

# BEST AVAILABLE DOCUMENT PDWAN494

## SURVEY METHODS FOR DETERMINING RESEARCH PRIORITIES

### IN MPTS RESEARCH : A THAI CASE STUDY

Dr. Suree Bhumibhamon

#### INTRODUCTION

Like most developing countries in the tropics, the depletion of forest resources in Thailand has mainly been caused by the continuous misuse and mismanagement of forest area. The over-exploitation and shifting cultivation practices of forest resources are closely linked with agricultural development and land encroachment.

As regards the declining trend of forest resources, the annual depletion rate of forest resources in Thailand decreased from 9.9% during 1968-1973 (Wacharakitti *et al.*, 1973) to the present trend of 3.2%, or equivalent to 0.5 million ha (RFD, 1982). In this connection, the forest area was diminished from 27.36 million ha in 1961 down to 15.66 million ha in 1982. The environmental and socio-economic evaluation of the deforestation was previously reported by Bhumibhamon (1986). In the forest resources profile of Thailand issues on the deforestation and the possible ways to solve that problem were also outlined by TRDI (1986a). However, the existing forest areas are scattered throughout the country. Under the present situation, there are ten provinces, mostly in the central plain, where the forest area was mostly converted to farming long ago.

1. Paper presented at F/FRED Workshop, Ambassador Hotel, Bangkok, 24-25 September 1986.
2. Associate professor, Department of Silviculture, Faculty of Forestry, Kasetsart University, Bangkok 10903, Thailand.

The stand density of the remaining forest varies according to the forest types. Highest and lowest stand density is found in Pine forest (46.71 m<sup>3</sup>/ha) and Dry Dipterocarp forest (5.60-19.91 m<sup>3</sup>/ha) respectively. However, the stand density in all forest types has decreased by 10.31-56.45% (Thammincha, 1985). The situation in 1978 indicated that the total growing stock in Thailand was about 185 million m<sup>3</sup>.

The decreasing trend of stand density has greatly limited the allowable cut from 3.1 million m<sup>3</sup> in 1979 down to 1.8 million m<sup>3</sup> in 1983. This allowable cut could provide only 10% of the need annually. The extra 90% of the wood consumption in the country was mainly illegal wood which was smuggled in all forms.

There is no indication that the present forestry situation could be improved unless tree planting in its different forms is conducted effectively and continuously. As for securing the need for wood supply in the industrial sectors, Thailand cannot avoid wood importation from neighbouring countries so as to provide sufficient wood in the local market. The over exploitation of the forest resources has also limited people's ability to gather minor forest products which are partly for food and additional income (Mungkorndin, 1981) as they did previously. Following this changing trend, it is expected that the additional income for farmers in rural areas either from illegal cutting for sawnwood, fuelwood, and charcoal, or gathering minor forest products has been decreased (Panpiamrat, 1984).

**BEST AVAILABLE DOCUMENT**

### DOWNSTREAM ATTITUDES ON FOREST RESOURCES

A survey of the attitudes of different social groups on the forest resources has been carried out (Bhumibhamon 1983). Senior forest administrators or those who hold the rank of director reviewed factors affecting the forest resources, including lack of forest policy, poor cooperation among governmental institutions and the possibility of local officers and politicians taking benefit from illegal cutting and land encroachment. However senior forest officers recommended to conserve more forest area and that strict control of the illegal cutting in the natural forest was required if human problems and forest fire could be prevented. Moreover, they recommended forest extension as the means to solve the problem and encouraged the setting up of more training programs on nature conservation for both adults and young people.

The survey was also conducted at the regional and provincial forest officer levels, who identified similar ideas about the depleting forest resources to the Directors (Bhumibhamon & Atipanumpai, 1983).

Moreover, they indicated additional actions which disturbed the forest resources including wood carving promotion, illegal tree felling for fuelwood and charcoal burning, as well as dam construction. This administrative group emphasized the need to promote tree farming and for serious control. They also recommended the farmers to try to earn extra income by bee raising, growing other agricultural crops, establishing bamboo plantations and establishing wild animal farms. In managing the forest resources, they suggested that it was necessary to establish community forests, particularly in the form of agro-forestry.

**BEST AVAILABLE DOCUMENT**

In another direction, Bhumibhamon *et al.*, 1984 interviewed 50 chiefs of villages who lived close to forest areas in some northern provinces. The chiefs mentioned that most forest destruction was caused by shifting cultivation, followed by action directly or indirectly by tobacco kiln owners, illegal carving practices, and some local officers. To earn extra income, village chiefs indicated that people under their responsibility had to cut trees down mainly for house construction or repairing and for fuelwood supply. People also collected medicinal plants, and other minor forest products.

A survey was also carried out in 50 villages in northern Thailand. Results showed the need for forest cover in the watershed areas (Bhumibhamon *et al.*, 1983). They listed similar groups of people who were involved in forest destruction as seen previously by the chiefs. To prevent this problem, villagers recommended to conserve part of the forest areas and allow them to exploit the other part as they claimed that natural regeneration was sufficient for forest exploitation. Nevertheless, farmers needed more land for farm practices.

Based on these top to bottom attitudes on the forest resource different social groups pointed out that the lack of forest policy allows various active groups to misuse the natural resources. Common property, as in the case of forest resources, still requires proper action to manage it for future use.

#### FOREST POLICY VERSUS FOREST RESOURCES

Kijkar (1985) reported the major causes of deforestation in Thailand, including shifting cultivation practices, illegal cutting and processing, infrastructure development, settlement, natural disasters and the modus-

4

operandi system. The state and private timber companies, other private entrepreneurs and peasants are directly engaged in the deforestation process. Politicians, traders, cash crop promoters, tourist promoters are indirectly involved. Forest destruction has caused serious ecological (climate, soil condition, soil erosion, water balance, salinization) economical, and social impacts (Bhumibhamon, 1986). To overcome these problems, many social groups emphasized the need for drafting forest policy. The drafted document on forest policy was later on presented for criticism. Based on public opinion, the completed draft was eventually accepted by the cabinet in December 1985.

