

**AGROFORESTRY IN THAILAND**  
**PERSPECTIVE OF FOREST INDUSTRY**  
**ORGANIZATION (FIO)**

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**ABSTRACT**

Nearly 80% of the country's 52 million people live on agricultural earning. Most of forest land is illegally cleared for agricultural purposes. Especially shifting cultivation, one of the most serious problems in forest destruction. The modified taungya system, one known form of agroforestry, has been applied by the FIO. to successfully solve these problems. Agroforestry systems carried out by the FIO. are :

- a) Forest trees and agricultural crops where families in forest villages of the FIO., excluding those in the South, cultivated agricultural crops, combined with forest trees.
- b) Forest trees and horticultural crops where the FIO.'s forest villagers in the South chose horticultural crops like coffee, rubber tree and cashew nut combined with forest trees.
- c) Animals and trees : cattle raising and bee keeping are maintained by FIO.'s plantations in all regions as extension programs.

**Introduction**

Thailand is located between Lat. 5 40' to 20' 30'N and Long. 97 70' to 105 45' E. The total land area is about 514,000 sq.km., and nearly 80% of the country's 52 million people live on agricultural earnings. Most forest lands are thus cleared for agricultural purposes, causing forest resources to diminish from 53.33% of total land area in 1961 to 28.03% in 1988. Shifting cultivation is one of the most serious problems in forest destruction. Also, due to population increases and industrial development, the demand for forest products rapidly increases leading to overfelling and illegal cutting in most forest areas.

**Forest Village Programmes**

The forest village programme is considered a modified form of the Taungya System. The population pressure in Thailand after world war II played a great role in the illegal land clearing of the forest. It was estimated roughly in 1978 that, there are 6 million people who have stayed on forest land.

The Taungya System has been applied, in those forest plantation area which have problem with illegal land clearing, by the Royal Forest Department. The system is to offer ways for both sides to get together. The forest village has been adopted to provide higher living standards to those living in remote areas to join in the forest plantation program. The forest village can also be

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considered a means among many means to be carried out in the rural development program.

The Taungya System was adopted in to the Royal Forest Plantation in 1906. When the forest plantation was first initiated in Prae (Northern province). However, it was found that the Taungya System was not fully successful, because, in many cases, the farmers paid most of their attention only to the crops when price increased, neglecting forest trees. In addition, the allotment of a cultivation period was only 2-3 years and the settled farmers subsequently turned to shifting cultivations. Later, the Taungya System was abandoned and the forest plantation was carried out under the labour hiring basis for all the activities of planting.

The pressure of land needed for agriculture still has a role in the forest plantation area. Those landless farmers can ask for permission to grow the crops in the spacing trees under the 2-3 years contract basis. The system has been adopted widely in the planting unit of the Royal Forest Department which can be considered another form of modified Taungya System.

In 1967, the Forest Industry Organization (FIO), (the government enterprise under the jurisdiction of the Ministry of Agriculture and Cooperative. It was set up in 1947 to serve the country in forest industry, timber business, reforestation and forest research.) initiated the project the called Forest Village System Plantation by which the Taungya System of planting was modified and named The Modified Taungya System (one known form of agroforestry) with considerable success in plantation establishment. The system is aimed at settling the landless people in communities and as a source of labor for plantation work. Each village normally plans to comprise 100 families. Each family is allotted 1.6 ha. of land per year for clearing, planting crops and

forest trees, and 0.16 ha. of land to live on for dwelling and backyard gardening. In the village electricity, water supply, school, temples and other welfare systems are provided. A reward of US\$ 8.0 per 0.16 ha. of tree planting areas also given to each family. In addition, if any family works on clearing land and planting trees for 3 consecutive years for over 4.8 ha., they will be paid a bonus of US\$ 60.0. From then on, for every additional year they work over the annual allotted areas of 1.6 ha. they will receive an extra US\$ 48.0. A quota of two laborers from each family is recruited to work of the plantation. Such employment adds substantially to the income of the family. Under this scheme, a plantation will be established 160 ha. a year in each village. The area of a forest village unit should cover the whole rotation of the species planted.

At present, there are 42 forest villages in the plantation programme of the FIO. of which 20 are in the North, 13 in the East and Northeast and 9 in the West and South parts of the country.

### **Agroforestry by the Forest Industry Organization (FIO.)**

The Forest Industry Organization annually allocates over US\$ 5 millions from its resources to establish forest plantations all over Thailand. This action serves the Organization's aim in bringing benefits of job-opportunity programmes directed at rural community development, to the inhabitants in the poor rural communities.

