

# Forestry Management in Burma

*With Particular Reference To Teak Forests  
And The So-called "Taungya Forestry"*

## INTRODUCTION

Burma, including the Federated Shan States, has an area of 167,453,650 acres, of which 96,562,180 acres or 58 per cent is covered with forests.

Burma may be divided into three (3) principal regions, namely, (1) the Western Mountains (Arakan Yoma) with the Arakan coastal zone; (2) Burma Basin comprising (a) the Irrawaddy-Sittang Delta; (b) Pegu Yoma, (c) Central Burma, and (d) Northern Burma; and (3) the Shan Plateau and its southern continuation, the Tennasserim ranges,

In the forests of Arakan Yoma grows teak, the typical and the most valuable type of vegetation along the lower reaches, while higher up in the slopes, oak and pine form the forests. The Burma Basin is one of the foremost rice-exporting regions of the world. It is also a region of valuable teak forests—the monsoon forests. In the higher elevation, pines and rhododendron grow. Vast expanses are still unexplored and unknown. The Shan Plateau is an area of evergreen forests, grasslands and pine forests.

## FOREST RESOURCES

In Burma, all forests belong to the State. The one important species is teak which forms ten to twelve per cent of the entire forest composition. The rest, with the exception of the several less known species with limited markets, is made up of useless trees and "weeds".

The first step in describing the forest resources of a country must be the determination of total forest area. Until the area is known with at least approximate accuracy,

formulation of a national forest policy is virtually impossible. The major land use classification is presented below:

### Forested lands:

Productive forest . . . . .	62,668,840	acres
Other forest . . . . .	33,893,340	"
Total . . . . .	96,562,180	" —58%

### Non-forested lands:

Cultivated and grasslands . . . . .	21,622,380	" —13%
Other lands . . . . .	49,269,090	" —29%
Total . . . . .	167,453,650	"—100%

Forested lands include lands bearing vegetative associations dominated by trees of any size capable of providing timber or other forest products or of exerting an influence on the climate or on the water regime. Also, lands from which forests have been recently clear cut or burned, but which will be reforested in the near future.

Productive forest includes lands physically capable of producing crops of usable wood. Other forest includes lands incapable of yielding products other than fuel because of adverse site situations. This category includes forests of slow growth and of dwarfed or stunted forms.

Cultivated lands and grasslands include lands under cultivation, and natural grasslands whether used for grazing or not. Other lands are brush lands, moors, deserts, sand dunes, bare rock, swamps or bogs, also areas occupied by towns, roads, and other uses.

From utilization stand point, the forests may be divided into three categories: (1) Hill forests, (2) Accessible hill reserves, and (3) Plain forests. The needs of the local population for timber and other forest pro-

ducts are taken from the plain reserves; the accessible hill forests are worked for valuable hardwoods, in addition to teak, for local trade; while the hill forests (inaccessible) are worked for teak alone, mainly for export which contributes roughly 60% of the entire forest revenue of the country.

The forests may also be classified into types; namely: (1) tidal forests, (2) beach and dune forests; (3) swamp forests; (4) tropical evergreen forests; (5) mixed deciduous forests, with three main forms consisting of (a) moist upper—, (b) dry upper—, and (c) dry mixed deciduous forests; (6) dry forests; (7) deciduous dipterocarp forests; and (8) sub-tropical and temperate evergreen forests.

The type that concerns us is the mixed deciduous forests where teak grows. The rainfall in the regions of this type varies from 40 to 120 inches a year, which explains for the three forms under this type. Most of the trees in forests of this type lose their leaves during the hot season, February to May. They put on new leaves towards the end of that season or at the beginning of the rains. The forests are fairly open. The three forms may be briefly described as follows:

(1) Moist upper mixed deciduous forests in lower and upper Burma are characterized by the presence of bamboos. These bamboos are useful and are of economic importance. These forests contain the finest of teak. The bamboo forests of Arakan may be included in this type.

(2) Dry upper mixed deciduous forests are also characterized by the presence of bamboos of another species. Teak is mixed with other species in the forest. These species belong to the genus *Terminalia*, *Pentacme* and *Shorea*.

(3) Lower mixed deciduous forests occur on low ground, sometimes alluvial, usually clayey, and are characterized by the scarcity or absence of bamboos. These forests also contain teak in association with other trees producing beautiful wood for fur-

niture and paneling as well as excellent fuel-wood.