To protect further genetic erosion in the natural forest, national forest policy indicates the need to preserve 15% of the total area as conserved forest, including that on steep-sloping areas. The current policy indicates the need for an action plan to solve the existing problem, of shifting cultivation and forest fire. Serious control of tree conservation forest is needed. An additional 25% of land area should be developed into economic forest for sustainable exploitation. The economic forest is meant to provide wood to meet the needs of all industrial wood-using sectors as well as the need for fuelwood. It was additionally recommended to use the Selection System or the Clear Cut System wherever applicable. If the Clear Cut System is used, it is recommended to replant the area immediately.

The zonation of land-use is needed as the utilization of land does not meet with the land capability and the forest land has been continuously converted into agricultural land. The policy claims to identify and control city expansion as well as the expansion of agricultural land into forest area. The left over area should be converted to green area.

5

To secure the need for land for settlements there should be more cooperation.

It was pointed out in the policy that the application of scientific knowledge and technical know-how to increase cash-crop production could indirectly prevent further shifting cultivation activities. Constraints in land-use require the need for emphasizing the relationships between forest resources and other resources, including land, water, minerals, wildlife, etc.

The interrelationship of resources allows the government to organize the National Forest Policy Committee so as to draw up policy, control, and administration of the forest resources. There is also the need to improve the forest law that prevents possible forest development. At the same time, the policy indicates the need for education-related social groups through forest extension programs.

To secure the wood required by all social groups, forest policy emphasized the need for incentives for the people who would establish tree farming or fuelwood plantations on any possible sites. The policy also recommended to form an integrated wood-industry network and search for other suitable materials that could be used in the substitution of wood products to a certain degree.

#### THE NEED FOR A REFORESTATION PROGRAM

As for experimental trials, the first plantation was established in 1906. Teak was planted in association with upland rice in the form of so-called "Agro-forestry". Up to the present time, Royal Forest Department (RFD) has successively established man-made plantations with the

total planting area of 0.3 million ha in 1982. Forest Industry Organization has three main types of planting program, i.e. planting based on FIO budget, by concession fee of FIO and by provincial forest company budget. FIO has 35 plantation units with the annual planting area of 5600 ha. The total planted area of FIO was 50,176 ha in 1982. Thai plywood Co (TPC) which is a state owned enterprise has planted about 2,700 ha in 5 plantation units. There are also other forms of tree planting created by other governmental organizations and other social groups. Table 1 indicates the situation of tree planting by the governmental agencies and is divided into 4 major groups, including industrial plantations, environmental plantations, replanting in poor conserved forest, and planting by using concession fee on the land recommended and approved by RFD.

**Table 1** Tree planting by the governmental agencies in Thailand.  
The situation in 1983

Year	Planting as			
	Industrial plantation	Environmental plantation	Replanting in poor conserved forest	Planting by using concession fee
Upto 1978	99,083.52	33,312.80	29,976.16	30,980.00
1979	22,543.52	11,855.20	14,447.04	13,393.92
1978	38,795.68	12,880.00	15,833.60	13,887.04
1981	15,153.60	11,808.00	14,541.44	11,216.80
1982	9,004.80	5,600.00	4,896.00	12,883.68
1983	8,975.20	5,600.00	4,816.00	12,862.72
Total	193,556.32	81,056.00	84,510.24	95,224.16

7

Due to the shortage of fuelwood and wood supply for industry, farmers have a high expectation in earning more income and have actively planted tree species on any available land.

#### CHOICE OF TREE SPECIES

Generally, the choosing of trees selected for planting should be based on native tree species which are generally grown in various parts of the country (Table 2).

Based on existing plantations, the number of native and exotic trees planted in different plantation types was 88 species (Table 3). Types of tree planting were also indicated, including those trees planted for multiple uses. However, many of these tree species have been rejected due to slow growth, poor form, or susceptibility to biotic injuries.

In exceptional cases, trees have been selected for planting due to easy and cheap seed collection, and in some cases good growth. The question of how to use the end-product effectively still remains unsolved. It was also found during the course of the study, with the exception of teak, eucalypt, and pine, that most tree species have been planted on a small scale scattered over the planted areas. This has limited the possibilities for managing the plantations for industrial purposes.

As the number of trees selected for planting was relatively high, questionnaires were then sent to 24 Regional Forest Offices to list 10 important tree species which were favoured for plantation establishment. The main tree species of interest to all offices are listed in sequence from top downward (Table 4).



