

The change in agricultural land use was in evidence from 1984 to 1986. Despite the fact that the total agricultural land increased, rice and sugar cane planting areas sharply decreased due to several factors, specifically the shortage of labor and low prices. Most of the sugar cane planting area was replaced by extensive cultivation of cassava, maize and fast-growing trees. The Agricultural Census of 1993 revealed that the total number of agricultural holdings was 59,895 and that their total was of 175,872 ha (1,099,202 rai). The major portion (38.64%) of the agricultural area in Ratchaburi Province was under field crops, followed by the area under rice (34.89%). Considering holdings with cropland, it was found that 92.17% of the total were holdings with cropland and 7.83% were holdings without cropland, mostly livestock raising. The districts of Chom Bung, Suan Pueng and Pak Tor have the larger portions of agricultural holdings, account for 21.49, 17.58 and 13.40%, respectively.

Of the holders, 77.93% were male and 22.07% female. Those 45 years old and over accounted for 60.08%. The size of the holder's household averaged at 3.95 persons. The area of land possessed by each household was 4.17 ha. For cropland area, the crops most cultivated were rice, accounting for 82,010 ha, sugar cane 33,596 ha, and maize 28,299 ha. The number of holdings having an area under 6.4 ha (40 rai) constituted 90.81% of which 30.68, 26.74, and 19.51% had areas under 0.96, 1.6-3.1, 3.2-6.2 ha (or 6, 10-19 and 20-39 rai), respectively. The

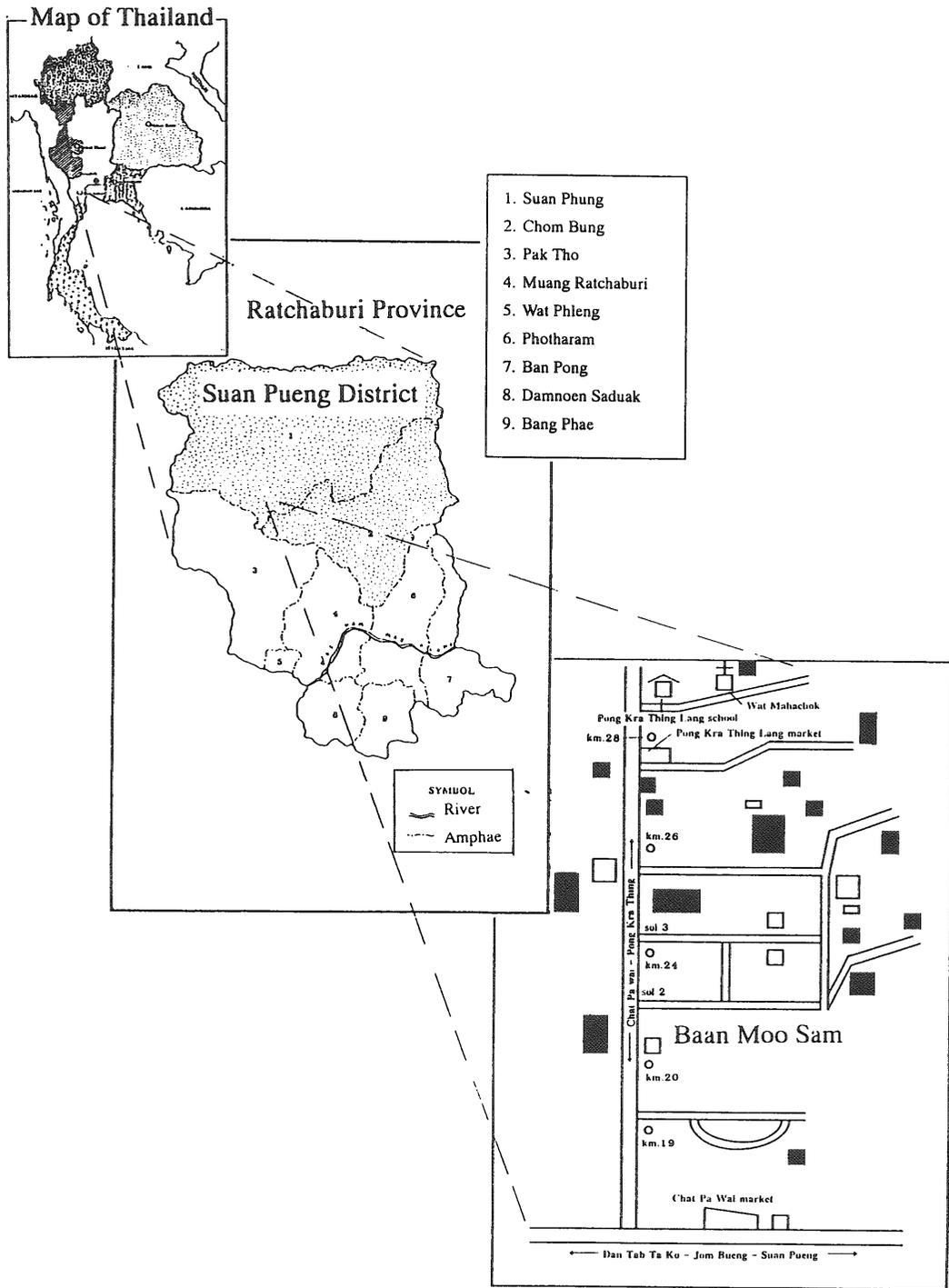


Figure II— 6 — 1 Location of the Study Area in Ratchaburi Province

number of holdings of large size (6.4 ha, or 40 rai, and over) occupied 9.19%, of which 0.85% were holdings having areas of 22.4 ha, or 140 rai and over.

As for the employment, 53.82% of the total holdings in this province employed agricultural workers, of which most (51.04%) employed workers only on an occasional basis. As for members of the holder's household, the members under twenty years of age were in the majority (39.04%). In terms of activity status of holder's household members aged thirteen years and over, it was reported that 56.89% of them engaged in agricultural work only on the holding, 28.47% engaged in agricultural work on the holding and other works, 6.56% did not engage in agricultural work on the holding, and 8.08% weren't economically active. Nearly half (49.29%) of holder's households earned income from agriculture only, while the rest (50.75%) earned income from agriculture and other sources. This indicates that some portions of the holder's households depended mostly on income from sources other than agriculture. About one-third (32.68%) of the holder's households were in debt for agriculture (National Statistical Office, 1993).

Because of the change in major land use and the agricultural situation described above, it can be concluded that the agricultural production structure has been unstable. Forest is no longer being converted to agricultural land. A large area of agricultural land became marginal, specifically in an area where sugar cane was extensively cultivated. This resulted in the change in production structure in the agricultural and business sectors. In the agricultural sector, sugar cane has been increasingly replaced by cassava, maize, and other crops in an extensive manner despite the fact that their productivity are fairly low. Fast-growing trees have also been introduced in an area previously planted with sugar cane. In the business sector, many agricultural businesses, such as Thai Cane Company, started buying woodchips for export. Wood-based forest enterprises, Siam Pulp and Paper for example, shifted its policy from using bagasse and bamboo from natural forests as raw materials to woodchips from tree farming. Therefore, tree farming has been extensively promoted on marginal agricultural land by the Government and private business sectors. Since the demand and the competition for wood have significantly increased, CTF in areas adjacent to woodchip factories have been intensively promoted.

Baan Moo Sam has a population of 106 households or 478 people, of which 256 (53.56%) are male and 222 (46.44%) are female. Most (323 people) have completed the compulsory level of schooling without further study. Few people (12) are in school higher than the compulsory level; of these, nine persons are in the junior high school, three persons in the high school, and nobody higher than high school level. Vocational training activities were not available. The access to water source is limited in some households: 104 households had access to clean drinking water and 45 households had access to household water. Two

households had no access to clean drinking water. None of the households had access to water for cultivation. Public services were fairly poor. A total of seven out of twenty-one basic public services items were provided. These were religious place, an animal care center, a health care center, a child-care center, a primary school, a village meeting house, a village reading place and an information dissemination house. Some important items related to occupational promotion and agriculture such as rice bank, a common place to collect agricultural products, a cooperative store, etc. were lacking. However, some of the services lacking in Baan Moo Sam are available in Suan Pueng District (CDD, 1994).

The total area of Baan Moo Sam is 380 ha (2,375 rai), of which over 75% of total land is under agriculture. However, less than 50% of agricultural land was being used due to shortage of water. Ninety-two households were growing trees and crops simultaneously in their home compound, mainly for consumption. Ninety households engaged in cultivation. Only eleven households grew paddy once a year, on an average area of 0.96-1.60 ha. Seventy-nine households grow field crops on an average area of 3.2 ha. The most common short-term field crop was maize, cultivated by 80 households, and the most common long-term crop was sugar cane, cultivated by only six households. As for the land tenureship, ninety households owned land and ten households rented all the land they used from neighbors in the same village. Labor migration was mainly by farm labors, totaling sixteen households, aging between 18-50 years old. Men worked in Bangkok as temporary wage labor, while women worked as daily wage labor in Ratchaburi Province.

4 . Farmer Side Analysis

Sugar cane has been planted extensively in the Suan Pueng and Chom Bung District area. In Baan Moo Sam, sugar cane was normally planted and then harvested for three years, after which it was cut down and replanted. Harvests were 12-14 months apart, thus giving uneven profits and sometimes causing losses. Maize for animal feed was normally cultivated twice a year, from May to August and from September to December. Yields are rather low, and comparatively, this crop is less profitable. Major problems faced are lack of water, pests and diseases, cash investment, and the low price of agricultural products. The provincial land use planning unit recommended to grow fast-growing trees in poorly-drained soil, saline soil, and water deficit areas.

The tree farms were established separate from the residential area. The farmers liked to grow eucalyptus on most of the plot with smaller plantings fruit trees and other crops. Eucalyptus was planted in blocks at planting spaces of 2×3 m, 3×3 m and 3×1.5 m. About 40% of farmers applied fertilizers after planting; 30% used chemical fertilizers and 10% green manure, but neither fertilizers nor reimbursement for fertilizer purchase are given by

the company. About 25% of farmers grew crops between trees in the first year. The associated crops on the tree farms were vegetables, flowers, which were planted in the low land or near a water source, and field crops such as cassava, maize, pineapple on the upland. However, most of the field crops were less profitable or failed.

About 95% of the farmers planting fast-growing trees knew how to manage their own tree farms. There are three cutting cycles. About 15% of farmers planned the first cutting when their trees reached the age of four years, and 80% of farmers planned the first cutting when their trees reached the age of five years. Farmers did no thinning in the first cutting cycle. They cut all trees and left the stumps to regenerate new shoots and then selectively cut the new sprouts when they were strong enough, leaving only 2-3 sprouts to grow. After the third cutting, some farmers indicated a preference to shift to planting fruit trees. An estimate of costs and profits of CTF is seen in Table II-6-2.

The study found that farmers had engaged in CTF under the promotion of the Siam Forestry Company since 1992. About 78% of the CTF farmers had had previous experience in planting trees for sale, but on a small scale. Generally, the holdings of farmers averaged 36.8 ha, of which 95.51% of the plot was used. About 20.25% of the used land was personally owned and 79.75% of the land belonged to the family. No land was rented for CTF. Most plot of land have land right certificate: 20% land reform certificates and 40% NS.3, 4% SK.1, 4% Title Deeds, and 32% have no land right certificates. Most of the land with no land right certificates were large plots, the biggest of which was 208 ha.

The CTF farmers shifted from field crops to trees because they were not successful in cultivating field crops, especially sugar cane, cassava, pineapple, and maize. About 45% of farmers faced low yield caused mainly by infertile soil, 40% faced labor shortages and were too old to maintain crops so they could not farm their own land, 35% of farmers suffered losses since the costs was high but the price of agricultural produce was low. About 15% of farmers faced labor shortages and low production, and so shifted to plant other crops. Some parts of field crop planting areas replanted to fruit orchards, and some were replanted to fast-growing trees such as cashew, casuarina, eucalyptus etc. The rest of the land was cultivated with crops and grass for cattle. Some areas were left idle since they were not profitable. The farmers perceived fast-growing trees as demanding little labor, growing being hardy fast, and easily to maintain. Moreover, the farmers obtained knowledge and information about fast-growing trees from the television and the Company. Farmers who were still planting field crops at present had their own reasons such as the need for short-term income or to repay loans to local merchants before changing to other crops.

In the establishment of tree farming, a fifteen-year rotation plan is scheduled. The whole period of the management plan is divided into three cutting cycles, each cutting cycle lasting

Table II— 6 — 2 Costs and Profits Estimation of CTF, Ratchaburi Province

Items	First Cutting						Second Cutting						Third Cutting						
	1	2	3	4	5	Total	6	7	8	9	10	Total	11	12	13	14	15	Total	
1. Tree Establishment	900	0	0	0	0	900	0	0	0	0	0	0	0	0	0	0	0	0	0
-1st land tilling	150	0	0	0	0	150	0	0	0	0	0	0	0	0	0	0	0	0	0
-2nd land tilling	120	0	0	0	0	120	0	0	0	0	0	0	0	0	0	0	0	0	0
-Fertilizers	65	0	0	0	0	65	0	0	0	0	0	0	0	0	0	0	0	0	0
-Labor cost for fertilizing	55	0	0	0	0	55	0	0	0	0	0	0	0	0	0	0	0	0	0
-Staking	25	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0
-Planting & replanting	200	0	0	0	0	200	0	0	0	0	0	0	0	0	0	0	0	0	0
-Weedings	200	0	0	0	0	200	0	0	0	0	0	0	0	0	0	0	0	0	0
-Others	85	0	0	0	0	85	0	0	0	0	0	0	0	0	0	0	0	0	0
2. Tree Maintenance	0	320	320	220	0	860	320	320	320	100	0	1050	320	320	320	100	0	0	1060
-Weedings	0	200	200	100	0	500	200	200	200	100	0	700	200	200	200	100	0	0	700
-Chemical fertilizers	0	65	65	65	0	195	65	65	65	0	0	195	65	65	65	0	0	0	195
-Labor in putting fertilizers	0	55	55	55	0	165	55	55	55	0	0	155	55	55	55	0	0	0	165
3. Cutting and Transport	0	0	0	0	3000	3000	0	0	0	0	4500	4500	0	0	0	0	0	3600	3600
-Cutting	0	0	0	0	1500	1500	0	0	0	0	2250	2250	0	0	0	0	0	1800	1800
-Transportation	0	0	0	0	1500	1500	0	0	0	0	2250	2250	0	0	0	0	0	1800	1800
4. Income																			
-Total income from wood					11215	11215						16875	16875						13500
-Net income from wood					6490							11315							8840

Remarks: Estimated Yields at the 5th, 10th, and 15th years = 15, 22.5 and 18 tonnes; wood price is 750 baht/tonne for the whole period.

Source: Siam Forestry Company (1996)

five years. In the first year, activities implemented are land tilling, applying fertilizers, staking, planting and replanting trees, and weeding. Tree maintenance, that is, weeding and applying fertilizers, are practiced from year two to year four. Trees are cut and transported to the factory in year five. In the second cutting cycle, tree sprouts are selectively cut to leave 1-3 shoots for the next cutting. Weeding is done twice in the second and the third year of each cutting cycle, and one more time in the fourth year. Fertilizers are applied once a year in the second year to the fourth year of each cutting cycle. In year five, ten and fifteen, trees are cut.

Technical advice is given by the company's extension staff members in terms of land preparation, tree planting and maintenance. In the area which previously were crop fields, it is recommend that tiller No. 3 be used to turn up soil, and tiller No. 7 to break up the soil. In case of wasteland, it is suggested to get rid of dense tree roots and then till twice to break up the soil and get rid of weeds. If the soil is compacted or has hardpan, it is recommended that hardpan be broken up. Trees should be planted at 3 × 3 m in holes 15 × 15 × 15 cm. One month after planting, the seedlings are inspected and the dead ones are replaced. When the seedlings are two months old, fertilizer must be applied at the rate of 15 grams per tree. After that fertilizer should be applied once a year. Weeding should be done twice a year: at the end of and before the rainy season. On the big plots, small tractors must be used to get

rid of weeds and laborers do weeding at a distance of 50 cm around each tree. For trees more than 3 years old, the company staff suggested that hand labor should be used so as not to disturb the tree roots. Before the dry season, firelines 4-6 m wide must be cleared.