## DEVELOPMENT OF FORESTRY

### *Historical background.*

Forest administration in Burma may be said to have started in 1826 when the coastal provinces of Arakan and Tenasserim passed into British hands. It may, however, be worthwhile to mention some facts, particularly relating to teak, long before this year. In Southeast Asia, the destruction of the forests had gone on from time immemorial in order to open up lands for cultivation and grazing, and to provide timber and other produce for domestic needs of the people and for trade. It is reported that during the Alaungpaya dynasty in Burma from 1752 onwards, teak was proclaimed a "Royal" tree and disposal remained the prerogative of the king. This acted as a deterrent to the indiscriminate exploitation of teak but did not stop shifting cultivation. Although the trees were not cut but they were killed in the process of burning. Up to 1824, however, vast areas of teak forests still remained.

It may be mentioned here that Burma teak was known to the Arabs from the eighth to the sixteenth century. In the seventeenth century, a large indigenous shipbuilding industry was in existence in the Irrawaddy Delta. In the eighteenth century shipbuilding on European lines was being undertaken at Syriam and Rangoon.

All the forests of Burma passed into British control in 1885 when upper Burma was annexed. This was preceded by the annexation of Pegu in 1852.

The year 1826 marked the beginning of large scale exploitation of the teak forests of Burma. The period 1826-1854 witnessed an increase in the rate of destructive exploitation of teak forests. Exploitation was left in the hands of licensees or concessionaires over whom little or no governmental control was exercised.

Due to the rapid rate of destructive exploitation, there was some agitation to ex-

ercise some sort of control, realizing that no forest existed which can be called inexhaustible. The Moulmien forests were badly damaged so that anxiety was beginning to be felt in regard to the maintenance of the supplies of teak.

#### *Beginning of scientific forestry.*

In 1855 the Governor-General laid down the policy based on the principle that all teak timber in the forests should be retained as State property; and that the selection girdling of green standing trees should be done by the Government agency and their removal from the forests carried out under Government supervision. In 1856 Dr. Sir Dietrich Brandis, the father of Indian forestry, took charge of the forests of Burma. He was the first scientifically trained forester to come to Burma.

Brandis inaugurated the first forest working plan for Burma. The plan was the result of forest valuation surveys by which estimates of stocking of teak trees by girth classes were prepared. From estimates of rate of growth he estimated the annual yield in terms of trees of exploitable girth. He also initiated the working of teak by Government agency in Tharrawaddy forests and Government auction sale of teak logs in Rangoon, which were continued without interruption up to 1942.

The work so well founded by Brandis was carried on by successive generations of forest officers and the development and systematic organization of forestry in Burma can compare favorably with that in any country in the world. He put into operations measures to protect the forests from injury by man, which included the control of the system of taungya or hill cultivation. He convinced the Government of the importance of administering the forests on the principle of sustained yield and entrusting their management to a trained forest service of the best quality.

After the war forestry work was resumed on about as high a level as pre-war, circumstances and conditions permitting. After in-

dependence the forest department continued to function retaining practically the same administrative set-up, with some modifications introduced to suit new conditions.

## FOREST ADMINISTRATION

### *Policy.*

The chief objective of forest conservancy in Burma is to ensure the permanent production annually of a sufficient quantity of teak and other valuable kinds of timber and other forest produce, to provide for the requirements of Burma and other countries.

For purposes of forest administration, the forests of Burma may be divided into four classes, namely;

- (1) Protection forests which are essential on climatic or physical grounds;
- (2) Commercial forests which afford a supply of valuable timber for commercial purposes;
- (3) Local supply forests, the use of which is to provide the local people with essential needs in respect to timber, firewood, etc.; and
- (4) Pasture lands.

### *Burma Forest Act of 1902.*

The basic forest law is the Burma Forest Act of 1902. It includes, among other things, provision for the constitution of reserved forests and general protection of forest. This Act contains definition of terms, among which are as follows:

(a) "Land at the disposal of the Government" means lands in respect of which no person has acquired either—

- (1) a permanent, heritable and transferable right of use and occupancy under any law for the time being in force; or
- (2) any right created by grant or lease made or continued by, or in behalf of, the British Government.

(b) "Public forest land" means land at the disposal of the Government and not included in reserved forest.

(c) "Reserved forest" means and includes a forest and every part of a forest—

(1) declared to be reserved forest under the provisions of Sec. 18 of this Act or the corresponding section of any act previously in force in Burma, or

(2) declared to be reserved forest under the provisions of any rules in force in Lower Burma previous to the 1st of July, 1882.