**Table 2.** List of highly commercial tree and commercial trees from the natural forests in Thailand

Species	Present status		Regions
	Highly commercial	Commercial	
<i>Acacia catechu</i>		✓	N, C
<i>A. leucophloea</i>		✓	C
<i>A. siamensis</i>		✓	N, NE, C
<i>Acrocarpus fraxinifolius</i>		✓	N, E, NE
<i>Adenanthera microsperma</i>		✓	N, S
<i>Adina cordifolia</i>		✓	N, E, NE, S
<i>Azalia xylocarpa</i>	✓		N, E, NE, C
<i>Ailanthus fauveliana</i>	✓		N, E, C, S
<i>Alagium salviifolium</i>		✓	N, NE
<i>Albizia lebeck</i>		✓	N, E, NE, C, S
<i>A. odoratissima</i>		✓	N, C
<i>A. procera</i>		✓	N, NE, C
<i>Alstonia scholaris</i>		✓	N, E, C, S
<i>Amoora polystachya</i>		✓	N, E, NE, S
<i>Anisoptera glabra</i>		✓	S
<i>A. scaphula</i>		✓	S
<i>Anthocephalus cadamba</i>		✓	N, E, NE, C, S
<i>Archidendron jiringa</i>		✓	C, E, S
<i>Artocarpus altissimus</i>		✓	S
<i>A. lakoocha</i>		✓	S
<i>A. lanceifolius</i>		✓	S
<i>Avicernia officinalis</i>		✓	S
<i>Azadirachta indica</i>		✓	C, S
<i>Berrya mollis</i>		✓	N, NE, C
<i>Bischofia javanica</i>		✓	N, NE, C, S
<i>Pombax anceps</i>		✓	N, C
<i>Bouea oppositifolia</i>		✓	N, NE, C, S
<i>Brownlowia helferiana</i>		✓	N, NE, S
<i>Caesalpinia sappan</i>		✓	C
<i>Calophyllum inophyllum</i>		✓	N, C, S

Table 2. (Continued)

Species	Present status		Regions
	Highly commercial	Commercial	
<i>C. puloherimum</i>		✓	S
<i>Cananga latifolia</i>		✓	N, E, NE, C, S
<i>Canarium kerrii</i>		✓	N, E, NE, S
<i>Carallia brachiata</i>		✓	N, E, NE, C, S
<i>Cassia bakeriana</i>		✓	N, NE, C
<i>C. fistula</i>		✓	N, C
<i>C. garrettiana</i>		✓	N, NE, C
<i>Casuarina equisetifolia</i>		✓	C, S
<i>Chrysophyllum roxburghii</i>		✓	NE, S
<i>Chukrasia velutina</i>	✓		N, C, S
<i>Cinnamomum bejolghota</i>		✓	N, C, S
<i>Cotylelobium lanceolatum</i>		✓	N, E, NE, C, S
<i>Cratoxylon</i> spp.		✓	N, NE, C, S
<i>Dalbergia cochinchinensis</i>	✓		E, NE, C, S
<i>D. cultrata</i>	✓		N, NE, C, S
<i>D. dongnaiensis</i>	✓		N
<i>Dehassia kerrii</i>		✓	S
<i>Dialium cochinchinense</i>		✓	NE, C, S
<i>Dillenia</i> spp.		✓	N, E, NE, C, S
<i>Diospyros burifolia</i>		✓	S
<i>D. dasyphylla</i>		✓	N, E
<i>D. ebenum</i>		✓	S
<i>D. fulvopilosa</i>		✓	S
<i>D. mollis</i>		✓	N, E, NE, C, S
<i>D. siamensis</i>	✓		N, NE, C, S
<i>Dipterocarpus</i>	✓		N, E, NE, C, S
<i>D. obtusifolius</i>		✓	N, E, NE, C, S
<i>D. tuberculatus</i>		✓	N, E, NE, C
<i>Dracontomelum mangiferum</i>		✓	N, S
<i>Duabanga grandiflora</i>		✓	N, E, S
<i>Durio griffithii</i>		✓	S
<i>Erythropheum</i> spp.		✓	NE, S

Table 2. (Continued)

Species	Present status		Regions
	Highly commercial	Commercial	
<i>Erythroxylum cuneatum</i>		✓	N, E, S
<i>Eugenia circumcissa</i>		✓	E
<i>E. cumini</i>		✓	N, C
<i>Fagraea fragrans</i>	✓		N, E, NE, S
<i>Firmiana</i> spp.		✓	N
<i>Garcinia costata</i>		✓	N, S
<i>Gardinia collinsae</i>		✓	NE, C, S
<i>G. obtusifolia</i>		✓	N, E, NE, C
<i>Garuga pinnata</i>		✓	N, E, C
<i>Gmelina arborea</i>		✓	N, NE, C, S
<i>Helioiopsis terminalis</i>		✓	N, NE, S
<i>Heritiera gavanica</i>		✓	E, S
<i>H. littoralis</i>		✓	C, S
<i>Holarrhena antidysenterica</i>		✓	N, NE, C, S
<i>Holoptelea integrifolia</i>		✓	N, NE, C, S
<i>Homalium tomentosum</i>		✓	N, E, NE, C
<i>Hopea</i> spp.	✓		N, NE, C
<i>Horsfieldia lehmanniana</i>		✓	S
<i>Hydnocarpus castaneus</i>		✓	S
<i>Hydnocarpus ilicifolius</i>		✓	N, E, C, S
<i>Hymenodictyon excelsum</i>		✓	N, C, S
<i>Intsia bakeri</i>	✓		E, S
<i>Irvingia malayana</i>		✓	NE, NE, C
<i>Kydia calycina</i>		✓	N
<i>Lagerstroemia calyculata</i>		✓	N, E, NE, C, S
<i>L. floribunda</i>		✓	N, E, NE, C, S
<i>L. loundoni</i>		✓	E, NE, C, S
<i>L. macrocarpai</i>		✓	N, NE, C
<i>L. speciosa</i>		✓	C, S
<i>L. tomentosa</i>		✓	N, C
<i>Lannea coromandelica</i>		✓	N, E, S
<i>Litsea grandis</i>		✓	S
<i>L. petiolata</i>		✓	S

11

Table 2. (Continued)