The farmers would get not less than 750 baht per tonne, which was the guaranteed price at the factory. In practice, a sub-contractor would cut and transport the trees or wood to the factory, charging about 200-250 baht per tonne. The rate for tree cutting is between 90-100 baht depending on the size. The transportation of smaller trees would be more expensive. When the wood was transported to the woodchip factory, the factory would pay the money to the farmers directly. Many farmers would like to plant neem and casuarina since both species commanded good prices. In 1994, wood was bought at 850-900 baht, the promotion criteria at present guarantee a price of 850 baht per tonne (one hundred baht higher than the original minimum guaranteed price in the contract agreement). Some farmers sold their standing trees in the plot to a merchant while they were only two years so as to get the income to pay bank interests. Some contracted farmers participated in the Program for the Promotion of Tree Planting by Farmer of the RFD. The CTF developed on farmers' own land. Those with small holdings established tree farms on the entire area, while farmers with medium-size holdings (2.4-6.4 ha) established tree farms on about half of their land, and farmers with large holdings established trees on about one-third to three-quarters of their land. Background of CTF farmers and their decisions are seen in Figures II-6-2 and II-6-3.

The CTF offers an opportunity in terms of seedlings, guaranteed prices and close technical advice, which currently is not available in the governmental extension service, for marginal farmers¹⁾ interested in planting tree for sale to establish tree farm on their land. However, only a single species of eucalyptus can be planted. The current CTF leads to the management of trees for a single purpose (woodchips), thus CTF discourages multiple production tree farming to meet various demands for timber and non-timber forest products by other local wood-based industries.

According to the contract, it is likely that there are significant risks and that an accident may consume farmers' profits. Thus, results farmers bear as high a risk as they ever did in field crop monoculture. The contract impedes flexibility in tree farm management and wood sale. Wood selling is limited only to the Company, so when other wood buyers offer much better prices, farmers will miss the best marketing opportunities. Furthermore, the contract deprives farmers of opportunity to get extension services provided by the governmental departments (once available). Finally, the contract doesn't encourage the development of farmer initiative in managing trees on their farms. Cooperation among farmers or farmer groups is discouraged by the strict supervision by the Company. Some selected activities of CTF are seen in Figures II-6-4 and II-6-5.

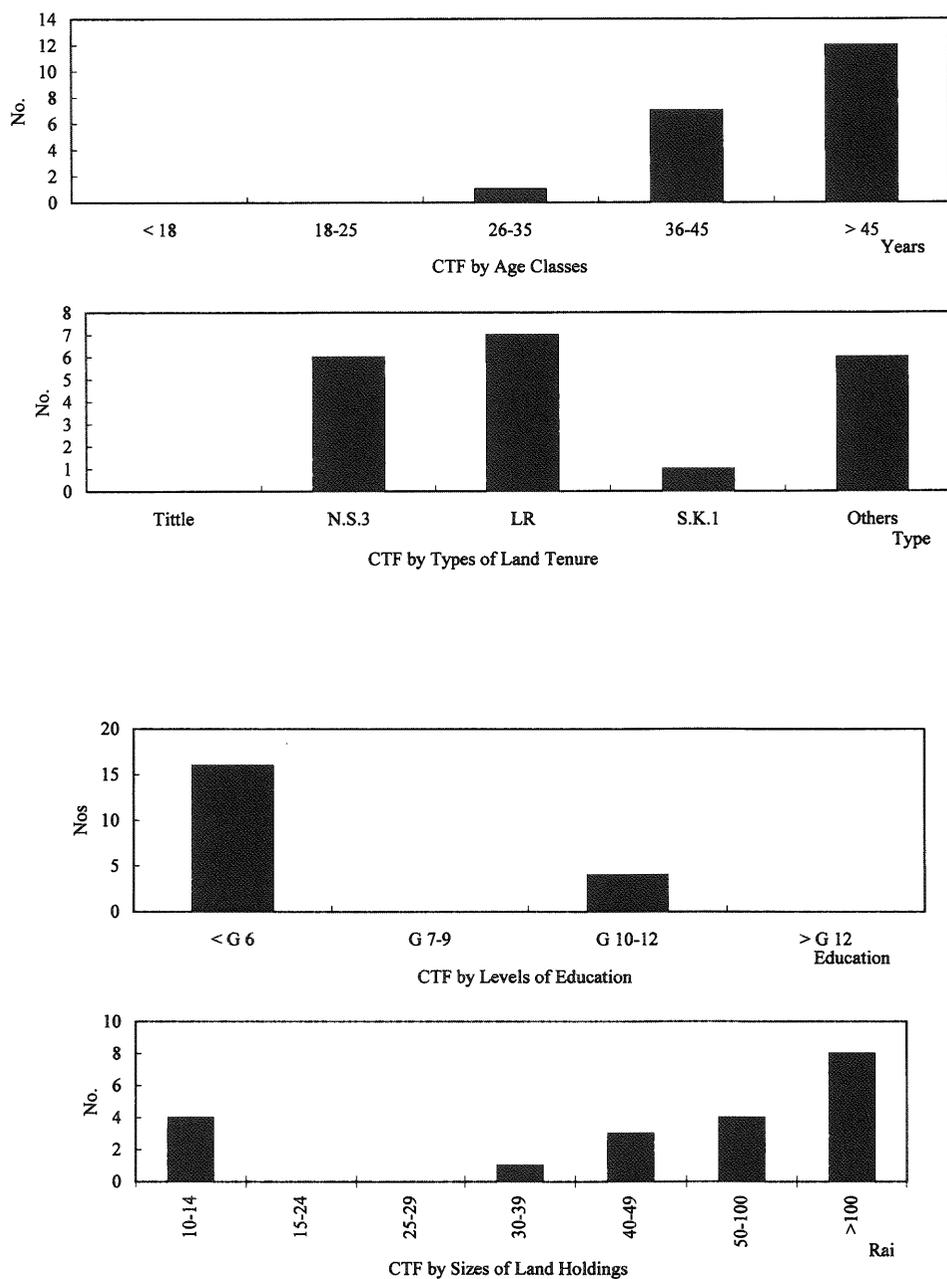


Figure II— 6 — 2 Contract Tree Farmers by Age Classes, Education, Land Tenure, and Sizes of Land Holdings, Baan Moo Sam, Ratchaburi Province

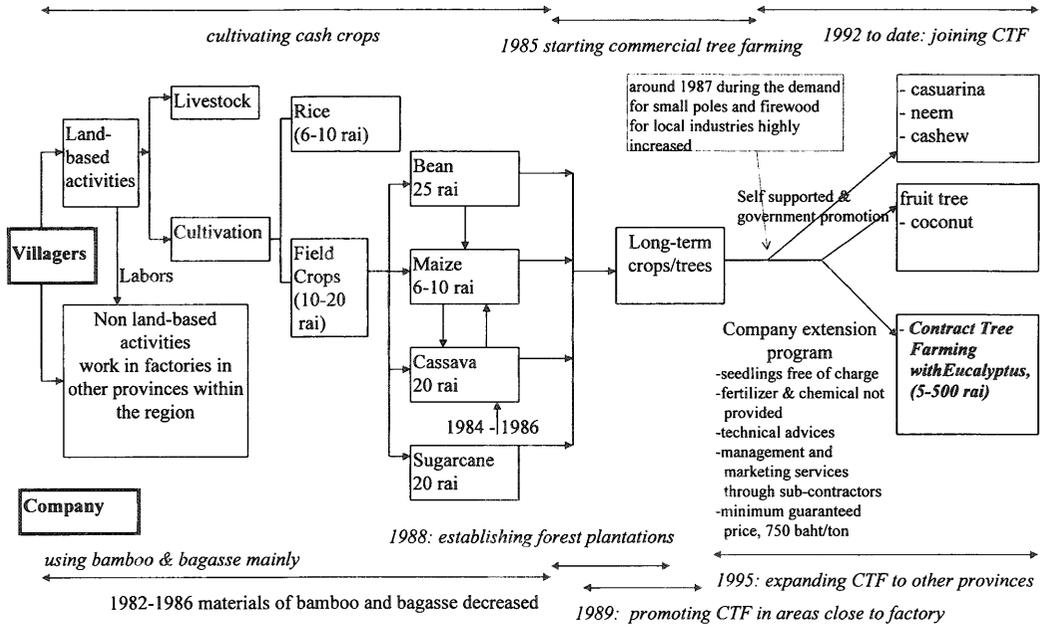


Figure II— 6 — 3 Processes of Contract Tree Farming Development in Baan Moo Sam, Suan Pueng, Ratchaburi Province



Figure II— 6 — 4 Association of Crop (maize) and Fast-growing trees (casuarina)



Figure II—6—5 Tree Cutting at the First Rotation of CTF, Ratchaburi Province

5 . Problems and Prospect

Since the supply of wood from forest plantation and from general wood purchasing cannot be stabilized in the long run, CTF became the most promising option for wood procurement of the Company at present and in the future. Therefore, extension services will be expanded, and research on forest management and seedling production technologies have to be furthered so that a stable supply of wood in the required quantity can be achieved.

The Company has to invest more in extension services covering promotion areas in eleven provinces. Research on nursery technologies and tree management needs support and that definitely requires long-term investment for CTF promotion. Moreover, the intensive labor needed for tree harvesting and transportation requires more investment. However, the Company will attain benefits from CTF in terms of security of wood material supply.

The future development of CTF will require close cooperation with the governmental agencies under the four-sector cooperation program. To expand the CTF area extensively, the Company may need governmental mechanisms to contact and encourage farmer to participate in the CTF. These very much depend on the agreement of the four-sector cooperation program, the content of which is being revised by the MOAC.

Generally, farmers have begun to plant trees for sale since 1987. However, most farmers made contract agreements in 1992 and 1993. Despite the fact that tree seedlings are distributed to farmers free of charge, the minimum guaranteed price is rather low. The recommended

planting space of 3×3 m discourages cultivation of crops and livestock raising, and thus does not promote the diversification of farm products and income. Although estimates of CTF give a positive financial return, farmers have been facing many problems in every step of operations, particularly in tree cutting, wood yield estimation or wood weighing, and transportation, in which farmer are unable to negotiate a reasonable cost, and only receive payment after all costs incurred are deducted.

Under the present agreement, farmers take all risks. The farmer bears all production risks and perhaps shares marketing risk from the second rotation onward. Farmers with low capital inputs have to take a lot of short-term credit at a high rate of interest to establish CTF, and if CTF fails, farmers will suffer from the losses. In the present situation, CTF is unlikely to be a long-term viable option for farmers.

The CTF has taken under different land tenure systems, so many governmental agencies such as the Land Reform Office, the Army, the RFD, the Public Welfare Department, etc., should be actively involved so that the land for CTF can be legitimately allocated, currently they are not involved. Though the support of private tree planting is the role of forest offices, apparently there is little involvement of forest agencies in the Company's CTF and cooperation between local forest offices and the Company is limited. Furthermore, the implementation of Government tree planting projects by local forest offices such as "the project for reforestation by farmers" and "the project for the adjustment of agricultural production structure" have made farmers confuse and created competition in getting farmer participants rather than cooperation. The government departments should take step to support CTF farmers by documenting and publicizing information on CTF and CTF farmers. Thus, tree farming conditions, particularly the condition of CTF farmers, can be accessible by the policy makers resulting in appropriate intervention.

Notes

- ¹⁾ The farmers used to plant various tree species according to the market need. However, they faced losses as costs for maintenance and transportation were high.

Chapter 7

An Analysis of Contract Tree Farming by the Thai Plywood Company

—The Case Study of Baan Moo Kao, Uthai Thani Province—

1. Features of the Company

The Thai Plywood Company is a state enterprise under the MOAC. The Company was registered in 1952 with the objectives to manage forests and forest product industries including logging and wood product processing. The Company established Forest Experimental Units in 1968 to investigate local soft-wood tree species suitable for producing plywood but did not succeed due to problems with land and villagers occupying land. Experiments with some fast-growing trees were carried out in 1979 but again failed due to unsuitable experimental sites. *Eucalyptus* was initially introduced experimentally in 1981 to produce woodchips for plywood and particle board. The Company began to promote fast-growing trees in response to the governmental policy to solve the problem of wood shortage in 1989.

The Company's annual production targets include 1.9 million sheets of plywood, 255,000 thousand sheets of hardboard, and 70,000 m³ of processed timber. In 1994, the Company planned to produce medium density fibreboard (MDF) at a factory which would be established in Kang Koi Industrial Zone of Saraburi Province with the annual production target of 1.7 million pieces in 1998. In fulfilling the company's production targets, approximately 200,000 tonnes of woodchips per year are required (Tavorn, 1996).

Raw material is procured in three ways: 1) from the company's forest plantations with a total area of 7,520 ha, or 47,000 rai in Chachoengsao, Uthai Thani, Kanchanaburi, Chumporn and Ubon Ratchatani Provinces, 2) direct purchase from tree growers or traders and 3) making contract agreement with farmers to plant fast-growing trees and sell wood to the Company.

The company's forest plantations were established over nearly 30 years (from 1967 to 1994), yet only 7,310.25 ha of forest plantations were established, of which 3,047 ha were eucalyptus; 1,742.36 ha teak, 412.56 ha *Acacia mangium*, and 2108.33 ha other species. These plantations can supply only 10-20% of the annual wood requirements. Thus, the Company has to buy more wood from various sources every year. The wood purchasing has been carried on in two ways: 1) purchasing wood through fixed traders and 2) purchasing wood from contract tree farmers under the Company's extension program.

The Company has two main divisions at the headquarters to handle supplying raw materials to its factories, that is, a reforestation division to produce raw materials and a marketing division to purchase raw materials. For field operations, the Company has six field

stations, five forest plantations, and one forest experimental station, previously focused on plantation operation, and currently being focused on wood buying and extension activities.

The extension program began in 1988 after the nationwide logging concession ban by the Government, which caused a shortage of wood supply to the Company's factory. The extension program began in the same year that field crops failed because of a serious drought in an extensive area of the upper Central Region, particularly in Sukruethai Sub-District, which is located near the Forest Experimental Unit. At the early stage of the extension program, the targeted area was planned at 160 ha, or 1,000 rai, per year, seedlings were sold at 0.75 baht per seedling to farmers who has lost their crops and couldn't continue crop cultivation. Later, in 1991, the competition in wood purchasing increased greatly and some other companies provided seedlings free of charge to farmers to promote tree farming in Uthai Thani. This affected the company's extension program. Thus, in 1991 the Company offered seedlings free of charge to farmers. At present, the Company extension program offers farmers seedlings free of charge, technical advice at every stage of tree planting and maintenance. Fertilizers are provided at a price purchased from a government unit, laborers for tree harvesting and trucks for transportation. Farmers are grouped and are consulted to implement tree farming activities. In harvesting trees, the Company supported a team of laborers to harvest trees at the farmers' expenses.

At present, the extension project is limited to Uthai Thani, particularly in Nam Rob Sub-District of Lan Sak District and Sukruethai Sub-District of Huay Kot District, due to shortage of extension staff and lack of supporting policy. At present, three extension staff members closely follow up the cultivating, applying of fertilizer, replanting, cutting, and transportation on a total area of 1,600 ha. About 15,000 tonnes of trees could be cut annually.

2 . Contract Agreement and Its Characteristics

The contract agreement is called "Contract Agreement on Fast-Growing Tree Planting" with three attachments: 1) Receipt for Delivery of Tree Seedlings, 2) Receipt for Delivery of Fertilizer and 3) Note Appended to the Agreement on the Planting of Fast-Growing Tree.