(e) "Shifting cultivation" includes taungya cultivation and cultivation of such other kinds as the Local Government may by notification declare to be shifting cultivation for the purposes of this Act.

(f) All standing trees wherever situated, except such as have been expressly alienated by grant or lease made by or on behalf of the British Government, shall be deemed to be the property of the Government and shall be reserved trees.

#### *Provisions on shifting cultivation.*

In the case of a claim relating to the practice of shifting cultivation, the Forest Settlement Officer shall pass an order specifying the particulars of such claim and permitting or refusing to permit such practice wholly or in part.

If the practice of shifting cultivation is permitted wholly or in part under the foregoing provision (Sec. 8 (3), the Forest Settlement Officer may—

alter the limit of the forest proposed for reservation so as to exclude land of sufficient extent, of a suitable kind, and in a locality reasonably convenient for the purposes of the claimants; or

cause certain portions of the forest proposed for reservation to be separately demarcated and give permission to the claimants to practice shifting cultivation under such rules and conditions as he may prescribe.

The practice of shifting cultivation shall be deemed a privilege subject to control, restriction and abolition by the Local Government, without payment of compensation and unless otherwise expressly permitted in the notification issued (Sec. 18), such cul-

tivation shall be practiced only by the person to whom such permission is granted.

Claim to the privilege of practicing shifting (taungya) cultivation.—It should be clearly understood that the practice of taungya cultivation cannot be claimed as a right. It is merely a privilege which can, at the time of reservation, be controlled or restricted in any way, or abolished without payment of compensation by Government. In his inquiry into such claims the Forest Settlement Officer has first to decide, on the evidence before him, whether the practice should be permitted or not.

If, for example, he considers that the persons making the claim can, without inconvenience, find sufficient land within easy reach of their village, outside the proposed reserve, the practice of taungya cultivation should not usually be permitted, unless for special reasons it is considered desirable to continue it under conditions accepted by the Forest Officer. The Forest Officer should explain it clearly to the Settlement Forest Officer what objections, there are, from a forest point of view to permitting the practice within the reserve. No compensation is permitted under Sec. 10 (last paragraph, page 9) to persons who have been in the habit of practicing taungya cultivation within a proposed reserve, merely on the ground that this practice is prohibited by an Order of the Forest Settlement Officer. But other rights of taungya cutters, e. g., the right to occupy existing houses within a proposed reserve or to extract fuel or other forest produce, etc. may, with the sanction of the Local Government, be surrendered by agreement or commuted by a money payment.

If it is necessary to allow taungya cultivation in a proposed reserve, the Forest Settlement Officer may deal with the matter in one or two ways. He may either alter the limits of the proposed reserve, so as to exclude from it land suitable for the purpose and sufficient for the needs of the person claiming the privilege, or he may permit taungya cultivation inside the reserve with-

in accurately defined and demarcated limits, subject to such rules and conditions as he may prescribe. In considering which of these two methods of providing for the practice of taungya cultivation should be adopted and in revising the boundary or, if the second alternative be adopted, in selecting a suitable area, fixing conditions and making rules for taungya cutting, the Forest Settlement Officer should take into consideration the views of the Forest Officer whose duty it is to assist him with advice on these points.

It should be borne in mind that an order cannot be passed permitting the practice of taungya cultivation in the whole of the proposed reserve, and that if an order is passed permitting the practice in any part of the reserve, as finally constituted, it must prescribe the conditions subject to which permission is granted. Finally, any permission granted by the Settlement Forest Officer must be granted to certain persons by name and not to the people of the village or part of a village. Such permission applies only to the persons to whom it is granted and not to their descendants. If the Forest Settlement Officer thinks that a general permission should be granted to the inhabitants of any local area, or to the people of any race or class, he should make a specific recommendation to that effect, in order that the Local Government may sanction the grant of such permission.

#### *Forest service.*

The administration and management of the forest resources of Burma is entrusted

to the Forest Department under the Ministry of Agriculture and Forests. It is headed by the Chief Conservator of Forests. The main territorial units of administration are the Circle, of which there are five in Burma proper, each under the charge of a Conservator, while the forests of the Federated Shan States are under the charge of a Principal Forest Officer, all of whom are directly responsible to the Chief Conservator of Forests. The Circle is further sub-divided into Forest Divisions, each under the charge of a Divisional Forest Officer who is directly responsible to his corresponding Conservator. The Forest Division is parcelled into Ranges under the charge of a Range Officer who is directly responsible to his corresponding Divisional Forest Officer. A Beat is the smallest administrative unit. Besides, there are two other Specialist Circles—the Working Plan and Training and Research. Working Plan Officers are performing the functions of the former while the Silviculturist, Forest Economist, Botanist and Entomologist are functioning under the latter.