For implementation, the Organization set up the FIO. forest village system in 1967 on the lines of a modified Taungya System with introduction of forest village infrastructure and emphasis in agroforestry practice to combine forest trees with crops as well as Silviculture activities.

The Agroforestry system carried out by the FIO. can be grouped into three types as follows.

(a) *Forest trees and agricultural crops.*

For earning supplementary income, agricultural crops are cultivated by most forest village families in FIO's plantations all over the North, East and northeast, and West.

Selected agricultural crops should meet the following requirements : i.e. high productivity ; in consistent demand, can prosper in the shade ; shallow root system ; and of the species leguminosae.

Spacing is an important consideration also. In later years, to make emphasis on agroforestry, the FIO subsequently made adjustment of spacing forest trees in its plantation from  $4 \times 4$  to  $2 \times 8$  metres.

In the North, the forest tree is teak (*Tectona grandis*), main crops are mize and upland rice, minor crops are ground nut, pumpkin, chili, red bean, mung bean and cotton.

In the Northeast and East, the forest trees are *Eucalyptus camaldulensis* and *Melia azedarach* ; main crop is cassava and minor crops are mize, kenaf, upland rice, ground nut, sorghum, bean, mung bean, red bean and chili.

In the West, the forest trees are teak (*Tectona grandis*), *Eucalyptus camaldulensis* and *Melia azedarach*, main crop is maize and minor crops are upland rice, cot-ton, castor bean.

(b) *Forest trees and horticultural crops.*

In Southern Thailand, the people are familiar with horticultural crops like coffee, rubber trees, cashew nut and other fruit trees. For this reason, FIO reforestation projects in the Southern region maintain forest trest combined with horticultural crops instead of

agricultural crops. The forest trees are *Dipterocarpus alatus*, *Leucaena leucocephala*, and *Parkia javanica*, horticultural crops are rubber tree, coffee and cashew nut. It is evident that the forest trees/horticultural crops combination produces successful results in several FIO plantations in the Southern region. Forest villagers in certain plantations or regions choose fruit tree over agricultural crops to earn better income from this supplementary source. Therefore, spacing must be enlarged to accommodate forest trees and fruit trees together.

(c) *Animals and trees.*

This practice of combineing animals with forestry has been introduced at a number of FIO's plantation as an additional source of income for participating families. There are 2 types of animal/forest tree practised.

1. Cattle Raising. Cattle raising or "Silvopastoral" involves controlled grazing of forest vegetation and elimination of forest fire hazards. Cattle raising provides substantial earning as additional income.

Cattle is raised with no problem in range management. But, for the best results, proper number per particular area, forest tree species, size end age, spacing and water sources must be considered.

2. Bee Keeping. Bee keeping of "apisilviculture" is another type of Agroforestry. Native bees will beraised in the box. The sites should have enough water and flowering trees. The flower from *Eucalyptus camaldulensis* is most perferable.

At present, FIO's plantations in the Southern and Western region maintain bee keeping as extension programmes for forest village families to earn more for their improved standard of living.