The contract is made between the Company and farmers who agree to plant fast-growing trees on their land. The agreement is made in triplicate, and the company's headquarters, the company's extension unit, and the farmer each hold a copy. Fertilizer is provided concurrently with the seedlings in the first year. To obtain contract agreement, a farmer must: 1) possess a planting area of not less than 1.6 ha which need not be a single piece of land, but they must have land right certificates or land reform certificates (Sor Por Kor 4-01); 2) on reaching the age of five years, or harvesting age, the trees planted under this agreement must be sold back to the Company solely; 3) the farmers may either cut, and transport wood

themselves or have the Company manage this process for them; 4) the Company would buy trees at the market price but not less than the stated price, for instance, in 1994, the price was fixed at 800 baht per tonne; and 5) according to the agreement, the price of trees with diameters of at least four inches are higher than the price¹⁾ of those with diameters of at least two inches. Trees whose diameters are less than two inches cannot be sold. Farmers will allow the Company to deduct the cost of fertilizer from the money paid to them for trees. The Company agrees to provide seedlings²⁾, fertilizer³⁾, and planting and maintaining guidance. Details are seen in Table II-7-1.

Table II — 7 — 1 Contract Agreement of the Thai Plywood Company

Contract Agreement on Fast-Growing Tree Planting:

Contract Agreement No ...

This agreement/contract is made at house No., MooRoad....., Sub-District, District....., Province. on(date..) between the Thai Plywood Co. Ltd. by, position, acting on the behalf of the Thai Plywood Co. Ltd., who will be called “the project operator”; and (Mr./Mrs./Miss) of, Moo....., Sub-District, District, Province, and will be called “the member” in this agreement/contract. The agreements is as follows:

1. The promoter agrees to deliver, and the member agrees to accept the eucalyptus seedlings and fertilizer according to the seedling receipt and fertilizer receipt attached, which are taken as part of this agreement.

The project operator will not charge for seedlings delivered to the participants. The cost for fertilizer will be charged according to the conditions in Item 8.

2. The member undertakes to make use of the eucalyptus seedlings and fertilizer stated in item 1, to establish forest plantation under the project for fast-growing tree promotion of the Thai Plywood Co. Ltd. situated at Tambol District Province on an area ofrai, designated on the map attached to this agreement.

3. The member undertakes to plant and maintain trees strictly in accordance with advice given by project officials.

In planting and maintaining trees according to the first clause, it is necessary to apply fertilizer according to the advice of the project officials. The project operator will provide

fertilizer according to the conditions of fertilizer cost deduction in Item 8 and the detailed report of fertilizer delivery later made, which is taken as part of the agreement.

4. If the planted trees die, the project participant will inform the project operator, and the project operator will inspect to determine causes and condition of the dead trees and will furnish seedlings free of charge to replace the dead ones.

During the period that trees are not mature enough to be cut as stated in Item 6, the project participant must be careful not to lose or damage any trees; in case of loss or damage before cutting period, the participant must be responsible according to Item 9.

5. The project operator maintains its right to inspect and monitor the implementation of the participant. In each case the participant must agree and appropriately cooperate.

6. When the trees are five years old or reach the cutting period to be used by the project, the participant agrees to cut and sell them to the project operator only at a suitable time or according to the notice given by the project operator.

7. The project operator agrees to buy trees reaching cutting period from the site planted by the project participant according to the following conditions and prices:

7.1 In case the project participant cuts and transports trees to the project office at Bang Na, the project will buy trees whose lengths are between 1-2 meters with a diameter at the top end of over two inches at the current price but not less than 950 baht per tonne.

7.2 In case the member sells trees at the planting site and the project operator must cut and transport trees by himself, the project operator will buy trees with a diameter at the top end of over two inches at the price of 600 baht per tonne.

7.3 In the case that the trees reach the cutting period and the tree price at the gate of the Bang Na factory in Bangkok, is higher than that stated in item 7.1, the project operator agrees to adjust the purchase price in item 7.2 according to the price given at Bang Na office.

8. The project participant agrees to allow the project operator to deduct cost of fertilizer stated in Item 1 and the second clause of Item 3, from the money paid to the member according to Item 7.

9. If either party violates the agreement or does not follow it, the other has rights to claim damages according to the cost of damage incurred.

The agreement is made in duplicate, each with the same text and attachments. The two parties have read and fully understand the whole context in detail and so fix their

signatures in front of witnesses. Each party shall hold a copy of the agreement.

Signature The project operator

Signature The project participant

Signature The witness

Signature The witness

Receipt for Delivery of Tree Seedling, Thai Plywood Co. Ltd.

This note is made as part of the joint agreement on planting of the fast growing tree plantation, Thai Plywood Co. Ltd. agreement no...../.....datedmonth..... year that Mr. as a company representative, has delivered eucalyptus tree seedlings (O180 seedlings per rai from cuttings, O 270 seedlings per rai from seeds) in the total amount of trees to Mr./Ms. to be plant in the area shown below.

Signature Sender,

Signature Receiver

Signature Witness,

Signature Witness

**Receipt for Delivery of Fertilizer,
Thai Plywood Co. Ltd.**

This note is made as part of the joint agreement on planting of the fast growing tree plantation, Thai Plywood Co. Ltd. agreement no...../.....dated, month, year that Mr., as a company's representative, has delivered fertilizer 15:15:15 in the amount of.....k.g., to Mr./Ms. to fertilize eucalyptus trees planted in the area shown below.

Signature Sender,

Signature Receiver

Signature Witness,

Signature Witness

**Note Appended to the Agreement on the Planting of Fast-Growing Tree
Plantation, Agreement No. / dated**

(about the support of production inputs)

This agreement is made at house no., Moo, Road, Sub-District District Province on..... between the Thai Plywood Co. Ltd. by

position who has obtained authority to act on behalf of “the project operator” as one party and at house no. Moo Road Tambol....., District....., Province as a “project participant” as other party. The two parties agree to

1. The project operator and the project participant agree to amend the text of Item 1, Item 3, and Item 8 of the joint agreement on planting of the fast-growing tree plantation, agreement No./..... on..... in which the original items are voided and the new texts are given as follows:

“1. The promoter agrees to deliver, and the member agrees to accept the eucalyptus seedlings and fertilizer according to the seedlings’ delivery receipt and fertilizer delivery receipt attached which are taken as part of this agreement

The project operator will not charge for seedlings delivered to the participants. But the cost of fertilizer will be charged according to the conditions stated in Item 8.”

“3. The member undertakes to plant and maintain trees strictly as guided by project officials.

In planting and maintaining trees according to the first clause, it is necessary to apply fertilizer according to the guidance of the project officials. The project operator will provide fertilizer according to the condition of fertilizer cost deduction in Item 8 and the detailed report of fertilizer delivery receipt made later, which is taken as part of this agreement.

“8. The project participant agrees to allow the project operator to deduct cost of fertilizer stated in Item 1 and the second clause of item 3, from the money paid to the member according to Item 7.”

2. This note is a part of the joint agreement on planting of the fast-growing tree plantation, agreement no...../.....dated Any text that is not mentioned in this note will be enforced by the agreement no./..... dated in so far as it is not against this note.

The agreement is made in two copies, in which the text and attachments are the same. Each party to the agreement has read and understood rightly the whole agreement in detail and fixes his signature in front of the witnesses. Each party shall hold a copy of the agreement.

Signature The project operator

Signature The project participant

Signature The witness

Signature The witness

Initially, it was not compulsory to apply fertilizer, but tree growth was very slow. Therefore, fertilizers have been sold together with tree seedlings in the first year and fertilizer delivery has become part of the contract since then.

Tree seedlings distributed have two different quality levels: the seedling grown from cuttings and seedling grown from seeds. The planting space for seedlings from cuttings is 3×3 m, with intensive maintenance (regular application of fertilizer and weeding) and that for seedlings from seeds is 2×3 m. The company's extension staff visits tree farms to give supervision on the usage of fertilizer, weeding, and fire protection. In the first year, fertilizer is delivered to the farmers together with seedlings. Then, from the second to third years, it is delivered only on the farmer's request. Thus, about 33.25 kg per ha of fertilizer is provided in the first year. Trees are expected to be cut at year five, or when tree yield meets a quality specified by the Company (diameter at the top end over two inches).

The Company would pay in advance for the expense of cutting and transportation of trees. This expense would be deducted from the money paid to the farmers for wood at the rate of 40 baht per tonne for tree cutting, 50 baht per tonne for collecting logs into piles, 150-210 baht per tonne for transporting from the plantation to the Thai Plywood factory at Bang Na (the rate of 1994). In total, the expenses are between 250-300 baht per ton. The transporter would carry about 20 tonnes a trip. The trees carried each trip would be weighed at the embarkation. The farmers must pay for the weighing at the rate of 20 baht per trip. When reaching the destination the wood is weighed once again. The tree owners would have to cross check the weight at the embarkation with that at the destination.

The contract agreement of the Thai Plywood Company enables farmers to establishment tree farming on their own land. Considering contributions to the agriculture, forestry, and the industrial sectors, CTF has at least five functions: 1) it immediately helps farmers suffering from complete crop failure caused by drought to maintain their land use through tree farming, 2) it develops wood resources on marginal farm land (maize, beans, cassava ect.), 3) it encourages small-scale reforestation by farmers, 4) it supplies wood material to local industry, and 5) it promotes the implementation of governmental policies on "the development of wood resources in substitution for imported wood", "Private reforestation" and "the adjustment of agricultural production structure".

3 . Area Analysis-Baan Moo Kao

Baan Moo Kao is a village in Nam Rob Sub-District, Lan Sak District, which is in the northern part of Uthai Thani Province (see Figure II-7-1). Uthai Thani covers the area of 673,024 ha, of which 268,900 ha, is under forest cover. There are nine forest reserves in the Province covering 452,509.60 ha or 67.24% of the whole area of the province. Most of the

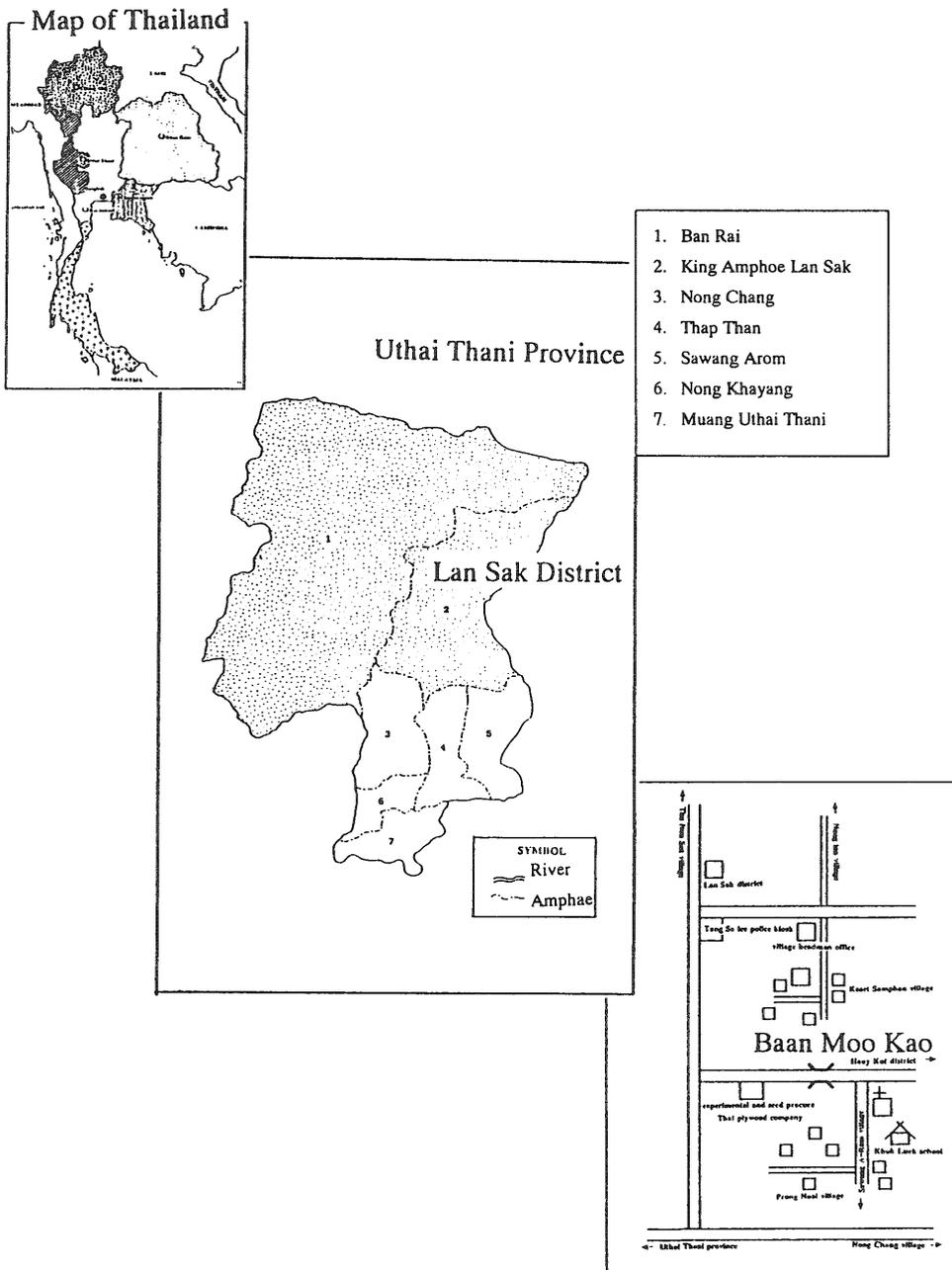


Figure II—7—1 Location of the Study Area in Uthai Thani Province

forest land is dipterocarp and deciduous forests. Some evergreen forests are in the zone of high hills in the west. According to forest statistics, in 1961 Uthai Thani had a forest area of about 489,900 ha, or 72.42%. Within twenty years, the forest area had decreased to 188,000 ha, or 40.77% (RFD, 1991).

The upland area of Uthai Thani is generally sloping with hilly areas in the west. The area planted with fast-growing trees is mostly in upland areas of Ban Rai, Lan Sak, and Huay Khot Districts. Uthai Thani Province consists of seven districts, 62 sub-districts and 484 villages. The population is 288,680 people, the average population density is 42 per km², and the growth rate is 1.08%. About 73% of the total population are farmers, the rest of the people work in industrial sector, commercial business and services. The important products can be divided into two groups: agricultural and non-agricultural products. The agricultural produce is mainly from cultivation. The rest of the produce is from livestock, forest, and fishery. According to the agricultural statistics of 1982-1986, most of this produce, 80%, is from the agricultural sector. The value of agricultural produce fluctuates and keeps decreasing every year. Most of the non-agricultural products increased at the average rate of 3.5% per year during 1982-1986, especially commercial business, stone mining industry as well as service business (OAE, 1987).

Most land holdings have legal status. There are 40,988 agricultural land holdings, with the area of 188,545.92 ha (31% of the total provincial area), of which 97.59% is under cultivation, and 2.41% is under livestock raising. The districts of Ban Rai occupied the larger number of holdings and area of holdings of about 22.02% and 24.75%, followed by Lan Sak District which are about 18.77% and 17.12%, respectively (National Statistical Office, 1993).

Holdings having an area less than 9.6 ha, or 60 rai, constituted 92.52%, 39.34%, 23.94% and 14.63% of the holdings had areas of 3.2-6.2, 1.6-3.1, and 6.4-9.4 ha (or 20-39, 10-19 and 40-59 rai) respectively. Of holding types, 72.81% were owned, 14.63% rented, and 1.07% others. The size of the holding possessed by each household was 3.47 ha (21.71 rai). The crops planted are rice, field crops, and fruit trees, and there is a vast area of wasteland (DLD, 1990). The short-term cash crops planted are maize, mung bean, and soy bean and the long-term crops are sugar cane and cassava. The major portion (51.22%) of the agricultural area was rice fields, followed by the area under field crops (40.76%). The area planted with trees was only 0.01%.