### FORESTS MANAGEMENT

#### *Circles.*

For forest management purposes, the forests of Burma proper are divided into five working circles and that of the Federated Shan States form a separate working unit. The forest areas within the circles and working unit fall under two classifications—the reserved forests and unclassed forests and these are shown below:

<i>Circle</i>	<i>Reserved Forests</i>	<i>Unclassed Forests</i>
Maritime	5,876,508 acres	16,568,320 acres
Hlaing	1,943,601 "	3,433,600 "
Sittang	3,111,545 "	3,486,080 "
Upper Chindwin	4,583,148 "	13,197,440 "
Lower Chindwin	4,733,035 "	13,893,760 "
Total for Burma	20,247,837 "	60,579,200 "
Federated Shan States	2,023,947 "	10,159,360 "
<b>Total</b>	<b>22,271,784 "</b>	<b>70,738,560 "</b>

Of the reserved forests in Burma, 8,208,706 acres are classified as merchantable (teak only), 7,886,785 acres as merchantable (all species), and 4,152,346 acres as unprofitable or inaccessible. Of the unclassified forests in Burma, 11,328,640 acres are classified as merchantable (teak only), 23,093,760 acres as merchantable (all species), and 26,156,800 acres as unprofitable or inaccessible.

In Burma proper, three square miles of reserved forests have not been surveyed while 6,327 square miles of unclassified forests remained unsurveyed. In the Federated Shan States, all the reserved and unclassified forests have been surveyed.

Of the unclassified forests in Burma proper, 14,277,120 acres are unexplored, 41,125,760 acres are unfit for reservation, and 5,176,320 acres are possibly fit for reservation.

#### *Silvicultural systems.*

The Hill Forests are worked solely for teak under what is known as the Burma Teak Selection System. This is a modification of the true Selection System practiced in Europe. The yield is fixed by the number of trees for each felling series after the growing stock, rate of increment and survival have been determined. The present formula for determining annual yield is.

$$\text{Annual yield} = \frac{\text{Number of trees 1 foot below girth limit}}{\text{Felling cycle}}$$

The felling cycle of 30 years is adopted and a minimum exploitable girth of 7-1/2 feet (6-1/2 ft. for dry forests) is fixed on the assumption that teak takes 150 years on the average to mature.

Three years prior to extraction teak is girdled and allowed to dry while standing. At the time of girdling or subsequently after extraction, extensive improvement fellings and climber-cutting are carried out not only to ensure regeneration, to assist saplings and poles to establish, and free bigger stems for proper growth, but also to reduce

the proportion of other hardwoods.

Comparison of the results of enumerations after a period of years shows a definite increase in the teak stock. Subsequent results show that there has been a general increase in the number of trees three feet in girth. This increase is shared by teak but its increase in relative proportion with other species in the crop has failed.

To increase the proportion of teak in such forests, advantage is also taken of the phenomenon of gregarious flowering of bamboo, which is invariably followed by the appearance of abundant natural regeneration of teak. Where regeneration is scarce, it is supplemented by planting of teak stumps and sowing, and subsequently tended by weeding, clearing, fire protection and thinning. Observation has shown that the most prolific regeneration takes place in the dry upper mixed deciduous forests.

In the past stress was laid on the necessity of fire protection of the young crop and the dead stock. Observations and experiments tend to prove that in many types of forest it was decidedly harmful in that it favored the valueless species. This was more so in the case of teak. The result was the general abandonment of fire protection except in plantations in their young stages of growth.

In Accessible Hill Forests, all valuable hardwoods are taken out in addition to teak. Selection system is also practiced and improvement fellings in favor of teak are carried out where teak regeneration is abundant. The objective here is the final production of a uniform or even-aged mixed forest of teak and other valuable hardwoods. Most of the forests are now in the conversion type.

Almost every species is taken out in the Plain Reserves. Coppice with standards system is practiced in these forests. In other suitable areas, clear cutting is carried out, after which plantations are made by taungya with paddy and vegetables as the crop. The other system used is natural regenera-

tion without seed bearers. In this system, the area is clear-felled and burned after all trees needed by the villagers have been removed. Satisfactory regeneration of all species is obtained.