Species	Present status		Regions
	Highly commercial	Commercial	
<i>L. pierrei</i>		✓	E
<i>Lophopetalum duperreanum</i>		✓	N, E, NE
<i>Maolura cochinchinensis</i>		✓	N, NE, C, S
<i>Madhuca grandiflora</i>		✓	E, C
<i>M. pierrei</i>		✓	C
<i>Mammea siamensis</i>		✓	N, E, NE, C, S
<i>Mangifera</i> spp.		✓	N, E, NE, C, S
<i>Manglietia garrettii</i>	✓		N
<i>Manilkara hexandra</i>		✓	C
<i>Melaleuca leucadendra</i>		✓	E, C, S
<i>Melanorrhoea usitata</i>		✓	N, C
<i>Memecylon caeruleum</i>		✓	N, S
<i>Mesua ferrea</i>	✓		N, E, NE, C, S
<i>Michelia</i> spp.	✓		N, E, NE, C, S
<i>Milusa linesta</i>		✓	N, NE, C
<i>Millettia atropurpurea</i>		✓	S
<i>M. leuchantha</i>	✓		N, C, S
<i>Millingtonia hortensis</i>		✓	N, C
<i>Mimusops elengi</i>		✓	N, C, S
<i>Mitragyna brunosis</i>		✓	N, S
<i>Morinda coreia</i>		✓	N, E, NE, C, S
<i>Murraya paniculata</i>		✓	N, C, S
<i>Myristica cinnamomea</i>		✓	S
<i>Nauclea orientalis</i>		✓	N, C, S
<i>Neesia altissima</i>		✓	S
<i>Nephelium lappaceum</i>		✓	C, S
<i>Oncosperma horrida</i>		✓	S
<i>Palagium gutta</i>		✓	S
<i>P. obovatum</i>		✓	E, S
<i>Parashorea stellata</i>		✓	S
<i>Parinari anamense</i>		✓	N, NE, C, S
<i>Parkia javanica</i>		✓	S
<i>Payena</i> spp.		✓	S

12

Table 2. (Continued).

Species	Present status		Regions
	Highly commercial	Commercial	
<i>Peltophorum dasyrachis</i>		✓	NE, C, S
<i>Pentace burmanica</i>		✓	C, S
<i>Pentaspadon velulinus</i>		✓	S
<i>Phoebe</i> spp.		✓	N, S
<i>Pinus kesiya</i>			N, NE, C
<i>P. merkusii</i>			N, NE, C
<i>Planchonella siamensis</i>		✓	S
<i>Premna tomentosa</i>		✓	N, E, S
<i>Protium serratum</i>		✓	N, NE, C, S
<i>Pterocarpus macrocarpus</i>			N, C, S
<i>Pterospermum diversifolium</i>		✓	E, C, S
<i>quercus</i> spp.		✓	N, E, NE, S
<i>Rhizophora apiculata</i>		✓	C, S
<i>R. mucronata</i>		✓	C, S
<i>Sandoricum koetjape</i>		✓	N, NE, S
<i>Schima wallichii</i>		✓	N, E, NE, S
<i>Schleichera oleosa</i>		✓	N, NE
<i>Schoutenia hypoleuca</i>		✓	N, E, NE
<i>Shorea curtisii</i>			S
<i>S. fauetiana</i>		✓	S
<i>S. henryana</i>			E, C, S
<i>S. obtusa</i>			N, E, NE, C
<i>S. parvifolia</i>			S
<i>S. siamensis</i>			N, NE, C
<i>S. talura</i>		✓	N, E, C, S
<i>S. thorelii</i>		✓	N, E, C
<i>Sindora coriacea</i>			S
<i>S. siamensis</i>		✓	N, NE, C
<i>Spondias pinnata</i>		✓	N, E, C, S
<i>Sterculia campanulata</i>		✓	N, E, NE, C, S
<i>S. foetida</i>		✓	N, E, C, S
<i>S. guttata</i>		✓	N, C, S

Table 2. (Continued)

Species	Present status		Regions
	Highly commercial	Commercial	
<i>S. ornata</i>	✓		N, C, S
<i>S. villosa</i>	✓		N
<i>Stereospermum</i> spp.	✓		N, E, NE, E, S
<i>Strychnos nux-vomica</i>	✓		NE, C
<i>Styrax</i> spp.	✓		N, NE
<i>Tectona grandis</i>			N, E, NE, C, S
<i>Terminalia alata</i>	✓		N, NE, C, S
<i>T. bellerica</i>	✓		N, C
<i>T. chebula</i>	✓		N, C
<i>T. citrina</i>	✓		C, S
<i>T. nigrovenulosa</i>	✓		N, E, NE, C, S
<i>Tetrameles nudiflora</i>	✓		N, E, NE, C, S
<i>Toona ciliata</i>	✓		N, E, NE, C, S
<i>Vatica odorata</i>	✓		N, E, NE, C, S
<i>Vitex oaneicens</i>	✓		N, E, NE, C, S
<i>V. pinnata</i>	✓		N, E, NE, C, S
<i>Walpure</i> spp.	✓		N, NE, S
<i>Wrightia tomentosa</i>	✓		N, E, NE, C, S
<i>Xerospermum intermedium</i>			E, NE, S
<i>Xylia kerrii</i>	✓		N, E, NE, C, S
<i>Xylocarpus granatum</i>	✓		C, S
<i>X. moluccensis</i>			N, E, NE, C, S