Rice production in Lan Sak District is about 1.56-2.81 tonnes per ha, 5-18% lower than the normal production of the province. The land holdings for paddy field were 1.76-3.2 ha, or 11-20 rai. Maize was planted early in the rainy season, between April-July, with average production. After maize, farmers plant mung bean or cotton, the yield of which was quite low due to insufficient labor for harvesting. The average maize yield was about 1.41-2.34 tonne per ha which was not very profitable, especially in infertile soil areas in Ban Rai, Lan Sak,

and Huay Khot Districts. Marketing of field crops was mostly handled by persons who extended credit during the planting season and take repayment at the harvesting season. The government attempted to solve cultivation problems by improving production capacity through new plant varieties, diversification of farm products, and soil improvement with organic matter. Over half (55.28%) of land holder households earned their income from agriculture, while the rest (44.72%) earned their income from agriculture and other sources. Over half (59.32%) of the holder's households were in debt for agriculture. As for the employment of agricultural workers, 70.90% of the total holdings employed agricultural workers, of which 69.80% employed workers only on an occasional basis. This implies that agriculture in Uthai Thani is heavily dependent on temporary farm labors (National Statistical Office, 1993).

Baan Moo Kao is a village in Nam Rob Sub-District, about twelve kilometers from Lan Sak District. Baan Moo Kao has a population of 90 households or 438 people, of which 207 (47.26%) are male and 231 (52.74%) are female. A total of 220 people have completed the compulsory level of education, up to grade six, without further study. Only 32 persons are in school above the compulsory level; of these six persons are in the junior high school, four persons in high school, and ten persons in levels above high school. Vocational training activities are not available.

An access to water was limited only for some households; 76 households had access to clean drinking water and 76 households had access to water for household use. Fourteen households had no access to clean drinking water. None of the households had access to water for cultivation. Public services were fairly poor. Of 20 basic public service items listed, only eight items, that is, a religious place, an animal medicinal center, a kindergarten school, primary and secondary schools, a village reading place, an information dissemination house and a school library, were provided. Some important items related to occupational promotion such as a rice bank, a common place to collect agricultural products, a village meeting place, a cooperative store, etc. were still lacking. However, services lacking in Baan Moo Kao were available in Nam Rob Sub-District, about 6 kms from this village (CDD, 1994).

The total area of Baan Moo Kao is 952.96 ha (5,956 rai), of which 5,456 rai (91.61%) is under agriculture and more than 90% of agricultural land is being used. Seventy households were growing crops and trees simultaneously in their home compounds, mainly for consumption. Ninety households engaged in cultivation. Only eight households grew rice once a year, on an average area of 0.96-1.6 ha, or 6-10 rai. Eighty-five households grew field crops on an average area of 2.72-3.2 ha, or 17-20 rai. Short-term field crops, maize, soy bean and peanuts, were planted by 85 growers, and a long-term crop, cassava, was planted by 20 growers.

In terms of land tenureship, 70 households owned land, 10 households owned and rented

land, and 20 households rented their land from other villagers in the same village. Labor migration occurred mainly among young people, between 15–20 years old and accounting for 30%, who worked in Bangkok as temporary wage labor for the periods of less than three months.

4 . Farmer Side Analysis

Lan Sak District is located in the middle of the province. It has an area of 108,030 ha, or 675,188 rai, and the population is 37,973 people in 6,209 households. The number of agricultural holding is 7,693 with an area of 32,118 ha, or 200,736 rai, the second highest after Ban Rai District. Lan Sak District has five sub-districts. Some villages in three sub-districts of Lan Sak, Praduyuen, Paa Or, Rabum and Nam Rob, were identified as backward villages with problematic soils, that is, high content of pebbles and infertile soils.

The study found that the farmers shifted to fast-growing trees in 1988 because they did not succeed in planting field crops especially maize, cassava, beans and sugar cane due to many factors: 45% of farmers faced deteriorated soil, 65% faced labor problems as the family members migrated to work in town and the land owners were too old to maintain cultivation on their plots, 60% of farmers faced losses because of high costs, 45% of farmers faced both labor shortages and low yields. The farmers tried to solve these problems by crop rotation and mixed cropping such as cassava and soy bean, or sugar cane and beans. However, these measures were not successful. Therefore, in 1988 some farmers shifted some part of the plot to fast-growing trees such as cashew, casuarina, eucalyptus. The rest of the plot was used to cultivate crops. Some areas were abandoned because they made no profit in cultivating crops and had to wait for the year of good price. However, the farmers who took loans from the local merchants to cultivate long-term crops such as sugar cane had to plant crops continuously so that they could pay interest and could repay the loan.

With the active promotion of the Forest Plantation Unit of the Thai Plywood Company, in 1988, twenty-four farmer households adopted contract farming system with eucalyptus trees on an area of 68.8 ha, or 430 rai. The first group of contract tree farmers were those unable to maintain crop cultivation and they could not afford to buy other tree seedlings such as casuarina or cashew. The households, whose young laborers migrated to work in Bangkok and who previously grew maize and cassava on a plot smaller than 6.4 ha, adopted contract tree farming earlier than others. The laborers left in their households were unable to cultivate crops. The late adopters were households growing sugar cane because they had to clear all debts to local merchants to invest in sugar cane plantations. The number of contracted farmers increased in 1991 due to the serious drought in this area.

Approximately 95% of the farmers interviewed had never planted trees either for their use

or for sale before. The land on which CTF was implemented averaged at 5.72 ha and was owned by the farmer. No land was rented for CTF. Every plot of land had land right certificate, of which 76.19% were land reform certificates and 28.31% NS.3. Farmers in Baan Moo Kao who made contracts to grow fast-growing trees for the Thai Plywood Company were those over forty-six years of age whose education was not higher than the compulsory level (grade six). They had lived in this village for more than twenty years, and possessed about 1.6-11.2 ha, or 10-70 rai, of land and most of whom had less than 6.4 ha, or 40 rai, about 70% of all the contract tree farmers interviewed had legal property rights, such as NS.3 and Land Reform Certificate (Figures II-7-2 and II-7-3).

About 85% of the farmers had some experiences in selling wood directly, through middlemen, and to the Company. Some farmers had started to plant other kinds of trees to be used in the family such as teak trees which could be used in 20-30 years. Usually, each farmer cut about 50.00-56.25 tonnes of trees per ha. However, some could cut less than the expected yield depending on the land quality, maintenance, and fertilizer application.

In the establishment of contract tree farms, the company's extension staff advised farmers on planting and maintaining trees. The farmer's households with less than 6.4 ha, or 40 rai, planted trees on the whole plot at once. The households with holdings over 6.4 ha planted trees on part of their holdings in two consecutive years, 1989 and 1990, about 3.2 ha a year. Trees were planted along the perimeter of plots of land where crops were being cultivated and farmers decided to continue planting crops. Trees were planted in a block pattern which was separated from the residential areas. The spacing was 2×3 m. Chemical fertilizers were applied after the trees were planted early in the rainy season and in the second and third years. About 10% of farmers used manure and about 25% of farmers planted associated crops in the first year. Crops associated with trees were soy bean and mung bean.

With the close advice of the company's extension staff, every farmer knew how to manage his own plantation. About 80% of the farmers planned the first cutting when the trees reached the age of five years old without thinning. They would use the clear cutting system and leave the trees to regrow, thinning the new sprouts when they were strong enough to leave about 2-3 shoots to grow. About 15% of farmers planned the first cutting when trees reached the age of four years. Some activities of CTF are seen in Figures II-7-4 and II-7-5.

Tree establishment and management were planned for fifteen years with three cuttings. For the first rotation (five years), the activities were: land clearing; tilling by tractor three times; staking and planting trees; tilling between rows of tree two times and applying fertilizers. Most activities concerning contract tree farming establishment were done by farmers except land preparation, which was done by hired tractor. The planned schedule for the second and the third cuttings was: tilling the area between rows of trees and applying

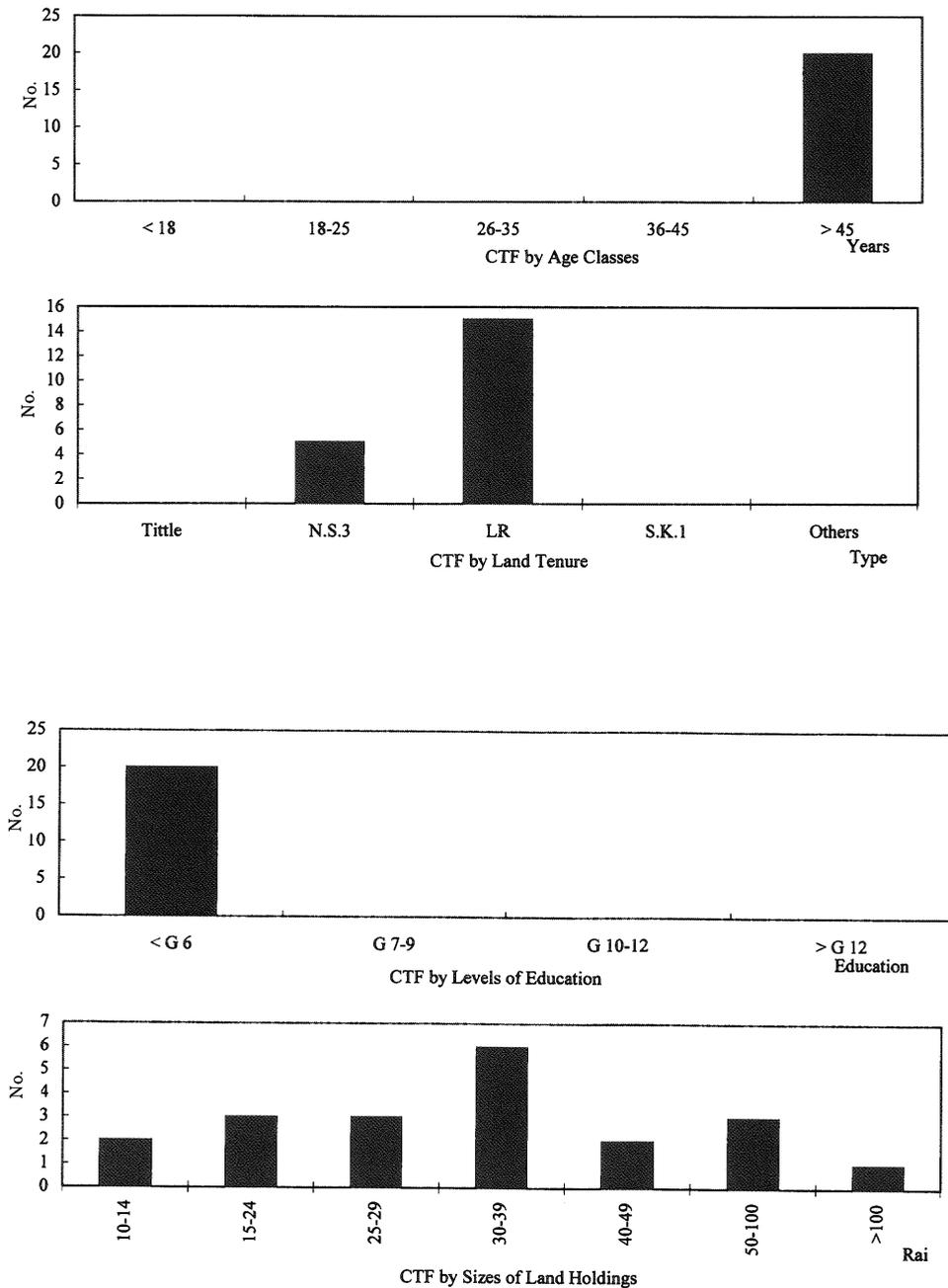


Figure II—7—2 Contract Tree Farmers by Age Classes, Education, Land Tenure, and Sizes of Land Holdings, Baan Moo Kao, Uthai Thani Province

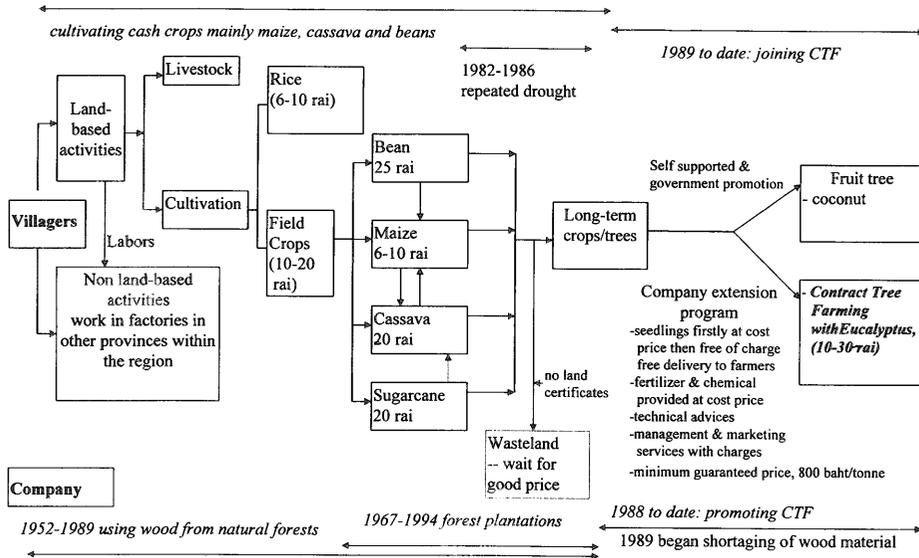


Figure II—7—3 Processes of Contract Tree Farming Development in Baan Moo Kao, Nam Rob,Larn Sak, Uthai Thani Province

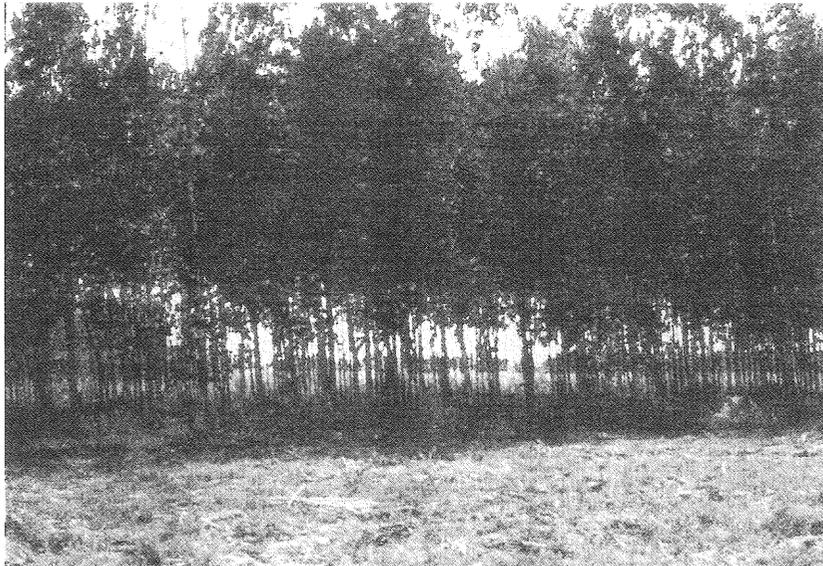


Figure II—7—4 Tree Farming Areas under CTF of Thai Plywood Company in Uthai Thani Province



Figure II — 7 — 5 Tree Farm After First Cutting for Six Months in Uthai Thani Province

fertilizer. Tree harvesting and transportation were done by hired labor provided by the Company. Sprout thinning were to be done in the sixth and the eleventh years. An estimate of costs and benefits of tree farms in Uthai Thani Province is seen in Table II-7-2.

Based on available information, CTF offers alternative income to farmer who previously suffered total losses in cash crop cultivation. Most of the farmers have no experiences in planting trees for sale. The CTF enables farmers to establish commercial tree farming by providing them with production inputs, price insurance, and advice from the company's extension staff. Seedlings and fertilizers are delivered directly by the Company to the farmer's households. Despite the fact that a wide range of raw materials required by the Company, only eucalyptus is promoted under the CTF. The single management of eucalyptus tree can contribute only to the woodchip supply, but discourages production of other products to meet various demands for trees by local people and industries.