## TAUNGYA FORESTRY

### *Forest cover in deserted taungya.*

Brandis reported in 1856 of an observation he had of deserted taungyas. There was an abundance of young trees with due proportion of teak. Another observation was made in 1861 to 1862 in Irrawaddy Division in Upper Zamayee forests. The forests were classified as Class C as the second class trees were about four times as numerous as the first class trees. The forests as a whole had the appearance of a young forest.

It is the tradition among the inhabitants of this part of the country that the hills were once densely populated by the Karens, who under their own Chiefs kept at bay the Burmans of the plains. The population is stated to have gradually decreased and to have been reduced to their scanty numbers then by the famine of 1853 caused by rat infestation. At the time there were only ten Karen villages left. The taungya clearings of these ten villages destroyed a space of nearly two square miles every year, and the injurious effects of even this limited taungya cultivation on teak was very apparent.

The hills of Upper Zamayee forests covered an area of over 200 square miles. It was speculated that this area must have been inhabited by about 50 villages for over 40 years and the whole area must have been laid under taungya cultivation. As there was no restriction at all as regards teak, taungya cultivation must have destroyed these trees together with most other large trees. The new forest springing up while taungya clearings gradually were reverting to their original character would, after the lapse of 60 or 70 years, present the character of the teak forest which at that time covered the hills of Upper Zamayee

District—few trees of large girth with a big number of trees of smaller classes.

### *History*

In 1858, the Karens inhabiting the Attaran forests offered to plant teak in their taungyas provided that trees so planted would be regarded as their personal property. However, teak plantings in taungyas were made to replace all teak which were killed due to fire in the course of taungya cultivation.

Real progress was made in 1868 when Karens in Thoonzai and Beeling forests were induced to plant teak in their taungyas at certain rates of remuneration. There were 2,515 acres planted with costs ranging from Rs. 9-14 an acre. In Pegu where the Karens collected the seeds, the payment was Rs. 10 per 1,000 plants (one acre) while in Tenasserim where seeds were provided by the forest department, the payment was Rs. 8 per 1,000 plants. Plants in excess of 1,000 per acre were not paid. Capitation (poll tax) and taungya taxes were paid for them. Plants were counted at the end of the rainy season and were about 6 to 12 inches high. In burning the taungyas they see to it that fires did not spread and they also assisted in protecting the reserves from fires originating outside the reserves.

Teak plants were planted at a spacing of 6 feet by 6 feet or about 1,210 plants to an acre. During the first three years the plants require to be kept clean of weeds as bamboos if not kept down would attain a height of 10 to 15 feet. Subsequent clearings were paid for separately and in many cases laborers for weeding were procured from elsewhere. In places where bamboos were abundant and fast growing, plant rows were 12 feet apart and plants on the row 3 feet apart to facilitate clearing of bamboos.

### *Early taungya plantations:*

That teak must be sown and planted artificially on a very large scale in order to increase its proportion to meet the needs of

local consumption and export trade had been an objective of forest management in Burma. This objective was hoped to be attained through the establishment of regular plantations and taungya plantations.

Regular plantations were started in 1856 with an initial planting of 16 acres in Attaran District. The work was extended to other districts and by 1880 there were in maintenance 3,389 acres of regular plantations with an average cost of Rs. 88 per acre. In 1868, taungya plantations were started in Thoonzai and Beeling forests. In 1880, 2,515 acres were in taungya plantations and the cost ranged from Rs. 9 to 14 per acre. It can easily be seen that the cost of planting taungya plantations is very much lower than that of regular plantations.

As early as September 26, 1853, a proclamation declared all forests in Pegu to be the property of the Government and prohibited the cutting, marking or felling of teak timber. The Rules of 1865 provided, among other things, that no clearings for taungya cultivation must be made on Government lands in which stood teak trees. The protection of the Government forests, however, had not been quite successful because large areas of teak-producing forests had annually been destroyed by taungya clearings.

Areas in the heart of the forests were assigned to the Karens. Areas were assigned to the community—not to any particular head of the clan. Outsiders who did not belong to the community were not allowed to settle in the area but old settlers could be included. These people were, however, encouraged to settle in wet paddy lands. The average area cleared by each family ranged from three to four acres. A bamboo forest could be cleared again after five to seven years while a tree forest after 15—20 years, although generally much older. As some parts of the areas were not fit for taungya cultivation, the areas assigned must necessarily be much wider.

In 1880, the total area of reserved forests was 1,157 square miles, of which 213 square

miles were assigned to the Karens. There were 572 families and the area required was only 44,640 acres, still 136,320 acres or over three times were assigned. The assignment was 64 acres per house or four acres annually on a rotation of 16 years or three acres yearly on a rotation of 21 years.