**Table 3.** Trees selected for planting in Thailand

Species	Native or exotic tree species	Planting in the form of					Others
		Indus- trial planta- tion	Farm wood lots	Environ- mental planta- tion	Multi- pur- posed trees		
<i>Acacia auriculaeformis</i>	E	✓	✓	✓	-	-	
<i>A. catechu</i>	N	-	✓	-	✓	-	
<i>A. mangium</i>	E	✓	-	-	-	✓	
<i>A. siamensis</i>	N	-	✓	✓	-	-	
<i>Adina cordifolia</i>	N	-	-	-	-	✓	
<i>Afzelia bakeri</i>	N	-	-	-	-	✓	
<i>A. xylocarpa</i>	N	-	-	-	-	✓	
<i>Albizia falcataria</i>	E	✓	-	-	-	-	
<i>A. procera</i>	N	-	-	-	-	✓	
<i>A. lebbek</i>	N	-	-	-	-	✓	
<i>Aleurites montana</i>	N	✓	-	-	✓	-	
<i>Alstonia macrophylla</i>	N	✓	-	-	-	-	
<i>Anacardium occidentale</i>	E	-	-	-	✓	-	
<i>Anthocephalus chinensis</i>	N	✓	-	-	-	-	
<i>Azadirachta indica</i>	N	✓	-	-	✓	-	
<i>Bambusa arundinaceae</i>	N	-	-	-	✓	-	
<i>Bauhinia spp.</i>	N	-	-	-	-	✓	
<i>Bombax insignies</i>	N	✓	-	-	✓	-	
<i>Broussonetia papyrifera</i>	N	✓	-	-	✓	-	
<i>Butea monosperma</i>	N	-	-	-	-	✓	
<i>Calophyllum inophyllum</i>	N	-	-	-	-	✓	
<i>Calotropis gigantea</i>	N	-	-	-	-	✓	
<i>Cassia fistula</i>	N	-	-	-	-	✓	
<i>C. siamea</i>	N	-	✓	-	✓	-	
<i>Casuarina equisetifolia</i>	E	✓	✓	✓	-	-	
<i>Casuarina junghuhniana</i>	E	✓	✓	✓	-	-	
<i>Ceriops roxburghiana</i>	N	✓	-	-	✓	-	
<i>Chichona ledgeriana</i>	E	-	-	-	✓	-	
<i>Corypha umbraculifera</i>	N	-	-	-	✓	-	
<i>Cotylelobium lanceolatum</i>	N	-	-	-	-	✓	
<i>Dalbergia cochinchinensis</i>	N	✓	-	-	-	✓	

Table 3. (Continued)

Species	Native or exotic tree species	Planting in the form of					Other
		Indis- trial planta tion	Farm wood lots	Environ- mental planta tion	Multi- pur posed trees		
<i>Delonix regia</i>	E	-	-	✓	-	-	
<i>Dipterocarpus alatus</i>	N	✓	-	-	-	-	
<i>D. obtusifolius</i>	N	✓	-	-	-	-	
<i>D. turbinatus</i>	A	✓	-	-	-	-	
<i>Eucalyptus camaldulensis</i>	E	/	/	/	/	-	
<i>E. deglupta</i>	E	✓	/	/	/	-	
<i>E. tereticornis</i>	E	-	-	-	-	✓	
<i>E. citriodora</i>	E	-	-	-	-	/	
<i>E. alba</i>	E	-	-	-	-	✓	
<i>Fagraea fragrans</i>	N	✓	-	-	-	/	
<i>Garuga pinnata</i>	N	-	-	-	-	✓	
<i>Gliricidia sepium</i>	N	-	-	-	/	-	
<i>Gmelina arborea</i>	N	✓	-	-	✓	-	
<i>Hopea odorata</i>	N	✓	-	-	-	✓	
<i>Homalium damronggianum</i>	N	-	-	-	-	✓	
<i>Hydnocarpus anthelmintica</i>	N	-	-	-	-	✓	
<i>Intsia bakeri</i>	N	✓	-	-	-	✓	
<i>Irvingia malayana</i>	N	✓	-	-	-	-	
<i>Jacaranda filiafolia</i>	E	-	-	✓	-	-	
<i>Lagerstroemia calyculata</i>	N	-	-	✓	-	-	
<i>L. macrocarpa</i>	N	-	-	✓	-	-	
<i>L. tomentosa</i>	N	-	-	✓	-	-	
<i>Lannea grandis</i>	N	✓	-	/	-	-	
<i>Leucaena leucocephala</i>	E	/	/	-	✓	-	
<i>Litsea grandis</i>	N	-	-	-	-	✓	
<i>Mangifera indica</i>	N	/	-	-	✓	-	
<i>Melaleuca leucadendron</i>	N	-	-	-	✓	-	
<i>Melia azedarach</i>	N	✓	-	/	/	-	
<i>Mesua ferria</i>	N	-	-	-	-	✓	
<i>Millingtonia hortensis</i>	N	-	-	-	-	✓	
<i>Parkia speciosa</i>	N	-	-	-	/	-	

Table 3. (Continued).

Species	Native or exotic tree species	Planting in the form of				
		Indus- trial planta tion	Farm wood lots	Environ- mental planta tion	Multi- pur posed trees	Others
<i>Parashorea stellata</i>	N	/	-	-	-	-
<i>Peltophorum inerme</i>	N	/	/	-	-	-
<i>Pinus caribaea</i>	E	/	-	-	/	-
<i>P. kesiya</i>	N	/	-	-	/	-
<i>P. merkusii</i>	N	/	-	-	/	-
<i>P. oocarpa</i>	E	/	-	-	-	-
<i>Pterocarpus indicus</i>	E	/	-	-	/	-
<i>P. macrocarpus</i>	N	/	-	-	/	-
<i>Rhizophora</i> spp.	N	-	-	/	-	-
<i>Samanea saman</i>	E	/	/	-	/	-
<i>Sandoricum indicum</i>	N	-	-	-	/	-
<i>Semecarpus curtissii</i>	N	-	-	-	-	/
<i>Sesmania grandiflora</i>	N	-	-	-	/	-
<i>Shorea talura</i>	N	-	-	-	-	/
<i>Sindora siamensis</i>	N	-	-	-	-	/
<i>Spondias pinnata</i>	N	-	-	-	/	-
<i>Sterculia foetida</i>	N	-	-	-	/	-
<i>Sweitenia macrophylla</i>	E	/	-	-	-	-
<i>Tamarindus indica</i>	N	-	-	-	/	-
<i>Tabebuia pentaphylla</i>	E	-	-	/	-	-
<i>Tectona grandis</i>	N	/	-	-	-	-
<i>Terminalia catappa</i>	N	-	-	/	-	-
<i>Tetrameles nudiflora</i>	N	/	-	-	-	-
<i>Thyrostachys siomensis</i>	N	/	-	/	/	-
<i>Xylia kerrii</i>	N	/	-	-	-	-
<i>Zollingeria dongnaiensis</i>	N	-	-	-	-	/