The present contract agreement offers more advantages to the Company than the farmer. In implementing the company's advice, farmers bore all costs incurred. There is a big difference in the price paid at the Bang Na factory and at the planting site: 950 baht per tonne at factory and 600 baht per tonne at planting site. CTF farmers bore the high cost of transportation. It is likely that significant risks will occur and that an accident will destroy the farmers profits. As a result, farmers bear as high a risk as they ever had in field crop

Table II— 7 — 2 Costs and Profits Estimation of CTF, Uthai Thai Province

Items	First Cutting						Second Cutting						Third Cutting						
	1	2	3	4	5	Total	6	7	8	9	10	Total	11	12	13	14	15	Total	
1. Land preparation 3 times	400	-	-	-	-	400	-	-	-	-	-	-	-	-	-	-	-	-	-
2. Staking and planting	150	-	-	-	-	150	-	-	-	-	-	-	-	-	-	-	-	-	-
3. Seedlings	540	-	-	-	-	540	-	-	-	-	-	-	-	-	-	-	-	-	-
4. Ploughing tree rows	360	240	-	-	-	600	240	-	-	-	-	240	240	-	-	-	-	-	240
5. Weedings 2 times	200	-	-	-	-	200	-	-	-	-	-	-	-	-	-	-	-	-	-
6. Fertilizers	190	380	380	380	-	1330	380	380	380	-	-	1140	380	380	380	-	-	-	1140
7. Labor cost for fertilizing	120	80	80	80	-	360	80	80	80	-	-	240	80	80	80	-	-	-	240
8. Sprouts thinning	-	-	-	-	-	-	100	-	-	-	-	100	100	-	-	-	-	-	100
Total cost	1960	700	460	460	-	3580	800	460	460	-	-	1720	800	460	460	-	-	-	1720
Estimated Income	17,000 - 3,580 = 13,420 baht 2,684 baht per year						17,000 - 1,720 = 15,280 baht 3,056 baht per year						17,000 - 1,720 = 15,280 baht 3,056 baht per year						

Remarks: 1. Estimated Income = Expected yield (20 tonnes) × guaranteed price (850 baht/tonne) = 17,000 baht

2. Excluded transportation cost at an average of 100 baht per tonne (depends on distances)

Source: The Thai Plywood Company (1996)

monoculture. The contract impeded the flexibility of wood sale. Wood selling is limited only to the Company. Furthermore, the contract causes farmers to lose the opportunity to obtain extension services provided by the governmental departments.

5 . Problems and Prospect

The Current CTF extension program faces some constraints because of company bureaucracy. An administrative and management decisions related to CTF at the farm level have to be approved by the Headquarters' office. This resulted in less flexibility in working with CTF farmers. The future of CTF will require management flexibility and cooperation with the governmental agencies, specifically in the research, development, and extension aspects of tree farming.

Due to some limitations, specifically in the financial situation, the Thai Plywood Company's CTF doesn't have policy support. Despite the fact that the factory requires a lot of wood material, the CTF extension policy is not present in the current and future plans. Therefore, the continuance extension services and supports of the Companies' CTF program in the future is doubtful. The future development of CTF will require a long-term policy commitment and support so that farmers can be assured of extension and technical services extended to them. The cooperation with the government agencies under the four-sector cooperation program can help strengthen this CTF program, particularly on more efficient management of tree harvesting, processing and transportation.

The farmer bore high costs for CTF establishment and risk for the CTF management. The

company's technical guidelines required costly fertilizer and weedings, and even though credit was extended to cover these, farmers had to pay back immediately after the first cutting. Therefore, the net income farmers received was not much, and the tree crop failed or was damaged by fire or other factors, farmers will suffer from the losses.

The close planting spaces recommended, 2×3 m and 3×3 m, discourage crop cultivation and livestock raising. Therefore, the CTF didn't properly promote the diversification of farm products and income as well as the efficient use of farm land. Although estimates of CTF give a positive financial return, farmers have been facing many problems in every step of operation, particularly in tree cutting, wood yield estimation or wood weighing, and transportation, in which farmers are unable to get information on costs and prices or to negotiate for reasonable costs, but only receive payment after all costs incurred are deducted. In discussing with farmers, half of the CTF participating farmers thought that the cutting and transporting expenses were too high and left them very little income. Such expenses should be less. Some farmers were not certain whether they should uproot stumps after the third cutting or not since the expenses were rather high.

In terms of profits and risks management in CTF, the repayment of credit to the Company should be extended to the end of the rotation or the last cutting so that farmers can have some savings. Some farmers sold their trees in year three, two years before the planned period, in order to repay short-term loans. The Company should share risks with farmers in such a way that it encourages both parties to pay more attention for the better management of CTF.

At present, the Government departments, particularly, local forest offices, have no involvement with the Company's CTF promotion. However, due to the uncertainty of the Company's policy in supporting CTF, necessary interventions to support CTF farmers by the Government agencies are essential. Considering that the Company's CTF doesn't have long-term policy support, the CTF farmers will definitely be susceptible in their tree management and marketing. The Government should help in this matter by coordinating farmers to formulate CTF farmer groups and enhance their capability in managing and marketing trees and tree products as well as obtaining access to governmental extension services.

Notes

- 1) Practically, they are bought at the average price.
- 2) In planting trees, the Company would provide 266 trees per rai or 1,662.5 seedlings per ha (2×3 m spacing). During the early period of promotion (1989-1990), 300 seedlings are given for 0.75 baht per seedling. If the farmers need more seedlings for replanting, the

Company would give them free of charge. After 1990, all seedlings have been free of charge.

- 3) The amount of chemical fertilizers the Company provided for farmers for four years were: 33.25; 83.13; 166.26; and 332.50 kg per ha for the first to the fourth year, respectively. Totally, 615–625 kg per ha at the rate of 5.50 baht per kg or 3,437.50 baht per ha for fertilizer and 225 baht for seedlings. The total cost is 775 baht per hectare paid in advance by the Company and will be deducted when their trees are sold.

Chapter 8

An Analysis of Contract Tree Farming by the Phoenix Pulp and Paper Company— The Case Study of Baan Kam Bon, Khon Kaen Province

1. Features of the Company

The Phoenix Pulp and Paper Company, located at Baan Moo Sam, Kud Nam Sai Sub-District of Nam Pong District, Khon Kaen Province, was the first paper pulp company established in the Northeastern Region. The Company first registered in 1975 as a paper pulp company producing pulp from kenaf with an initial investment of US\$ 47 million. By 1994, the Company was registered in the Stock Market as a public company. The Company aims to produce 200,000 tonnes of short-fibre paper pulp annually, of which 70% is for the domestic market and 30% is exported to Korea, Australia, and Japan. To meet its production target, an area of 44,000 ha (275,000 rai) has been planned to produce raw materials. A total of 20,000ha of bamboo and 24,000 ha of eucalyptus have been scheduled (RFD, 1989).

The Company uses three types of raw material, that is, kenaf, eucalyptus and bamboo. Kenaf pulp is the most expensive. Bamboo pulp is more expensive than eucalyptus pulp but is much needed. *Dendrocalamus asper* was highly recommended as it could be easily found.

The local bamboo is rarely found, however, it is also recommended as far as all other species such as Phai see-suk (*Bambusa blumeana*), Phai liang (*Bambusa nana*), Phai ruak (*Thyrsostachys siamensis*). At one time, grass, kapok trees, kenaf, and paper mulberry were also used. However, they had to be given up since supplies were unpredictable. In promoting eucalyptus, *Eucalyptus degrupta* and *Eucalyptus urophylla* were tested experimentally but grew very slowly, and *Eucalyptus grandis* was destroyed by insects. At present, only the species *Eucalyptus camaldulensis* is promoted.

Raw materials procurement is done in two ways: 1) direct purchase from farmers or traders and 2) making contract agreements for buying or selling raw materials with farmers

in advance. The Company purchases raw material at the factory and at field purchasing units located in the strategic locations where raw materials are being harvested, for instance, in Phetchabun, Prachin Buri, and Uthai Thani Provinces for bamboo, and in Khon Kaen, Udon Thani, Maha Sarakham, and Chaiyaphum Provinces for eucalyptus and kenaf. In addition to local sources, bamboo is also procured from Laos. The Company has a field operation division to handle overall raw material procurement. This division has twenty field extension units located in five provinces, within 100 km (initially 50 km and expanded to 100 km) from the factory, to promote tree farming contracts with farmers. In the past, the Company planned to have its own forest plantations by leasing 16,000 ha of forest land from the Government to plant bamboo and eucalyptus. This has not yet been successful. Thus, the present Company's policy is to develop CTF with farmers in areas near the factory. To implement the CTF program, the Company produces five to six millions of seedlings¹⁾ per year.

Extension areas for tree farming are focused on five provinces, that is, Khon Kaen, Udon Thani, Maha Sarakham, Kalasin, and Chaiyaphum. There are extension units in 20 districts of these five provinces. The extension target of each district is unlimited; it depends on farmers' interest. The extension unit uses a field staff of 1-2 extension workers with vocational school certificates. They are trained in a 2-3 months course to deal with farmers and to assist in technical aspects of tree farming. Extension staff must encourage the farmers to participate in the project. The following guidelines are set to select farmer participants²⁾: 1) farmers with 0.16-8.00 ha of land available to plant trees each year for many years (not a specific number of years), 2) occupation background, and 3) set up groups of farmers.

When first establishing a tree farm, farmers are recommended to plant fast-growing trees on about 30% of the area and increase this in the following years. Practically, the ability of farmers to take care of their tree farms is taken into consideration, a farmer with small-farm tractor being considered a good prospect, regardless the location of the farm. After being accepted, farmers receive: 1) 1,112.50 seedlings per ha planted at 3×3m spacing; 2) guaranteed price at 650 baht per tonne at the factory, with a seven year warranty.

The products were estimated at 62.5 tonnes per ha (10tonnes per rai) in four years³⁾. If they can get 100 tonnes of products from 1.6ha, it is acceptable. If less than this, it must be taken into consideration whether or not some trees were sold to other people.

2 . Contract Agreement and Its Characteristics

The contract is quite detailed. There are two types of contract, namely "Selling/buying agreement for eucalyptus" and "Buying agreement for Bamboo". There are two pages in the eucalyptus contract, and three pages in the bamboo contract, and each contract has two

copies, one for the farmer and the another for the Company. A procurement agreement for fertilizers and materials is annexed to the bamboo contract but not to the eucalyptus contract. The manager of the Company is the administrator of the contract. If the plots occupied by the farmers are rented ones, the duration of the lease must be taken into consideration. A project members can apply for price guarantee several times and no asset⁴⁾ were required for collateral. However, each year, the plot must not be over 0.16-8.0ha. Most of the time, the number of farmers applying to be members is over the target. In such cases, they must leave their applications to be considered next year. After expiration, contracts can be renewed or canceled depending on the consideration of the Company through its extension unit. The Company believes that in the future, eucalyptus might be in oversupply. Thus, the contract and guarantee of the price⁵⁾ are useful for farmers. Details of contracts are seen in Tables II-8-1 to II-8-3.

The contract agreement is an attempt to prevent other companies from competing in buying the wood produced. Generally, the Company makes contract with farmers planting eucalyptus mainly to prevent other companies from competing in buying wood products. There are not many activities for the eucalyptus groups since there are very few problems.

The contract for bamboo is done with the objective to introduce a productive system for bamboo planting and management for commercial culm production by farmers. The process of bamboo planting is more complicated than that for eucalyptus. Thus, the Company must follow up all the time. Sometimes the Company arranges field trips for the bamboo groups to overseas locations such as China. At the end of 1992, about 5,000 farmers⁶⁾ had signed agreements with the Company. In 1993, when there were about 1,000 farmers, each contract farmer owned approximately 0.8 ha⁷⁾ of land.

As for bamboo, much promotion is done since planting for culm harvesting is not popular with farmers. It is a rather new idea for farmers too. The Company motivates the farmers borrow production inputs from the Thai Farmers Bank and Bangkok Bank as follows: 1) seedlings, 2) fertilizers and 3) pesticide with interest for four years, three years for mortgage. They ensure a price⁸⁾ of 700 baht per tonne.

The farmers are responsible for fire protection. In case trees are stolen, the Company might not strictly enforce return payment. As for cutting and transportation, farmers' bamboo has been cut only once. However, the agreements with some farmers might be terminated if they did not follow suggestions, for instance, if they left five shoots instead of one to two as recommended or did not follow the suggestions on fertilizer application. Due to the conditions of price guarantee, the farmers cannot sell their wood/trees to other people. However, at present, construction poles get very good prices in the market. The Company lets the farmers sell some of their trees as construction poles.

Table II—8—1 Contract Agreement of the Phoenix Company for Eucalyptus

**Selling/Buying Agreement for Eucalyptus, Agreement No. ...
Phoenix Pulp and Paper Company**

This selling/buying agreement is made between (Mr./Mrs./Miss) of house no. ..., Moo, Village, Sub-District, District....., Province....., I. D. Card No., issued at, Province (who shall be called "the seller" in this agreement).

The seller possesses a plot of land planted withrai of Eucalyptus at Village, Sub-District District Province The eucalyptus was planted in June, ... at the planting space of ... meter(s). The seller applied to be a member of Eucalyptus Selling Group and received the membership number ofto sell his eucalyptus at the rotation no.... to the buyer. Both parties agreed to make an agreement with the following statements and conditions:

1. The seller agrees to sell and the buyer agrees to buy the eucalyptus at the price and with delivery conditions as follows:

1.1 The buyer agrees to buy the eucalyptus at a price of not less than baht per kg or at baht per metric ton. The eucalyptus must come from the area stated in the agreement only. The weight of the tree is calculated according to the fresh weight with no deduction for moisture.

1.2 The buyer shall buy the eucalyptus from the seller in the needed quantity and according to the producing capacity of the buyer's paper pulp factory or as specified by the buyer.

1.3 The seller must sell not less than 8-15 metric tons of the abovesaid eucalyptus to the buyer.

1.4 The seller promises not to sell, distribute, nor transfer the eucalyptus trees to other people or do anything which would cause the buyer lose any privilege to buy according to this agreement unless the buyer gives his consent in writing.

2. The seller must deliver eucalyptus trees to the buyer according to the following size, quality, and specifications:

2.1 The eucalyptus must not be less than 4 years old.

2.2 The diameter must not be less than 2.5” with no limitation of largest size.

2.3 The trees with the diameter of 2.5-5 inches must be cut into logs with the length of 2 meters.

2.4 The big trees with diameter over 6 inches must be cut into logs with the length of 1.5 meters.

2.5 All knots, branches and roots must be cut off.

2.6 Rotten or burnt trees shall not be accepted.

If the delivered eucalyptus trees lack of any of the above-mentioned characteristics, size, and/or quality, the buyer can refuse to buy or reduce buying prices accordingly. The seller must deliver the eucalyptus trees to the buyer at the buyer's paper pulp factory situated at Kud Nam Sai Sub-District, Nam Pong District, Khon Kaen Province or any other place designated by the buyer.

3. If either party cannot fulfill this agreement due to strikes, riots, war, flood, drought, wind damage, fire and/or other causes which could not be possibly controlled nor expected by anyone, both parties agree to extend the buying/selling period until the situation is better and the buyer is ready to buy.

4. The buyer will provide convenience to the seller in selling and receiving money for the trees.

5. In selling according to this agreement, the seller must pay for transportation, transporting fees, and any other delivery expenses as well as every type of tax.

6. The duration of this project is year(s) from date month year to date monthyear

Both parties have thoroughly read and clearly understood the details of this agreement, and sign their names and stamp their seal (if any) as evidence in front of the following witnesses:

Phoenix Pulp and Paper Company

Signature

Seller

Signature

Buyer

(.....)

(.....)

Table II—8—2 Contract Agreement of the Phoenix Company for Bamboo

Buying Agreement for Bamboo	
Agreement No...	Phoenix Pulp and Paper Company
	Date....., Month....., year.....

This buying agreement is made between, age..... years of house no., Moo....., Village....., Sub-DistrictDistrict....., Province....., (who shall be called "the seller" in this agreement) and the Phoenix Pulp and Paper Company, whose factory is situated at 99 Moo 3, Kud Nam Sai Sub-District, Nam Pong District, Khon Kaen Province (called "the buyer" in this agreement).

The buyer possesses a paper pulp factory situated at Kud Nam Sai Sub-District, Nam Pong District, Khon Kaen Province. The buyer manages the Bamboo Planting Project to promote agriculture and obtain material for the paper pulp factory of the buyer (which shall be called "the project" in this agreement).