#### *Early proposals and plans:*

As previously stated, the Karens were paid for the trees planted after the end of the rainy season. But for the plants to survive, they need to be clear of weeds for the first three years. It was then proposed not to permit taungya to be cut for planting teak unless the people undertook the responsibility of clearing the plants of weed continuously for the first three years. Clearing was to be paid for separately. No person was permitted to cut fresh taungya for teak planting unless he had complied with the conditions with regard to clearing weeds from older taungya planted to teak.

The problem encountered was the overtopping of teak by bamboos. In four to five years, teak may attain a height of 15—25 feet while bamboos would be 40—60 feet high. If the cutters were made responsible for clearing, they would endeavor to make a good burn of bamboos.

The early plan called for the planting of 1,000 acres a year in reserved forests. It was estimated that these could be done by 330 taungya cutters with families. The cutters lived in 22 hamlets or tays with 15 cutters in each tay. The total population was estimated at 1,200 to 1,800 persons. Under this plan, 10,000 acres could be planted in ten years. However, care had to be taken to have sufficient area of suitable land available and conveniently situated, where the people could raise their paddy with teak for the continuance of these operations and for their maintenance.

#### *Taungya plantations in Arakan:*

Teak does not occur indigenously in Arakan. Original plantings in taungyas must have occurred in 1872—1880.



Among the hill tribes (Kamis, Chins, etc.) of Arakan, there existed a very consistent and deeply embedded prejudice on their part against having anything to do with formation of teak plantations. This hostility was partly based on the fear that the formation of plantations would restrict the areas available for taungyas, and partly on a very distinct dislike in having any interference from forest subordinates or Arakanese officials. The Kamis and Chins (hill tribes) would as a rule prefer to earn Rs. 10 by a really hard month's work on their own than to earn Rs. 30 by working for the Government under subordinate's orders.

It has been the experience here of having very meager results on very high expenditures on the formation of taungya teak plantations. Weeding was done by women folks who could not recognize teak seedlings from other weeds and as a result many plants were cut down.

A taungya cutter usually preferred a bamboo forest; usually he had neither the energy nor the implements to clear an area properly of large trees. In the case of some tribes, the choosing of the side of his taungya was attended by some occult rites, which determined whether or not it was to be lucky or not. For example, after having chosen tentatively the site of his taungya, he returned home and slept on the matter. If he should perchance dream of tigers, elephants, dead men, etc., the omens were not propitious as far as that particular site was concerned and he abandoned his intentions to clear such site.

In some cases, taungya cutter cooperated and had shown willingness to have their yas planted if offered some reward.

#### *Recent taungya plantations:*

For many years forest officers looked upon the taungya cutter as an unmitigated curse. It has later been recognized, however, that he could play a useful part, and that, in the taungya cutter, Burma possessed an extremely valuable asset in the regeneration of the forests. All of the teak plantations

in Burma have for many years been made by taungya. The taungya cutter does all the work of cutting, burning, cleaning, etc. for nothing and merely gets a reward at the end of the season for the live trees in his ya.

Taungya plantation procedure depends on getting the cultivator to plant or sow a new forest crop with his food crop so that when he moves out useful trees, and not weeds restock the area. The system converts the existing miscellaneous worthless forests into valuable forests. Taungya plantation varies with families—the area ranging from one to five acres. The advantages of taungya plantation are as follows:

- a. It gets over labor difficulties;
- b. It is cheaper from financial point of view; and
- c. It tends to bring about cordial relationships between the Forest Department and the village folks.

As stated elsewhere in this paper, the practice of shifting cultivation is deemed a privilege. It is subject to cancellation if the permittee omits for a continuous period of exceeding five years to practice such cultivation, either himself or by some member of his family, and if such person has not during such period been engaged in the cultivation of taungya plantation in reserved forests on behalf of the Government. An example of this was the cancellation of taungya rights granted to 50 villagers in Ngamin Reserve in 1919 as they had not been exercised. Another instance was in North Zamayi Reserve where in 1923 taungya rights granted to 50 villagers were also cancelled due to non-use.