**Table 4.** The choice of tree species of 24 Regional Forest Offices in Thailand, by rank.

Species	Score
<i>Eucalyptus camaldulensis</i>	17
<i>Tectona grandis</i>	15
<i>Acacia auriculaeformis</i>	15
<i>Leucaena leucocephala</i>	12
<i>Gmelina arborea</i>	11
<i>Pterocarpus macrocarpus</i>	10
<i>Melia azedarach</i>	8
<i>Peltophorum dasysachis</i>	6
<i>Anacardium occidentale</i>	5
<i>Acacia catechu</i>	5
<i>Azadirachta indica</i>	5
<i>Xylia kerrii</i>	4
<i>Azelia xylocarpa</i>	4
<i>Rhizophora</i> spp.	3
<i>Casuarina equisetifolia</i>	3
<i>Dipterocarpus alatus</i>	3
<i>Parkia javanica</i>	3
<i>Acacia mangium</i>	2
<i>Cassia siamensis</i>	2
<i>Bombax</i> spp.	2
<i>Hopea odorata</i>	2
<i>Dalbergia cochinchinensis</i>	2
<i>Swintenia macrophylla</i>	2
<i>Pinus kesiya</i>	2
<i>Chukrasia velutina</i>	2
<i>Parkia speciosa</i>	2
<i>Cassia garrettiana</i>	1
<i>Fagraea fragrans</i>	1
<i>Bruguiera cylindrica</i>	1
<i>Litsea grandis</i>	1
<i>Alstonia macrophylla</i>	1
<i>Ceriops</i> spp.	1
<i>Albizia procera</i>	1

Table 4. (Continued).

Species	Score
<i>Spondias pinnata</i>	1
<i>Pithecellobium dulce</i>	1
<i>Sindora siamensis</i>	1
<i>Mangifera indica</i>	1
<i>Ailanthus triphysa</i>	1
<i>Casuarina junghuhniana</i>	1
<i>Pinus merkusii</i>	1
<i>Intsia palembanica</i>	1
<i>Calamus caesius</i>	1
<i>Delonix regia</i>	1

A study by interview on the tree species chosen for research purposes by 81 foresters and related scientists directly or indirectly responsible for tree planting was also carried out. The list of the top ten trees chosen is shown in Table 5.

Table 5 The most common trees selected for research at the present and in the next five years as outlined by 81 persons, by rank

Species	Ranking	
	At present	In the next 5 years
<i>Eucalyptus camaldulensis</i>	48	37
<i>Tectona grandis</i>	32	20
<i>Acacia auriculaeformis</i>	32	24
<i>Leucaena leucocephala</i>	27	10
<i>Melia azedarach</i>	27	20
<i>Pinus kesiya</i>	18	18
<i>Azadirachta indica</i>	15	22
Bamboo	14	13
<i>Dipterocarpus alatus</i>	14	29
<i>Acacia mangium</i>	13	16

Based on Table 4 and 5, there is a similarity in choice of tree species between those who work in theoretical and practical fields. However, foresters and related scientists still wish to maintain trees of interest. *Eucalyptus camaldulensis* was the main tree species. Surprisingly, 29 researchers selected *Acacia mangium* as a promising species for the next five years.

20

## MULTIPLE PURPOSE TREES

The Asian Region Workshop on "Increasing the Productivity of Multipurpose Tree Species" held in Kandy in 1984 recommended a list of priority species for Moist/West, Arid/Semi arid, and Mountainous Zones. In this meeting, 10 Species Networks were proposed but only six species Networks are of interest in Thailand, including *Acacia* sp., Bamboo, *Albizia* and *Leucaena*, *Eucalyptus* sp., *Azadirachta* and *Melia* and Rattan Species Networks.

As reviewed by 81 Thai scientists, the *Acacia* species Network received highest priority, followed by the *Eucalyptus* Species Network, *Azadirachta* and *Melia* Species Network, Bamboo Species Network, *Albizia* and *Leucaena* Species Network, and Rattan Species Network.

## PROBLEMS RELATED TO TREE PLANTING

Under the present situation, problems related to tree plantation establishment in Thailand have been identified as follows :-

### 1. Land

Land availability for tree planting on a large scale is limited and has been caused by land encroachment. Foresters responsible for tree planting have to confront with the rural poor who need more land for growing cash crops and staple foods. There are still 0.5 million families who are landless and another one million families rent land for growing farm products. There are also signs of cutting trees in the conserved forest and plantation areas to use the land for growing cash crop to supplement the basic needs of the rural poor.

Regional forest offices indicated that villagers in some areas still favour growing fruit trees or rubber trees to growing economical or fast-growing trees. Moreover, the available land for tree planting is infertile and faces severe environmental or political problems.

Provincial Forest Companies established plantation using the logging concession fees. However, these companies are still faced with the problems of land availability for their annual planting programmes.

In the Sixth National Economic and Social Development Plan, the leasing larger areas of poor productive forest land to tree farmers is recommended. The plan also recommends the growing of trees on any available land, particularly on the edge of the farm area, and in backyards. Trees are needed to be planted for soil improvement in poor fertile soil and good site preparation by mechanical tractors and the application of nitrogen fixing trees as well as the application of compost and chemical fertilizer are the main tasks to be carried out for solving the land problems.