The seller is a farmer possessing a plot of land planted with aboutrai of bamboo, situated at Village, Moo....., Sub-District District, Province The seller applied to be a project member and has the membership number of He planted bamboo species of in (month).....(year)..... to sell this species of bamboo called "bamboo" in this agreement) to the buyer.

Both parties agree to sign this agreement with the following details and conditions:

1. The seller agrees to sell and the buyer agrees to buy bamboo planted in this project at the price, condition and delivering procedure as follows:

1.1 The buyer agrees to buy fresh bamboo at a price not less than 0.70 baht per kg or 700 baht per metric ton, calculated from the bamboo's fresh weight with no deduction for moisture.

1.2 the buyer shall specify the actual price of bamboo according to the quality, size, and specifications of the bamboo as stated in 1.3 and 2. of this agreement. The buyer shall occasionally inform the seller of the price.

1.3 The bamboo sold according to this agreement must not be less than two years old. The buyer shall buy the bamboo of such age according to the quantity and at the period when the buyer shall inform the seller.

When the bamboo planted for this project is not less than three years old, the buyer shall buy it from the seller according to the needed quantity and the capacity of the paper pulp factory of the buyer or as the buyer shall specify.

When the bamboo planted for this project is not less than four years old, the seller shall have to sell at least two metric tons of bamboo per rai per year to the buyer until the project expires according to No. 10.

The seller promises that he shall not sell, distribute, nor transfer the bamboo planted for the project to other people or do anything which would cause the buyer lose any privilege he should get from buying under this agreement without the consent of the buyer in writing.

2. The seller must deliver bamboo to the buyer according to the following size, quality and specifications:

2.1 The bamboo must be fully mature, and not less than two years old as stated in No. 1.3 of this agreement.

2.2 The bamboo must be cut into lengths of 1.50 -3.00 m.

2.3 Each culm of bamboo must have no root, knot, branch and thorn.

2.4 Each bamboo must have no stump attached nor be crooked.

2.5 Within the bamboo must be clear of soil, pebbles, sand, water, mud, and debris nor any other hard stuffs.

2.6 In case of bamboo whose diameter is less than 2 inches, for instance, *Thysostricus siamensis*, the seller must tie them together in bundles, each of which must be about ten kg. These bamboo must be tightly tied with rope or kenaf rope only and must be tied up at at least three positions per bundle. When thrown to the ground the bundle must not be break and the string or kenaf rope must not breek. The seller must not use cord made of plastic, nylon, electric wire nor metal wire.

2.7 The buyer will not buy burnt bamboo.

If the bamboo delivered is different from or does not comply with the characteristics, size and/or quality as stated above, the buyer reserves the rights to refuse to buy it or deduct from the buying price accordingly.

3. The buyer shall pay for the bamboo according to the number and quantity delivered to the buyer within 7 (seven) days after the buyer has received the bamboo. The seller shall allow the buyer subtract the cost of materials and other expenses as well as the money paid by the buyer in advance for the bamboo planting or for the benefit of the buyer in this project.

4. If in any case the seller does not sell the bamboo planted for the project to the buyer, the seller must pay back the advance money including the cost of materials and other expenses which the buyer already paid and a fine of half of the total price of bamboo which the seller planted for the project unless there are unexpected events according to No. 5 of this agreement.

5. In case either party cannot follow this agreement due to strikes, riots, war, flood, drought, wind damage, fire or other causes which could not be possibly controlled nor expected by that party, the other party is willing to extend the buying period until the situation is better or normal and the buyer is ready to buy.

6. The buyer shall assist the seller in planting bamboo for the project by sending its officer to meet the buyer to advice and solve problems of bamboo planting for the project such as seedling preparation, soil preparation, maintenance till the bamboo is cut and sold to the buyer.

7. The buyer shall provide convenience to the seller in selling and receiving the money paid for the bamboo so that the procedure shall be more easy and not necessary repaid.

8. In selling/buying according to this agreement, the seller must pay expenses for transportation, wages and other delivery expenses himself as well as every types of taxes.

9. If there are any disputes caused by or relating to the agreement, due to misunderstanding of any statement in the agreement or interpretation, the buyer shall be the only one to designate an arbitrator to decide that dispute.

10. The project according to this agreement lasts 10 years from date....., month....., year, to date, month, year.....

Both parties have thoroughly read and clearly understood the details of this agreement, and sign their names and stamp their seals (if any) to it as evidence in front of the following witnesses.

Phoenix Pulp and Paper Company

Signature.....Seller,
(.....)

Signature.....Seller,
(.....)

Signature.....Buyer
(.....)

Signature.....Buyer
(.....)

Table II—8—3 Agreement of the Phoenix Company on Selling/Buying on Credit

This agreement was made at the Phoenix Pulp and Paper Co. Ltd. on date..... between the Phoenix Pulp and Paper Co. Ltd., whose factory situated at 99 Moo 3, Kud Nam Sai Sub-District, Nam Pong District, Khon Kaen Province, by (Mr./Mrs./Miss)..... the General Manager authorized the company, who shall be called "the seller" in this agreement, and (Mr./Mrs./Miss)..... age.....years of house no.Moo.....Sub-District.....District.....Province..... called "the buyer" in this agreement. Both parties agree to make an agreement with the following details:

1. The "buyer" and the "seller" agree to the sale of bamboo seedlings to be planted in the plot of land specified by the buyer as well as fertilizer and insecticide to be used in maintaining bamboo planted in the quantity needed by the "buyer" with the purpose to sell the bamboo produced to the seller in the fifth year after the date this agreement is signed.

2. Both parties agreed to sell/buy the following materials

- a. bamboo seedlings at baht per seedling, for a total of.....baht (.....)
- b. kilograms of fertilizers at ... baht per kg, for a total of.....baht (.....)
- c. kilograms of pesticide at ..baht per kg, for a total of.....baht (.....)

3. The "buyer" has received materials on the day this agreement is signed in the amount of baht as stated in the appended list. The "buyer" agree to receive the rest in the second, third and fourth year after the day this agreement is signed. Documents accompanying each transaction will be considered a part of this agreement. The "buyer" received the materials but has yet to pay the seller.

4. The buyer and the seller agreed to specify payment periods as follows:

4.1 The buyer will have to pay 30% of the total material cost for the materials he already received five years after this agreement was signed as the first payment.

4.2 In the sixth year after this agreement was signed, the "buyer" agrees to pay the second payment for 30% of the total material cost for the materials the "buyer" already received.

4.3 In the seventh year after this agreement was signed, the "buyer" agrees to pay for the rest of the material sold to him as a final payment.

5. In paying for the material according to no. 4, the seller reserves the rights to deduct the cost of material sold by him from the money the buyer receives for selling product to the seller.

6. The "buyer" must plant and use the materials sold to him according to the advice of the officers of the "seller". He must obey and follow the advice strictly for seven years from the day this agreement is signed.

7. The "buyer" must sell the products obtained from these sold materials, that is, bamboo, to the seller only. As for other products, the seller permits the buyer to sell to other people. However, the harvesting must strictly follow the advice and consent of the officer of the seller only.

This agreement is made in duplicate with the same content. Both parties have thoroughly read and clearly understood the details in this agreement, and seeing that it is satisfactory, have thus signed their names to it in front of the witnesses.

Signature.....Seller,

(.....)

Signature.....Witness

(.....)

Signature.....Buyer

(.....)

Signature.....Witness

(.....)

Material Receipt (Appendix to Buying/Selling On Credit Agreement)

No...

Phoenix Pulp and Paper Co. Ltd.

Date.....month.....year.....

Ref. Agreement.....dated.....

I, age....., years, of house no. ..., Moo ..., Village ...,Sub-District....., District, Province have made a buying/selling agreement with the Phoenix Pulp and Paper Co. Ltd. and have received the following buying/selling materials on the date and venue stated above:

1.seedlings at baht (.....) per seedling, for a total ofbaht (.....)
2.kilograms of fertilizer formula ..., at ...baht (....) per kg, for a total of...baht (.....)
3.kilograms of pesticide atbaht (.....) per kg, for a total of...baht (.....)

Signature.....Buyer

(.....)

Signature.....Witness

(.....)

The contract agreement of the Phoenix Pulp and Paper Company enable some farmers within 100 km from the company's factory to establish tree farming on their own land. Considering its contributions to the agriculture, forestry, and the industrial sectors, CTF has four functions: 1) it helps farmers facing losses or unable to maintain in cultivation to maintain their land use with bamboo or trees with a minimum guaranteed price, 2) it develop wood resources on marginal farm land, 3) it encourages small-scale commercial tree planting by farmers, 4) it supplies wood material for local industry (the company's factories), and 5) it promotes governmental policy and plans on "the development of wood resource in substitution of imported wood", "Private reforestation" and "the adjustment of agricultural production structure".

3 . Area Analysis-Baan Kam Bon

Baan Kam Bon is a village in Koke Soong Sub-District of Ubonratana District, Khon Kaen Province. In studying CTF in Baan Kam Bon, it is necessary to understand the location, land-use, agricultural conditions, and socioeconomic conditions of people in different administrative levels, in which Baan Kam Bon is located (Figure II-8-1).

Khon Kaen is situated between 15.14-17.05 °N and longitude 101.46-103.11 °E and is 445km from Bangkok. Khon Kaen's total area is 1,143,614 ha, 7.47% of the Northeastern Region's area, of which 318,314.68 ha is forested area with 28 forest reserves. Intact forests account for 103,012 ha, or 9.47%, and are located in the northwestern part of Si Chom Phu, Chum Pae, and Phu Wiang Districts and some areas in the north: Nam Pong, Ubonratana, and Kra Nuan Districts. The forests in the southern part are in Pol, Baan Pai, Chonabot, Nong Song Hong, Wang Noi, and Peuy Noi Districts. Except for a few in the mountainous area in Phu Pa Man and Phu Wiang Districts, most lowland forests are degraded.

Khon Kaen Province is located in the middle of the Northeastern Region and has an average altitude of 200m. Khon Kaen borders Udon Thani and Loei Provinces in the north, Kalasin and Maha Sarakham Provinces in the east, Nakhon Ratchasima Province in the south, and Chaiyaphum Province in the west. Khon Kaen consists of three sub-regions. The western plateau covers the districts in Phuphamarn, Si Chom Phu, Chum Pae, Phu Wiang, Nong Rau, Ubonratana, and some parts of Khao Suan Kwang, Nam Pong, Muang, Ban Fang, and Manjarkiri Districts. The eastern plateau side, covering Kra Nuan, Khao Suan Kwang, Nam Pong, and the northern part of Muang District, is elevated land that is fairly rolling alternating with lowland paddy and is suitable for field crop growing and cattle ranching. The Chee, Pong, and Choen Rivers are the main rivers flowing through the province to the Mekong River. The soil is mostly sandy loam or sandy soil except in the low land areas. The major soil types are Roi Et, Korat, and Nam Pong. Wasteland occupies approximately 45,494.

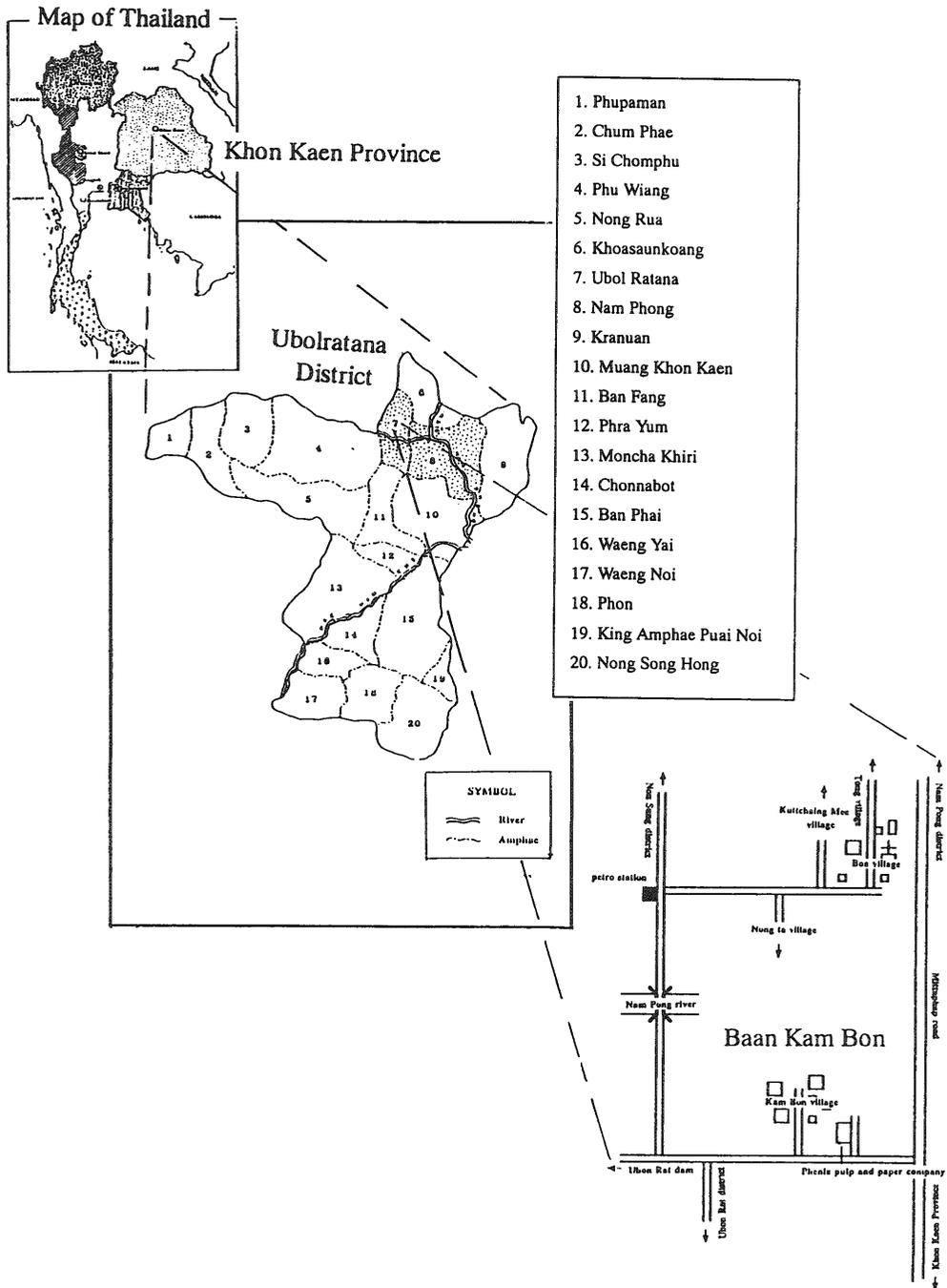


Figure II—8—1 Location of the Study Area in Khon Kaen Province

56ha, or 4.18%, of Khon Kaen: this land is seasonally utilized or has saline soil (12% of the provincial area) or is degraded land. The climate is tropical with clear seasonal changes. The duration of the rainy season, winter, and summer are May–October, November–February, and March–May, respectively. The average rainfall is 1,162mm.

Khon Kaen Province consists of 20 districts, 160 sub-districts, and 1,749 villages (OAE, 1987). The population is 1.96 million and the average population density is 171 per km² (Ministry of Interior, 1994). The population is denser in the districts of Muang, Baan Pai, Phu Wiang, and Nam Pong, and sparser in the districts of Phu Pa Man, Puey Noi, and Wang Noi. People settled in each part of the province long time ago. According to Kor Kor Chor-statistics reported by OAE (1987), 298 villages, or 184,485 households, are located in the national forest reserves. The number of villages outside forests without any property rights on land were 38. The newer settlements, founded within the past 20 years, are mostly in the districts of Chum Pae, Si Chom Pu, Kra Nuan, Muang, Phu Wiang, and Baan Phai.