As of March 31, 1923, there were carried in the books of the Forest Department 98,840 acres of taungya plantations with an average cost of about Rs. 24 per acre. In 1940, plantations have been classified as "old" or "modern" according to existence of accurate records of expenditure and revenue. No particular date could be used as the dividing line between "old" and "modern"

plantations, as Circles differed greatly in the possession of accurate data. Hlaing Circle was able to adopt 1918 as the first year of "modern" plantations, and Sittang and Maritime Circles, 1921; but Northern and Chindwin Circles could not fix earlier dates than 1935 and 1937 respectively.

In 1940, after writing off areas considered as failures as well as revision and recomputation of areas, there were in record 53,168 acres of "modern" plantations and 83,341 acres of "old" plantations. The average cost of the total area of 136,509 acres was Rs. 32 per acre.

#### *Forest Villages:*

It is reported that J. W. A. Grieve, a Conservator, did remarkable job in establishing forest villages, in which it was hoped to find solution of two vexed questions of how to secure adequate labor supply, and what to do with the taungya cutter.

The definition of a forest village was somewhat enlarged by the decision of the Government in 1924-1925 to grade certain villages which have taungya privileges in reserved forests as forest villages for purposes of administrative control. This decision was made in order to allow the control of these villages through the medium of the Forest Department. A forest village proper was a village established by mutual agreement between each individual villager and the Forest Department with the object of undertaking planting operations or otherwise affording a labor supply.

In 1927 forest villages were classified into three categories; namely. "plantation villages" primarily engaged on planting forest crops in connection with shifting cultivation, "labour villages" to supply workmen for any other operation, and "enclave villages" which had no obligation to work with the forest department. In 1928 there were 149 forest villages, consisting of 68 plantation, 48 labor, and 33 enclave villages.

In 1930 there were 38 enclave villages all located in Hlaing Circle. It was reported that the position of these villages was most

unsatisfactory. The majority of them were inhabited by Karens, the descendants of those who were given rights for taungya cutting in certain areas at the original settlement of the reserves. The right was given in general terms to the Karens of the Pegu Yoma and it was hoped that they would form a useful labor supply. With the exception of one village, none of the Karens have been successfully employed on plantation work. Some had taken to permanent cultivation. Areas for permanent cultivation were for definite location and the Karens increased the areas under permanent cultivation without permission. The areas shown as cultivated were actually less than half the area under cultivation, thereby reducing the area necessary for a continuation of taungya cutting.

In 1929, under Circular No. 13 of the Chief Conservator, a policy was laid down allowing 250 acres for each household still practicing taungya cutting and for the transfer of the Karens to permanent cultivation in the plains with suitable compensation. The offer to transfer did not receive favorable reaction and the Karens' alternative proposals as regards compensation being extortionate showed their unwillingness to leave the areas. Nevertheless, the re-settlement of the Karens on the basis of 250 acres for each taungya cutting household, allowed considerable areas of valuable teak forest being resumed.

In 1931, areas under permanent cultivation were surveyed as well as those areas suitable for permanent cultivation. The purpose was to encourage permanent cultivation and to restrict unregulated taungya cutting inside the reserves. In that year there were 10,332 acres permanently cultivated inside the reserved forests.

It was reported in 1935 that the position with regard to Karen Villages in enclaves in the Pegu Yoma reserves was still far from satisfactory. At the original settlement, very large areas were set aside within reserved forests for the practice of taungya cutting by the Karen inhabitants. These Karen

areas, as they were called, contained some of the best forest soils in the reserves and some of the finest teak forests. Assuming a liberal annual cutting area of six to eight acres and a reasonable margin for unsuitable soils, an allowance of 250 acres per household must be considered an adequate allotment as the taungya rotation does not exceed 15 to 20 years.

Within seven Divisions inside Pegu Yoma Reserves, there were in 1935, 1,130 taungya cutters and the area assigned under the old settlement were 620,381 acres. On the basis of 250 acres per cutter, the area required should only be 282,500 acres or an excess of 337,881 acres.

The population of the Karen areas has not appreciably increased since the settlement of the reserves, rather the contrary. The areas containing teak were not available for cutting as under the privileges for taungya cutting granted at settlement, no teak over one cubit in girth at three feet from the ground may be cut or injured from fire. Cultivation was confined to secondary growth on areas previously cut and the reduction of areas so as to exclude from the Karen areas the forests containing good teak would cause little, if any, hardship to the Karen inhabitants. On the contrary, once the Karen areas were reduced to reasonable limits action could be taken to eradicate all teak in them so that the Karens would be under fewer restrictions, while steps could be taken to place at their disposal areas suitable for permanent cultivation.