## 2. Budget

It was found that the budget for tree planting was generally inadequate as was claimed by most Regional Forest Offices. Sometimes, the budget provided by the government for annual planting is irregular and often prevents good future planning. The bureaucratic system also affects the proper management of existing plantations.

Researchers identified that the budget to support research and development programs was relatively small. They also strongly recommended donors to support practical research programmes, even in the case of multipurpose trees.

22

Provincial Forest Companies mentioned that they had no problems with budgeting. Whenever there is no available land for planting, they deposit the concession fee to be used for tree planting in a bank.

Tree farmers asked the responsible agencies to ease the planting programme by providing them with incentives, particularly in the case of soft loans. The rural poor require free seedlings and often ask about price guarantees and the marketing of end products.

#### Seed and seedlings used

Since species selection is not taken into serious consideration, seeds used have been collected from unclassified seed sources. Some Regional Forest Offices claimed to have no problems in seed used, but the evaluation was mainly based on the quantity rather than the quality. However, some have problems of recalcitrant seed and did not preserve genetic material in the form of seedlings. Buying seed from other agencies maintains the confusion about seed quality.

Based on a survey of the problems existing at 44 Nursery Centres, results show that seed used was mostly collected from unclassified seed sources.

16 Provincial Forest Companies obtained seed by buying from forestry agencies (38.10%) the private sector, (23.81%) by direct collection (33.35%), and by importing from foreign seed companies (4.76%).

Researchers recommended to have mass selection and collect seed from qualified seed sources. Knowledge on seed processing and seed storage of selected tree species is needed.

Seedlings are generally raised in plastic bags, preferably in black polyethylene bags. Seedling containers are now being introduced into the market so that cheap and vigorous seedlings can be obtained. The medium used varies according to the availability of materials at the nursery sites. Sand, forest topsoil, ash, burnt rice husks, rice straw, etc. are commonly used. Research on seedlings and cuttings is done on rather a small scale.

#### 4. Management of planting area

Lack of machinery prevents foresters from changing to better management of the planting areas. This is common to most state-owned plantations. Limited budgets also limit proper management programs, and 5 years after planting, the budget for plantation maintenance is cut off. This is one of the main reasons why tree farmers grow better plantations than RFD forestry officers.

The main problems affecting the existing plantations were forest fire, poor site, damage cause by several biotic enemies and lack of general knowledge about silvicultural practices, including thinning, pruning, weeding and fertilizer application. Lack of qualified personnel was also pointed out by Provincial Forest Companies, but in their case some machines were available e.g. for mechanical weed control (42%) and fire control units (50%), etc.

#### RESEARCH PRIORITIES IN MPTS

Forestry research needs in developing countries have been pointed out by the World Bank and FAO (1981) and the research priorities indicated in four main areas, including forestry in relation to agriculture and

24

rural development, forestry in relation to energy production and use management and conservation of existing resources (mainly natural forest) and industrial forestry. Callaham and Buckman (1981) also listed the key areas needed for future research programs, with more emphasis on lesser-known species, critical forest types, reforestation in left-over areas, growth and yield of natural forests and fast-growing trees, logging and utilization of waste during processing etc. USAID (1984) conducted the Asia/Forestry/Fuelwood Research and Development Planning Conference in Bangkok. Research topics recommended to be given high priority in this meeting were, in order: species trials, nursery techniques, provenance trials, genetics, spacing trials, reclamation of wastelands, establishment techniques, grazing/fodder, shelterbelts, nitrogen-fixing trees, biomass productivity etc. In the Kandy Meeting, high priority research activities were identified in more detail (Shea & Carlson, 1984; Burley & Stewart, 1985). These research topics were ranked in order from highest to lowest priority and included silvicultural and management research, genetic improvement of MPTS, choice of species, design of agroforestry systems, cost-effective techniques for nursery-stock production, use of nitrogen-fixing organisms with MPTS, cost-effective techniques for tree establishment and maintenance, pest-management systems, and utilization studies.

In the present study, a survey of research work was done by interviewing 81 researchers on the major on-going research programs and programs to be conducted in the next five years (Table 6).

**Table 6** List of high-priority research conducted by 81 Thai forest scientists

Ranking	Research priorities	
	At present	During 1986-1991
1	Planting techniques	Wood utilization
2	Growth and yield	Physiology
3	Seed	Agroforestry
4	Seedling	Tree improvement
5	Agroforestry	Seedlings
6	Plantation management	Biomass
7	Weed control	Fuelwood
8	Fertilization	Seed
9	Biomass	Growth and yield
10	Fuelwood	Genetics
11	Tree improvement	Wood properties
12	Wood utilization	Planting techniques
13	Soil	Logging and transportation
14	Biotic enemies	Anatomy
15	Wood properties	Urban planting
16	Physiology	Biotic enemies
17	Logging and transportation	Soil
18	Genetics	Fertilization
19	Conservation plantations	Conservation plantations
20	Urban planting	Weed control

26

Under the present situation, most Thai forest scientists are satisfied with the research activities. However, 20 forest scientists claimed that the research system was unsatisfactory. The majority of forest scientists stressed that forest research policy was inconsistent and undirected so that most research program aims differed widely and it was difficult to turn the results into practical applications. They acknowledged that researchers have been active in the programs but claimed that support from official organizations was relatively low. Researchers lacked research funds and capable teams to tackle the problems.

Researchers have little contact with related organizations and thus the dissemination of information is prevented. Also the majority considered it necessary to improve the scientific atmosphere in forestry research programs.