The gross product for all sectors increased 6.23% per annum. The major source of income of the people is from agriculture. The agricultural sector contributes 16.78% of all sectors and the annual growth rate is 4.02%. Forestry constituted 12.56% of the total agricultural product (DLD, 1987). The main crops are rice, cassava, sugar cane, kenaf, and maize. The agricultural land area of Wang Noi, Pol, Nong Song Hong, Baan Pai, Pra Yuen and Muang, is partly salty. The livestock area is 140,995.84 ha, or 16.90% of agricultural land. Agricultural households account for 89.60% of total households. The percentage of agricultural households was fairly high among the districts in the flat plain areas of the Chee's and Pong's tributaries in the central part of the province, that is, Muang, Baan Phai, Nam Pong, Phu Wiang, and Pol, and was lower in the districts in the northern and western parts due to mountainous and forested areas.

The policy of Khon Kaen Province stated that economic measures were the promotion of economic investment, commercial business, and services, on which the community industrial center of Nam Pong District is focused. Integrated agricultural manufacturing industries are promoted, focusing on the export products and the production for replacement of imported products, specifically in a community-centered agricultural services such as Ubonratana District. Household industry, small-scale agricultural processing industry, and farmer organization improvement are also promoted. Agricultural policy in Ubonratana District is to improve rice production and to replace cassava with peanut, kenaf, and other crops.

Income from agriculture came from seven major sources; these were, rice, field crops, vegetables, fruit trees, fishery, livestock, and silk, with an average income of 8,759.90 baht per family per year. Among 19 districts (data on Phu Wiang not available), Chum Pae, Munjarkiri, Phu Pa Man, Nam Pong, and Si Chom Pu Districts have incomes over 10,000 baht

per family per year, mainly from rice and major cash crops such as cassava, sugar cane, and kenaf. The agricultural income in Ubonratana District was 8412.60 baht, a little lower than the provincial average.

Ubonratana District is located in the northwestern part of the province. It is bounded by Nam Pong District in the east, Phu Wiang District in the west, Khao Suan Kwang District in the north, and Ban Fang and Muang Districts in the south. The population of Ubonratana District is 37,973 people, or 6,209 households, of which 47.22% are male and 52.88% are female. The percentage of agricultural holdings is relatively low, 71.36%, because a large area of land, specifically in the northern part of the district, was designated for the conservation of forests. Historically, people have been settled in this district for more than 20 years, which accounts for 97%, and only 3% have been settled less than 20 years. According to the OAE (1987), 18 villages, or 35% of the total villages in Ubonratana District, were located in national forest reserves. The main sources of income from agriculture were from field crops and rice, which account for 97.10% of total agricultural income. Ubonratana District has six sub-districts. Many villages in the three sub-districts of Koke Sung, Baan Dong, and Kuen Ubonratana were identified as backward villages⁹⁾. Among these, Baan Kam Bon of Baan Dong Sub-District, which I selected as a study site, was one of the first villages to develop tree farming in this area.

Baan Kam Bon has a population of 216 households, or 1254 people, of which 640 (51.04%) are male and 619 (48.96%) are female. About 87% of all the households owned land, 8.33% owned and rented land, and 3.7% rented all their land. Every household had paddy fields, and 125 households (57.87%) had crop fields. About 75-90% of the agricultural land areas was cultivated. This had mostly been unprofitable. Nearly all (208) households used new varieties of rice, and 195 households applied fertilizers. The long-term crops most planted were sugar cane and cassava. Cassava used to be predominant but has been gradually replaced by sugar cane, short-term crops, and fast-growing trees. Firewood and charcoal are commonly used for cooking. Wood is collected from trees in the field (CDD, 1994).

Villagers of 209 households, 96.76%, have more than one job, earning an average of 25,000 baht per year, while seven households having a single job and earn at an average of 20,000 baht per year. Concerning participation in local organizations, a total of 50 farmers are members of agricultural cooperatives and 45 farmers are members of agricultural occupational groups. Credit is obtained from agricultural cooperatives, BAAC, governmental revolving funds, and local merchants.

Public services in Baan Kam Bon were fairly good. There was a rice bank, a cattle bank, health care, and electricity. Nevertheless, cooperative stores or shops selling material used in agriculture were not available. A road gave convenient access in the dry season. Child care

and a high school were lacking. The educational level is rather low. A total of 988 people, or 78.78%, were educated, most of them, 76.4%, at the compulsory level. The percentage of those whose education was higher than the compulsory level was quite low.

4. Farmer Side Analysis

Cost of rice and field crop production increased since the early 1980s, and at the same time, droughts and floods occurred frequently. Despite the fact that cultivation areas were fairly stable, harvested areas decreased. A total of 45,391, or 71.09%, out of 63,847 rice-growing households could not produce enough rice for household consumption. Some agricultural land became saline. Crop species have been changed to cope with price fluctuation, cost of production, and land productivity. Some new long-term crops and trees such as cashew and bamboo were introduced. Cashew cultivation did not succeed due to low yield and marketing problems. Eucalyptus, which was introduced on a small-scale in 1978, became more profitable than many existing cash crops due to low costs of production and transportation and a readily available market. Therefore, once the Phoenix Company began to promote tree farming with fast-growing tree species, bamboo and eucalyptus were chosen for planting in farm areas where crop cultivation was less profitable or unprofitable and/or there was a shortage of labor, specifically in cassava and maize fields. Regardless of the distance from the farm to the factory, farmers plant fast-growing trees extensively. Nevertheless, CTF began primarily in the districts close to the woodchip factory, that is, in Nam Pong and Ubonratana. The farmers had repeatedly faced problems and constraints in doing agriculture, and had long tried to sustain their agriculture, including off-farm work, to attain short-term income. The present choice of some farmers, particularly those without sufficient capital and/or labor, is to undertake tree farming with fast-growing trees such as bamboo and eucalyptus on part of their farm land.

All of the 20 farmers interviewed were over 46 years of age. About 95% of the farmers planting fast-growing trees had graduated from primary school, and 5% from college. About 95% had been settled there for more than 20 years, and 5% for 16-20 years. The farmers possessed land an average of 3.74 ha (23.38 rai) of land. The smallest plot was about 0.8 ha and the largest was 8 ha. About 93% of the land holding was used, and 61.19% of the land used belonged to the farmers, and 38.81% belonged to their families. The farmers did not rent land to plant fast-growing trees. About two-thirds (65.38%) of land right certificates were self-help land settlement certificates, 23.08% were NS.3, and the rest were the land reform certificates, SK.1. Nevertheless, some plots of land had no certificates.

Farmers who had made contracts to grow fast-growing trees with the Company were those having 1.6-3.2 ha or 10-20 rai of land suitable for field crops and who had experienced failure

of one or more of three main crops: kenaf, sugar cane, cassava, due to unprofitability, loss to drought and flood, and shortage of farm labor and capital. These factors affected each other; for instance, when cultivation became unprofitable or seemed to offer less hope, family labor turned to off-farm jobs in Khon Kaen city to earn income. Farmers planting kenaf¹⁰ were among the early adopters as they faced higher cash investment and low prices, such that kenaf eventually became unprofitable, and so they turned to bamboo plantation. The late adopters were the sugar cane growers who faced a serious shortage of farm labor. Some sugar cane fields had been replanted to cassava before fast-growing trees were planted. Cassava growers, the latest adopters, faced low yields and low prices, then unprofitability and later shortage of labor. Previous kenaf fields, which are on low land, were changed to bamboo while sugar cane and cassava fields, which are on upland, were planted to eucalyptus. In summary the tree farmers of Baan Kam Bon were small-scale farmers who had suffered losses from crop cultivation, had insufficient family labor to cultivate crops, and received promotion from the Company (see Figure II-8-2).

According to the study, the farmers gave up planting field crops and shifted to the fast-growing trees because they were not successful in cultivating crops especially cassava, maize, kenaf, and sugar cane. About 45% of the farmers faced the problem of deteriorated soil, 40% faced the problems of labor shortage and being too old to maintain crops. About 35% of farmers suffered losses since costs were high but prices fell. About 15% of farmers faced the problem of labor shortage and low prices of crop products and thus they replaced some plots of field crops with fast-growing trees such as casuarina, eucalyptus, and bamboo (*Dendrocalamus asper*), etc. The rest of the land was still planted with crops.

The farmers began to plant more *Dendrocalamus asper* for sale to the paper pulp factory in 1987. Many farmers planted bamboo under contract agreements in 1992. The farmers would plant *Dendrocalamus asper* in plots at a spacing of 6×6m. They used chemical fertilizers when the bamboo were planted and insecticide to protect against termites at the bottom of the planting hole. About 95% of farmers planting bamboo knew how to plan and manage their tree farms. They cut the bamboo for sale when it reached maturity, that is when it was three years old. The farmers cut some bamboo shoots for sale in the second year. They left 8-9 sprouts for each plant and applied fertilizer every time the sprouts were cut. The farmers planting bamboo obtained more income from the bamboo shoots than their culms. In 1994, the bamboo flowered and most died, and the farmers had to plant bamboo in 1995 using the seedlings from the Phoenix Company. Some farmers shifted from bamboo to eucalyptus.

The farmers planted eucalyptus with a guaranteed price from the Phoenix Company. They planted in blocks at a 2×3m planting space. All of the farmers applied some chemical fertilizer after planting and in the early rainy season. About 40% of the farmers planted field

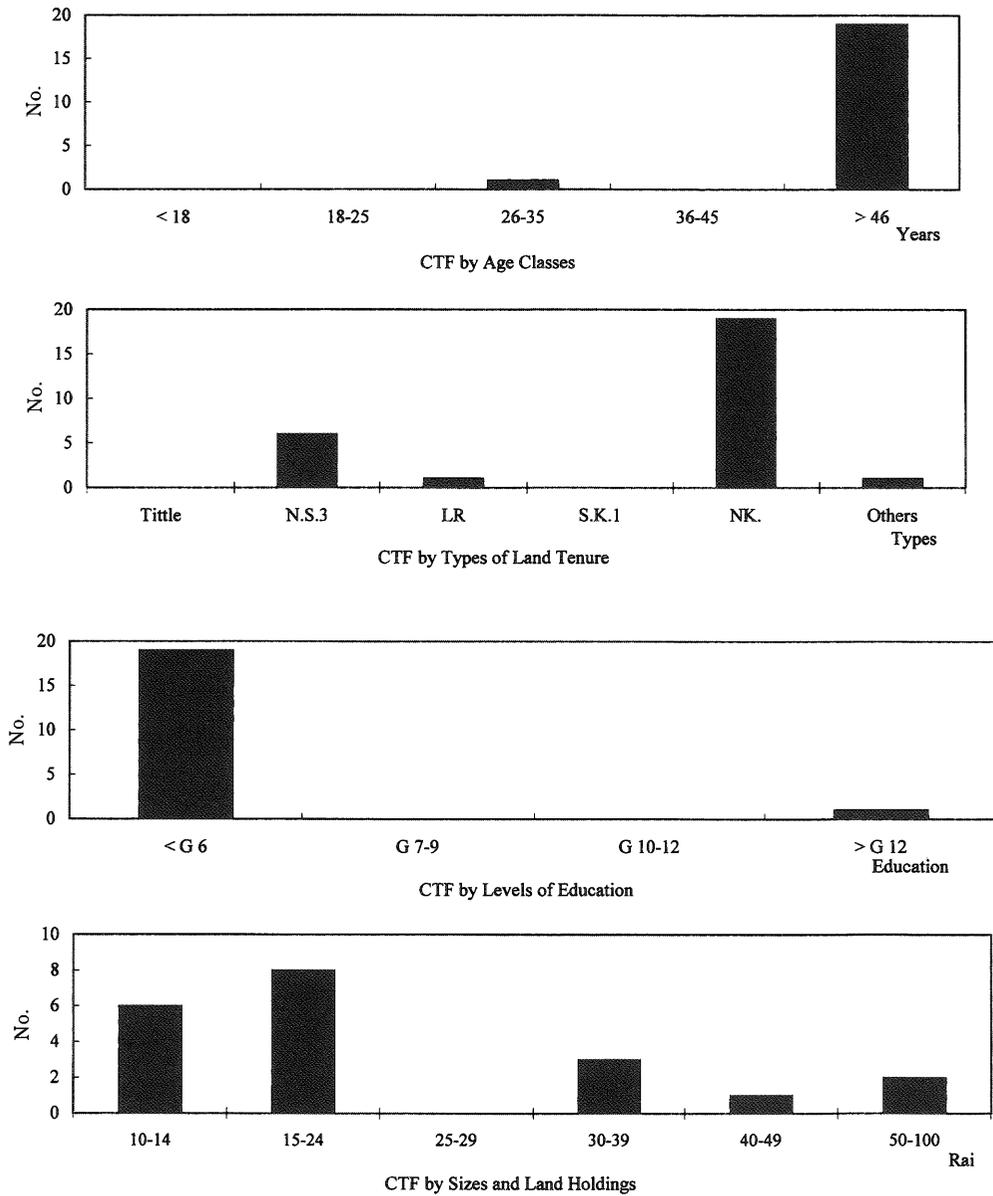


Figure II—8—2 Contract Tree Farmers by Age Classes, Education, Land Tenure, and Sizes of Land Holdings, Baan Kam Bon, Khon Kaen

crops such as cassava, kenaf, and pineapple in the first year. The farmers had tried to solve agricultural problems continuously for a long time. They had shifted from one crop to another, such as from cassava to kenaf, pineapple, or fruit trees, or replaced some plots of cassava with kenaf, but they could not solve the problems of losses. Finally, they decided to plant bamboo and eucalyptus (see costs and profits estimation in Table II-8-4). Some

Table II— 8—4 Cost and Profits Estimation of CTF, Khon Kaen Province

Eucalyptus

Items	Expenditure	Income
1. Land preparation 2 times	300	
2. Quality Seedlings	-	
3. Staking and planting	100	
4. Fertilizers	23	
5. Weedings 2 times	480	
7. Cutting	1,600	
8. Transportation	2,000	
9. Others	200	
Five years average (rai/year)	1,316	2,000
Estimated Income (baht/rai/year)		684

Remarks: Cutting at year five with average yields 10 tonnes per rai, selling at 800 baht per tonne

Bamboo

Items	Expenditure	Income
1. Land preparation 2 times	290	-
2. Quality Seedlings	375	-
3. Planting	100	-
4. Maintenance	2,290	-
5. Harvesting	360	-
Average in five years (rai/year)	683	
Estimated Income (baht/rai/year)		3,375

Remarks: cost of seedlings 15 baht/seedlings, bamboo shoot 3.50 baht/kg, bamboo culm 5 baht/culm

Source: Anon (1996)

farmers planted trees on the whole plot whereas some planted trees in a part of a plot and kept the low land for rice fields and bean. The process of CTF development is seen in Figure II-8-3.

Bamboo could be cut from the third year. In the third year, shoots should be collected. In the fourth year shoots and culms can be collected, and in the fifth year, the culm product is harvested using a selection system by which a weight of about 9.38 tonne per ha is obtained.

In selling wood, the farmers sell the whole lot to a middleman, who had to cut and transport himself. At present, since the farmers do not know the real weight, the company has their employees help estimating the weight so that the farmers would know how much they should get. In the past, they could get 1,000-2,000 baht. Some plantations sold by area at the rate of 3,125 baht per ha. After they became able to estimate weight, they get more income. The limitation of eucalyptus, in general, is that each log must not be less than four years old and not less than 2.5 inches in diameter. The length must be 1.0-1.5 m for trees of over six inches in diameter and over two meters for trees of 2.5-5.0 inches in diameter. The Company does not concern itself with transportation of products. Some CTF activities are seen in Figures II-8-4 and II-8-5.