**Table 1** Forest village, location and area established by FIO. (1988)

Region	Forest village name	Location District, Province	Year established	No. of family	No. of population	Area established (ha)
North	1. Tung Kawien	Hangchat, Lampang	1968	37	169	2,443.52
	2. Maenai	Muang, Lampang	1971	50	209	3,283.52
	3. Maemoh	Maenoh, Lampang	1968	101	425	3,038.72
	4. Mae Jang	Mae ta, Lampang	1968	67	303	2,888.80
	5. Khun mae Kamme	Rong Kwang, Prae	1970	39	231	3,267.84
	6. Khao Krayang	Wangthong, Pitsanuloke	1968	30	149	2,560.32
	7. Mae Sai	Kham Muang, Lampang	1971	78	374	2,373.12
	8. Mae Hor Pra	Mae taeng, Chiangmai	1972	44	190	1,479.36
	9. Mae Li	Li, Lumpun	1971	14	72	2,376.80
	10. Ban dan lan hoy	Bandan, Sukhothai	1971	43	255	2,320.00
	11. Mae Jaem	Mae Jaem, Chiangmai	1973	95	401	1,164.48
	12. Lad yao	Ladyao, Nakornsawan	1977	55	247	913.28
	13. Mae Lamao	Mae sod, Tak	1974	9	40	1,132.48
	14. Srisatchanalai	Srisatchanalai, Sukhothai	1975	60	226	2,103.36
	15. Maeyom-Maepaeng	Wangchin, Prae	1978	7	32	298.40
	16. Wangchin	Wangchin, Prae	1977	63	288	1,559.68
	17. Mae Saroy	Wangchin, Prae	1978	32	156	1,717.44
	18. Khao Kana	Chon daen, Petchabun	1978	12	52	720.32
	19. Luang sankampaeng	Sankampaeng, Chiangmai	1979	50	197	744.00
	20. Mae Kampong-Mae	Sai Rongkwang, Prae	1979	13	73	655.36
East & Northeast	21. Somdet	Muang, Kalasin	1975	232	1,146	2,001.28
	22. Sakaao	Wangnamyen, Prachinburi	1974	46	248	898.40
	23. Wathananakorn	Wathananakorn, Prachinburi	1978	16	80	427.04
	24. Sopsisai	Sopsisai, Nongkai	1977	15	93	181.60
	25. Khunharn	Khunharn, Srisaket	1974	77	330	746.24
	26. Tepsathit	Tepsathit, Chaiyaphum	1978	58	225	742.72
	27. Pibulmungsaharn	Pibulmungsaharn, Ubolrachathani	1976	84	470	1,376.32
	28. Namsom	Namsom, Udonthani	1976	13	79	318.24
	29. Khonsarn	Khonsarn, Chaiyaphum	1979	90	424	704.16
	30. Kasetomboon	Kasetomboon, Chaiyaphum	1979	27	101	574.08
	31. Dankhantod	Dankhantod, Nakornrachasima	1980	21	102	911.84
	32. Manjakiri	Manjakiri, Khonkaen	1980	44	210	1,354.88
	33. Sangkha	Sangkha, Surin	1980	20	102	244.32
West & South	34. Salui-Tasae	Tasae, Chumporn	1978	29	148	893.76
	35. Sinpun	Prasaeng, Surathani	1978	19	89	324.20
	36. Klontom	Klontom, Krabi	1975	17	106	2,121.12
	37. Karnchanadit	Donsak, Surathani	1974	34	135	898.88

Region	Forest village name	Location District, Province	Year established	No. of family	No. of population	Area established (ha)
	38. Prasaeng	Prasaeng, Surathani	1975	70	344	1,279.36
	39. Wangviset	Wangviset, Trang	1975	9	77	1,483.84
	40. Tongpaphum	Tongpaphum, Kanchanaburi	1979	70	327	1,935.52
	41. Ongpra	Danchang, Supanburi	1979	46	232	937.92
	42. Ongkot	Danchang, Supanburi	1984	8	53	340.96
	Total			1,944	9,210	57,740.48

Source : Forest Industry Organization, 1988

**Table 2** Tree-crop combination in the Modified Taungya System of the forest village of FIO. (1988)

Region	Forest village name	Tree species planted	Intercroppec species planted
North	1. Mae Hor Pra	Te g	Or s, Ar h, Go s, Gl m
	2. Mae Li	Te g	Ze m, Gl m, Or s, Ar h, Al a
	3. Mae Jaem	Te g	Gl m, Ze m, Ve c
	4. Lad yao	Te g	Zem, Ma e, Vi r
	5. Srisatchanalai	Te g	Gl m, Ze m, Oc b
	6. Wangchin	Te g	Ze m, Vi r, Be h, Or s, Cu m, Go s Ca a, Se o
	7. Luang sankampaeng	Te g	Ze m, Ni t, Sa o, Mu s, Ar h
East & Northeast	8. Somdet	Eu c	Ma e, Or s
	9. Sakaeo	Eu c	Ma e, Or s, Co s, Ze m, Vi r, So b
	10. Wathananakorn	Eu c	Ma e, Ze m, Vi r
	11. Khunharn	Eu c	Ma e, Co s, Ar h, Cu m
	12. Tepsathit	Eu c	Ma e, Co s, Ze m
	13. Namson	Eu c	Ma e, Mu s
	14. Khonsarn	Eu c	Ma e, Ze m, Gl m, Vi u, Ca a
	15. Manjakiri	Eu c	Ma e
West & South	16. Salui-Tasae	Di a, Le l	Co r, He b
	17. Sinpun	Le l	Or s, He b
	18. Klongtom	Ca e, Eu c, Le l	He b, An o
	19. Karnchanadit	Pa j	Co r, He b
	20. Prasaeng	Le l	Co r, He b
	21. Wangviset	Le l	He b
	22. Tongpaphum	Te g, Le l	Ze m, Gl m, Vi r, Go s, He b
	23. Ongpre	Eu c	Ze m

Source : Forst Organization, 1988.