REFERENCES

- Bhumibhamon, S. 1983. Present views of senior forest administrators on forest resources conservation. Mimeograph. 12 p.
- Bhumibhamon, S. 1986. The environmental and socio-economic aspects of tropical deforestation. Faculty of Forestry, Kasetsart University. 105 p.
- Bhumibhamon, S. and L. Atipunampai. 1983. Present views of Regional Forest Officers and Provincial Forest Officers in northern area on forest resources conservation. Mimeograph. 12 p.
- Bhumibhamon, S., T. Vajirajutipong, T. Viriyaratanaporn, A. Parnnakapitu L. Atipunampai, and S. Changtragoon. 1983. Present views of villagers on the natural resources conservations in the northern area. Mimeograph. 21 p.
- Bhumibhamon, S., T. Vajirajutipong, T. Viriyaratanaporn. 1984. Present views on natural resources conservation of chief of villages in some northern area. Conservation. 7 : 52-59.
- Burley, J. and J.L. Stewart. 1985. Increasing productivity of multi-purpose species. IUFRO, Vienna. 560 p.
- Callahan, R.Z. and R.E. Buckman. 1981. Some perspectives on forestry in the Philippines, Indonesia, Malaysia, and Thailand. USDA For. Serv. 66 p.
- Mungkorndin, S. 1981. Forests as a source of food to rural communities in Thailand. FAO Regular Programme No.RAPA 52-69 p.

28

- Panpiamrat, K. 1984. Thai rural areas : progress and reverse development. Social Science Society of Thailand. Saengrung Press. Bangkok. 291 p. (in Thai)
- Shea, K.R. and L.W. Carlson. 1984. Increasing productivity of multipurpose tree species : a blueprint for action. IUFRO Planning Workshop, Kandy. IUDA For. Service. 100 p.
- TDRI. 1986a. Forest and Mangrove Resources In Thailand Natural Resource Profile. Mimeograph. 67 p.
- 1986b. Land Resources In Thailand Natural Resource Profile. Mimeograph. 141 p.
- Thamwincha, S. 1985. Private Communication.
- USAID. 1984. Asia/Forestry/Fuelwood Research and Development Planning Conference. Bangkok. Draft Final Report. 65 p.
- Wacharakitti, S., P. Boonnorn, P. Sangvantam, A. Boonsaner, C. Silapatong, and A. Songai. 1979. The assessment of forest areas from LANDSAT Imagery. For. Res. Bull. No. 60. 22 p.
- World Bank and FAO. 1981. Forestry research needs in developing countries-time for a reappraisal. 17<sup>th</sup> IUFRO World Congress, Kyoto. 50 p.

FORESTRY/FUELWOOD RESEARCH AND DEVELOPMENT PROJECT  
Social Economic and Institutional  
Research Component

**Background:** S&T/FNR and S&T/RD are jointly developing the Forestry/Fuelwood Research and Development Project. The project will utilize an integrated approach to better understand biological, physical, technological, socio-economic, and institutions aspects of forestry and fuelwood production.

**Project Goal and Purpose:** The goal of the project is to help reduce uncontrolled forest eradication and natural resources degradation in developing countries while increasing rural and urban incomes and employment opportunities derived from tree and forest goods and services. The purpose of the project is to increase the production of forestry goods and services in developing countries through the use of appropriate biological and social science information (derived from applied and basic research) in development projects with forestry/fuelwood components. It will strengthen the forestry and associated social science research capacity of developing countries and help create regional networks that place special emphasis on fuelwood research.

**Emphasis of Social, Economic and Institutional Research Component:** The primary objective of this component of the project is to better understand the social, economic and institutional constraints and opportunities that lead to failure or success in contribution of forests and trees in the solution of problems and achievements of goals in agricultural and rural development.

The project addresses the following questions:

- o What rural development problems and goals depend upon solutions in forestry and fuelwood production and conversion activities?
- o What are the social constraints and opportunities that affect forestry and fuelwood projects?
- o How do we integrate this knowledge with that of the biological sciences to enhance project effectiveness and to meet rural development forestry goals?
- o What methodologies and tools are available to conduct this research?
- o What methodologies and tools need to be developed or refined to conduct this research, systematize our efforts, and advance learning?

What approaches are most appropriate for overcoming the constraints and bottlenecks that are identified?

The general research strategy is composed of three interdependent components:

1. Synthesize and integrate existing social science knowledge about social constraints and opportunities such as: a) perceptions, values, roles, behaviour and participatory systems of people involved in forestry activities; b) distributive mechanisms for land and forest resources; c) economic mechanisms affecting the adoption or rejection of a fuelwood project; and d) institutions that regulate access and use of forests and tree resources and deliver a variety of forestry-related goods and services;

2. Identify and develop methodologies and tools for field application to provide new knowledge and approaches for addressing the problems identified; and
3. Develop a database memory of human behavioral knowledge, project experience, and indigenous knowledge to systematize and advance learning from existing and new knowledge about rural development forestry.

Outputs of Social Science Component: We are considering a range of social science related outputs such as:

- o case study reports
- o state-of-the-art papers
- o improved social science methodologies such as rapid reconnaissance systems adapted for rural development forestry
- o social science theories adapted specifically to forestry/fuelwood problems in rural and agricultural development
- o training curricula in research techniques and data interpretation
- o workshops for host and donor researchers for the dissemination of research results
- o regional training courses in research methodology and research management techniques
- o national forestry research plans with strong social/economic/institutional components
- o networks of developed country and LDC institutions to conduct research
- o coordination of related research activities by host and donor institutions

We would like to hear about the socio-economic problems and constraints you face in your forestry, fuelwood and rural development programs. We also would appreciate your suggestions as to the form and types of social science outputs that would be most appropriate to your rural development forestry program.

05492

31