Most of farmers have no experience in planting trees for sale. The CTF enables farmers to establish commercial tree farming by providing them with production inputs, price insurance, and technical advice. With the close advice of the company's extension staff, CTF farmers gained knowledge and experience in tree establishment and management. Coopera-

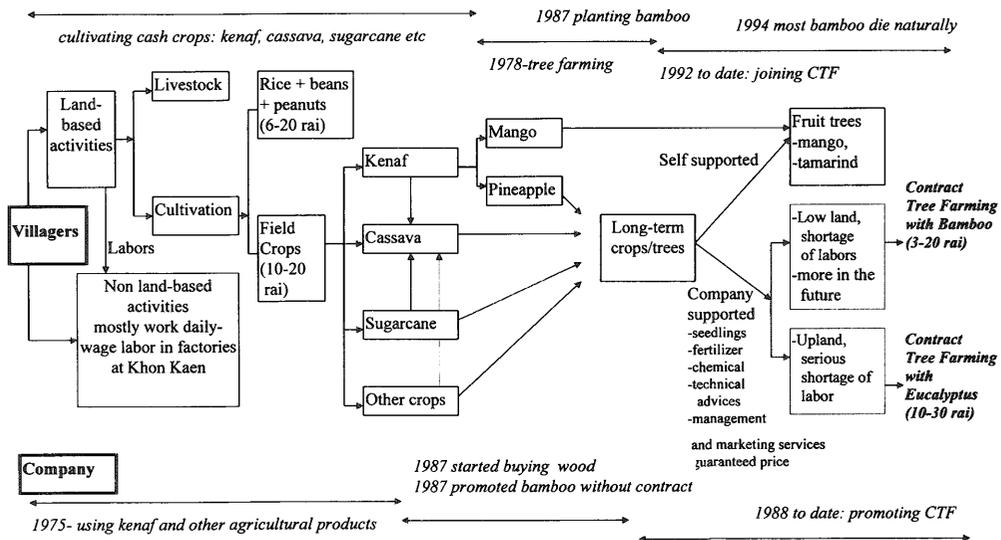


Figure II—8—3 Processes of Contract Tree Farming Development in Baan Kam Bon, Khon Kaen Province



Figure II—8—4 CTF with Fast-Growing Tree in Khon Kaen Province



Figure II—8—5 CTF with Bamboo (*Dendrocalamus asper*) in Khon Kaen Province

tion among farmers or farmer groups is encouraged by the extension staff.

However, farmers bore risks as high as they ever had in field crop monoculture. Finally, the death of all bamboo planted during 1994-1995 caused farmers big losses and made them unable to repay loans. The contract impeded the wood marketing opportunities. Wood selling is strictly limited to the Company, but currently the wood price is very much higher than the guaranteed one. Sale of wood for poles also gives higher profit than sell for woodchips. Furthermore, the contract causes farmers to lose the opportunity to obtain extension services of the governmental departments. The contract doesn't encourage the development of farmer initiatives in managing trees for multiple products on their farms.

5 . Problems and Prospect

At present, due to the good price of wood in the local market, particularly during 1995-1996, the Company faced problem of wood selling by CTF farmers to other companies. The Company has to pay much attention to fix this. In connection with this, the Company has an extension program in which every farmer group is visited once a month. On each visit, the Company staff monitors farmers' tree farming problems. They discuss with the farmers in groups. The Assistant Chief of the Extension Section answers the farmers' questions. If the situation is not clear enough, they go to inspect their tree farms. The Extension Section works closely with the farmers on tree maintenance and management.

Paper pulp produced by the Company is significantly depended on the overseas market. In case the overseas price of pulp and paper decrease, the buying of wood from CTF farmer will definitely limited. The future of CTF is relatively uncertain.

All of the farmers interviewed had never planted trees for sale before participating in this program. They became interested in planting fast-growing trees for sale after the paper pulp factory was founded and bought raw materials like kenaf, bamboo, fast-growing trees. The products of trees on the farmers' farms were poles, fuel wood, charcoal, and logs for chipwood. Most of the pole products were sold directly to merchants at the farm. Whole lots of logs were sold to a middlemen, who cut and transported them to the factory. About 28% of farmers had experience in selling directly and through local merchants or middlemen. The farmers had planted various kinds of trees according to market demand. However, they faced loss due to high labor requirements for tree maintenance and high expenses for weeding.

Considering that the Company has long-term policy to support its own CTF program, the number of farmer participants will definitely increase. Thus, data on CTF and CTF farmers should be regularly documented so that interventions can be made appropriately if needed. At present, the government doesn't have any involvement with the CTF. However, considering that farmers bear high risks in CTF, the government mechanism should move forward so that

the risk be shared properly between the Company and the farmer. As CTF limited some management initiatives and opportunities in marketing and extension services, Government intervention in terms of coordination for the formation of farmer groups, extension services, and marketing information are also important. Research and development in tree farm management can suggest more management options to CTF farmers.

Notes

- ¹⁾ Nursery technique is assisted by an academic institution. Propagation of cuttings has been used since 1993. It totally failed at the beginning, and at present 60% of the cuttings grow. Tissue culture is also being experimented.
- ²⁾ If the farmers apply to participate in the project in groups through an extension unit, their application is considered rather quickly without thorough consideration by the field operation division. On the contrary, if farmers apply individually, strict screening is applied.
- ³⁾ The company's demonstration plot can produce 22 tonnes of wood in four years (not including the small end). If the waste water from the factory is utilized, they expect to get 187.50 tonnes per ha.
- ⁴⁾ Most farmers' assets were given to the BAAC or local merchants for collateral.
- ⁵⁾ Due to high competition in buying wood at present, the Company was flexible in case the farmers could not fulfill the obligation. Thus, more farmers made the agreement with company every year. However, this implies that there will be strict control on contract once eucalyptus wood is in oversupply.
- ⁶⁾ Although the Company claims that many thousand farmers were contracted, the name list of these contract farmers was not available during the field study.
- ⁷⁾ In the view of the Company, the size of the plot is considered more important than the number of members. The Company is likely to have contacts with farmers with larger land areas (Phoenix's extension staff).
- ⁸⁾ The buying price of bamboo at the factory during field interview in 1995 was 775 baht per tonne.
- ⁹⁾ Identified by indicators of the national rural development program.
- ¹⁰⁾ This contradicts the government policy in promoting kenaf cultivation to replace cassava.

Conclusions

Tree planting has been developed in a marginal land and gradually evolved into contract tree farming in late 1980s due mainly to the unsuccessful production of forestry and agriculture. Tree farming evolved from three main factors: the decline in the agricultural sector (mainly crop sector), the cancellation of logging concessions, and the rapid growth of the paper and paper pulp business. All these factors stimulated the demand for woodchips as a raw material to supply industry. The contract tree farming (CTF) system evolved under the Four-Sector Cooperation Project in the late 1980s.

Four companies promoting CTF in four distinct areas were examined. The Agrolines Company began to produce pulp and paper mainly for export in 1985 with production capacity of 300,000 tonnes per year, which requires about 900,000 tonne of woodchips per year. The Company promotes CTF extensively in the Eastern Region in areas predominantly under cassava cultivation. The CTF has been carried on since 1990. Under The Company's contract entitled "Agreement on Fast-Growing Tree Planting", the farmer agreed to buy a certain type of tree seedlings from the Company at a set price. The Company agreed to sell quality tree seedlings to the farmer at a set price, advise them on tree planting and maintenance until cutting, and buy their trees at the market price or no less than a minimum guaranteed price of 850 baht per tonne. Farmers have made contracts to grow fast-growing trees with the Company since 1990.

The Siam Forestry Company produces about 110,000 tonnes of paper pulp, requiring about 285,000 tonnes of woodchips. The factory used eucalyptus, bagasse and bamboo as raw materials. Before 1985, CTF was promoted within 150 km of the factory in ten provinces, and from 1996 it will be promoted in four other provinces with an annual target area of 9,600 ha. The case study at Baan Moo Kao, Ratchaburi Province, found that most of the farmers made contract agreements in 1992 and 1993. The agreement, lasting six years, covers seedling distribution and the selling of trees. The Company sells seedlings to the farmer with the conditions that the participating farmer consent to plant and maintain the trees according to the company's instructions, and to sell their trees to the company. The CTF is planned for 15 years with three cutting cycles, in the 5th, 10th and 15th years, with estimated yields of 125, 187.5 and 150 tonnes per ha, respectively.

The Thai Plywood Company produces plywood, fiberboard, and particle board for domestic use and export. The Company's annual production targets include 1.9 million sheets of plywood, 255,000 thousand sheets of hardboard, and 70,000 m³ of processed timber. In 1989-1990, the Company faced a slow down in its plywood products and so shifted to density fibreboard production. In 1994, the Company planned to produce medium density fibreboard

at its new factory with the annual production target of 1.7 million pieces. At present, about 200,000 tonnes of woodchips per year are required. The Company began to promote fast-growing trees in 1989 in areas predominantly under maize and cassava cultivation in Uthai Thani Province. The case study at Baan Moo Song, Lan Sak Districts found that CTF farmers had failed in crop cultivation and abandoned their land because of droughts made contract agreement in 1989. The Company's contract is called "Contract Agreement on Fast-Growing Tree Planting" and has three attachments : "Receipt for Delivery of Tree Seedling", "Receipt for Delivery of Fertilizer" and "Note Appended to the Agreement on the Planting of Fast-Growing Tree Plantation". To obtain contract agreements, farmers must possess not less than 1.6 ha of planting area with land right certificates. The company would provide eucalyptus seedling and fertilizers to the farmer and agrees to buy wood from the farmer at the stated price. The farmer must strictly follow the instructions of extension officers of the company. At present, the Company extension program offers farmers seedlings free of charge and technical advice on tree planting and maintenance, fertilizers at cost price, labor for tree harvesting, and trucks for transportation. Farmers are grouped and are consulted in carrying out activities. The CTF is likely to enable farmers get a profitable option for crop cultivation.

The Phoenix Pulp & Paper Company produces about 200,000 tonnes of short-fibre paper pulp annually from kenaf, bamboo, and eucalyptus. An area of 44,000 ha, 20,000 ha of bamboo and 24,000 ha of eucalyptus, has been planned to produce raw materials. The contract on eucalyptus is an attempt to prevent competing companies from in buying the wood produced. The contract on bamboo aims to increase non-wood raw material for pulp production. The Company promotes CTF in areas predominantly under cassava, kenaf, and sugar cane cultivation, mostly within 100 km of the factory. The case study at Baan Kam Bon in Ubonratana District, Khon Kaen Province, found that CTF farmers who faced unprofitable cash crop cultivation got extension service from the Phoenix company. The company set the duration of CTF management at 16 years, during which trees must be cut for sale every 4 years, with an estimated production of not less than 62.5 tonnes per ha. At the end of 1992, about 5,000 farmers had signed agreements with the Company. Farmers adopted tree farming as a profitable option for crop cultivation. There are two types of agreements: a eucalyptus selling agreement and a bamboo selling agreement, together with an added agreement about credit received in the form of seedlings, fertilizer, and pesticide. Farmers must possess 0.16-8.00 ha of land available to plant trees each year for many years. After being accepted, farmers receive seedlings and a guaranteed price at 650 baht per tonne at the factory, with seven years warranty. As for the agreement for bamboo, the farmer must be a land owner, cultivate bamboo, and sell it to the company. The Company will buy bamboo at a guaranteed

price of not less than 700 baht per tonne if it is of the quality stated in the agreement. The farmer has to pay back credit in three installments: immediately after the agreement, within six years, and in year seven.

It can be concluded that CTF is a full management contract and has two important features 1) agreements between the company and the farmer are made to buy and sell trees/wood and/or tree seedlings, 2) guidelines on tree management are strictly used. In addition, (optional) some production inputs are provided to the farmer, for instance, fertilizers, chemical on short-term credit. In CTF system, farmers are not relieved of many risks and are not able to have economic security while engaged under CTF. Many farmers have taken short-term credit from various sources to invest in CTF. Farmers bear the risks for the whole operation period and have no bargaining power.

Most farmers accept the agreements made with the company though they do not thoroughly understand the terms of the agreement in detail. As a result, they worry about wood production and income, for which they have to wait for a rather long time. The farmers have no power to negotiate with company thus they have to strictly follow the company's promotion criteria. This resulted in monoculture of eucalyptus tree that exclude crop cultivation and livestock raising in this system. The CTF did not pay proper attention to support the long-term management of tree farm and farmers' livelihood. There are many other problems in connection with the contract agreement, such as credit, tree management techniques, marketing, and the high costs and risks borne by farmers. The suggestion is that crop cultivation and livestock raising should be promoted in parallel with wood production to diversify products and income and reduce production risks. There is some incentive to plant local trees because the requirements for building materials and poles cannot be met by existing natural tree stocks.

In supporting CTF, it is necessary that tree farming be monitored and evaluated regularly so as to understand CTF farmers and their situation, the tree farming area, and the wood production from tree farms. The CTF's production system should be able to meet the needs for wood and wood products at the local and the industrial levels. Thus, research must be done on land use for fast-growing trees so that it yields more than one kind of tree or crop and on creating new enterprises and marketing facilities.

Though the companies encourage long-term land utilization on idle farm land and marginal crop fields, which is a direct response to governmental policies. CTF became a promising option in wood procurement for the companies, but farmers didn't get as much in return as expected. Because of intensive investment in large-scale company forest plantations, the CTF promotion may be only a short-term strategy. In the future, when wood produced on the company's forest plantations is in sufficient supply, the procurement of wood by CTF may be

significantly reduced, and this will definitely affect the selling of wood produced by CTF farmers after the agreements are expired. Farmers bear high production risks and share some risk in marketing from the second rotation onward. In the present situation, CTF does not stabilize farm production and income reasonably. Moreover, farmer groups or cooperatives are not part of the policy of the companies, so the future development of CTF does not necessarily imply a long-term management option for tree farmers. Therefore, the development of policy and guidelines related to planting areas, production targets, production system patterns, silviculture, marketing, the value added tree products, and the organization of farmers is firmly recommended.

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和 文 要 旨

タイにおける契約造林は1990年に、紙パルプ産業などの林産企業向け原料の安定確保を目的に、チャチュンサオ県において開始され、林産企業と農民という非政府のセクターによる造林普及事業で、私的な所有地において森林を育成し、また造林者・林木の生産者としての農民と木材の需要者としての林産企業との間で契約関係を結ぶものである。

本研究は、契約造林の政策論的背景、その実態と問題点、今後の展望等を明らかにすることを目的としている。特に、契約造林は農民と林産企業との間の契約関係を前提としていることから、農民と林産企業の関係について考察することを主な目的とし、特に農民が契約造林を行うようになった動機、農民がどのように企業との様々な取決めの中で造林を実行していくか、といった点に重点を置いている。そのためタイにおける契約造林の代表例として、4つの林産企業が行っている契約造林を研究対象として選び、それらに関係する造林農家、商人、林産企業、政府機関に対して聞き取り調査を行い、実態把握を行った。また土地利用、造林・林業経営、農業等に関する資料、民間造林に関連する制度・政策に関する資料の収集と分析を行った。その結果次のような結論を得た。

第一に、契約造林は、穀物耕作の収益性、穀物耕作を維持するための家族労働力の利用可能性、造林の収益性、市場へのアクセス、そして企業の介入、といった要素に規定され、様々なタイプがあること。また土地が農民によって所有されている地域においては、契約造林が高い割合で見られた。

第二に、契約造林の背後には、森林面積の確保、企業利益の確保、農民の要望との合致、といった次元の異なる多くのねらいがある。国土保全を目的とした政府の立場からは、契約造林は森林面積を増加させるのに役立つものの、同時に生物の多様性を減少させることにもなっている。また林産企業側から見ると、契約造林の展開は資源の確保につながっているが、契約農家が他の企業に生産物を売却してしまうというリスクをも負っている。さらに農民側から見れば、

彼らもまた収穫率と市場価格の低下というリスクを負っている。彼らは単作に集約せざるを得ないため、低価格に固定され、順応性を失うといった意味で、そのリスクをさらに増している。それにもかかわらず、現金収入という点でかなりの直接的な利益を得ていることもまた事実である。

第三に、契約造林は木材関連工場の近辺に位置する農民によって、キャッサバ、サトウキビ、メイズ等の作物と並んで、収益の多い一つの選択肢として受け入れられてきた。一方林産企業側は、農民と契約造林の取り決めを行うことによって、他企業に林木を購入されてしまわないよう原料確保の安定化させることをねらっているために、造林・保育以外の農家経営には関心を示さない。そのため農家経営の安定化に必要とされる他の農作物や家畜との複合経営は、林産企業の関心外になってしまう。また契約造林を行っている農家は、伐採や輸送に関する下請け経費を必要とし、高いリスクを負う。造林請負を行っている農家の協同組合への組織化は進んでいない。契約造林農家に対する農業を含めた短期、長期の助成システムの創設が、契約造林の推進のために必要である。