## Tree species :

Teak :	Te g	=	<i>Tectona grandis</i>
Yang :	Di a	=	<i>Dipterocarpus &amp; alatus</i>
Ipil-ipil :	Le l	=	<i>Leucaena leucocephala</i>
Eucalypt :	Eu c	=	<i>Eucalyptus camaldulensis</i>
Beefwood :	Ca e	=	<i>Casuarina equisetifolia</i>
:	Pa j	=	<i>Parkia javanica</i>

## Agricultural crop :

Maize :	Ze m	=	<i>Zea mays</i>
Upland rice :	Or s	=	<i>Oryza sativa</i>
Pumpkin :	Cu m	=	<i>Cucurbita moschata</i>
Groundnut :	Ar h	=	<i>Atachis hypogaea</i>
Sesame :	Se o	=	<i>Sesame orientale</i>
Mungean :	Vi r	=	<i>Vigna radiata</i>
Cassava :	Ma e	=	<i>Manihot esculenta</i>
Cotton :	Go s	=	<i>Gossyping spp.</i>
Soya bean :	Gl m	=	<i>Glycine max</i>
Chili :	Ca a	=	<i>Capsicum annum</i>
Tobacco :	Ni t	=	<i>Nicotiana tabacum</i>
Kenaf :	Co s	=	<i>Corchorus spp.</i>
Wax gourd :	Be h	=	<i>Benincasa hispida</i>
Shallot :	Al a	=	<i>Allium ascalonicum</i>
Sweet basil :	Oc b	=	<i>Ocimum basilicum</i>
Sorghum :	So b	=	<i>Sorghum bicolor</i>
Vegetable crops :	Ve c		

## Horticultura/Fruit crop :

Banana :	Mu s	=	<i>Musa sapientum</i>
Sugarcane :	Sa o	=	<i>Saccharum officinarum</i>
Coffee :	Co r	=	<i>Coffea robusta</i>
Cashew :	An o	=	<i>Anacardium occidentale</i>
Pararubber :	He b	=	<i>Hevea brasiliensis</i>

**Table 3** Income of the forest villagers of FIO. (1988)

UNIT : US\$

Region	No.of family	Sources of Income				Total	Total income /family/year
		Dailywages	Taungya compensation	Taungya bonuses	Agro-crop income		
North	899	415,567	15,336	4,615	195,788	631,306	702.23
East & Northeast	743	206,787	3,701	74,884	129,052	414,424	557.77
West & South	302	237,567	6,597	22,329	73,077	339,570	1,124.40
Total	1,944	859,921 62.08%	25,634 1.85%	101,828 7.35%	397,917 28.72%	1,385,30	

Source : Forest Industry Organization, 1988

**Table 4** Natural Forest Areas in Various Regions of Thailand.

Region Total	Natural Forest Area (ha.)							
	Land area	1691	1973	1976	1978	1982	1985	1988
North	16,964,429	11,627,500 (68.54)	11,359,500 (66.96)	10,232,700 (60.32)	9,493,700 (55.96)	8,775,600 (51.73)	8,412,600 (49.59)	8,040,227 (49.39)
East	3,650,250	21,166,300 (57.98)	1,503,600 (41.19)	1,263,100 (34.60)	1,103,700 (30.24)	800,000 (21.92)	799,000 (21.89)	783,382 (21.46)
Northeast	16,885,433	7,090,400 (41.99)	5,067,100 (30.01)	4,149,400 (24.57)	3,122,100 (18.49)	2,588,600 (15.33)	2,422,400 (14.35)	2,369,335 (14.03)
Central	6,739,870	3,566,050 (52.091)	2,397,000 (35.56)	2,182,600 (32.38)	2,042,600 (30.31)	1,851,600 (24.47)	1,722,800 (25.56)	1,724,435 (25.59)
South	7,017,519	2,962,600 (41.89)	1,843,500 (26.07)	2,013,900 (28.48)	1,760,300 (24.89)	1,644,200 (23.25)	1,548,500 (21.90)	1,462,963 (20.69)
Whole country	51,311,501	27,362,850 53.33%	22,170,700 43.21%	19,841,700 38.67%	17,522,400 34.15%	15,600,000 30.52%	14,905,300 29.05%	14,380,349 28.03%

Note : A data were derived from LANDSAT except for the 1961 data which came from aerial survey.

Values in parenthesis are percentages of the total land area in each region.

Source : RFD.