There were in 1940, 233 forest villages consisting of 42 plantation, 58 labor and 133 enclave villages. During the year 14,610 acres were under permanent cultivation. Areas under permanent cultivation inside the reserves had not increased considerably since 1925 which were 10,666 acres; 10,687 acres in 1930; 11,485 acres in 1935; 13,762 acres in 1937; and 14,833 acres in 1939.

#### *Recent policy on taungya plantation:*

It was recognized as early as 1926 that the policy so enthusiastically inaugurated in

1918 of creating large areas of artificially produced crops was by no means a safe one. The factor of disease was a very formidable one and its existence was only too apparent. Teak was being attacked by wood-boring insects.

It was also recognized that artificial regeneration was the quickest and surest method of getting a crop on the ground. In many cases, for example, heavy bamboo forest, it was the only economical method. Where the extraction demand for timber exceeded the supply available in the natural forest there was no reasonable alternative to artificial regeneration and the risk of disease had to be faced. Where however the demand was light, the same reason did not exist and regeneration should go slow to avoid sacrifice.

Besides, it was becoming axiomatic that artificially created crops required continual attention up to the tenth year and thereafter clearings and thinnings every five years for at least the first half of the rotation if not throughout the rotation. In addition it was found that attack by beehole borer was much heavier in the case of teak trees grown in plantations than in natural forest. As teak plantations were made mainly as a commercial proposition, with the object of growing teak for export, the Government must be certain that growing such plantation would be a financial success. It was therefore necessary to consider the question of the advisability of discontinuing making any further teak plantations on the ground that such plantations could not produce timber of the same quality as that produced in natural forest and also on the ground that it was doubtful whether such plantations would prove a financial success.

The question of future policy with regard to plantations in Burma was discussed at a conference of Conservators some time in 1933-1934. It was the opinion of the Chief Conservator at the time that making any more plantations was financially and silviculturally unsound. However, maintenance

of existing plantations had to be carried on and limited plantings would be done in a smaller scale in suitable areas.

The controversy on the plantation question was resolved by a statement of policy enunciated by the Government. This policy ruled that in view of the speculative nature of the investment and the long rotation necessary to obtain timber of the quality required, further planting of teak for export should cease and at the same time advocated increased attention be paid to natural regeneration. Planting for supply of the internal demands of Burma was fully approved provided that planting was mainly confined to teak and pyinkado (valuable hardwood) and in the case of teak, was restricted to localities where the incidence of beehole borer was not heavy. The Forest Department began in 1934-1935 a review of each plantation center in the light of the policy laid down. It was possible to justify continuance of operations at the majority of centers, but each case was dealt with on its own merits.

A number of centers in the zone where the incidence of borer was heavy have been given up, but efforts were made to redistribute centers and ensured that they were situated only in the localities best suited for growth of the produce required.

The policy of 1934 for the establishment of plantations was revised in 1935 in the following terms:

"Government consider that planting on the long rotation necessary to produce teak timber of a size and specification suitable for export is too speculative a policy to be justified on any ground and that it certainly cannot be justified on economic grounds. Planting, or any other form of production for export trade must be regarded solely as a business undertaking and the assurance of a profit is essential. In view of the long term investment involved, of the risk of damage by natural enemies attendant on the planting of large areas of pure forest, especially with a species such as teak which in a natural state

grows in a mixed crop and of the increasing menace by substitutes, it is considered that this desideratum cannot be fulfilled. It follows, therefore, that the policy of planting teak for export should be abandoned and Government have decided that the work of forming such plantations shall be closed down gradually."

In 1938, the Government confirmed the 1934 policy regarding plantations of teak for export, namely, that such planting should be gradually closed down to end in 1938-1939. The 1934 policy regarding maintenance of existing plantation was however modified. The Forest Department was formerly ordered to examine the existing plantations on their merits with a view either to their maintenance on the usual lines or complete cessation of protection and tending at the earliest possible date. It has been accepted that all reasonably successful plantations should be maintained. It was stipulated that a review should be made from time to time to see that only plantations which were proving to be sound economic proposition were maintained.

The aim of the Government to provide for internal demand for teak and pyinkado timber as well as firewood by planting within reasonable access of the more populous centers were confirmed. For this purpose, an annual limit of 1,500 acres of new plantations for the period 1939 to 1943 was fixed, the bulk of these to be for village supply and the balance for commercial sawing timber for use in the country.

As a result of the policy pursued in limiting the areas planted to teak for export, a gradual reduction of area planted was made. During the period from 1924-'25 to 1928-'29, there were planted an annual average of 3,660 acres; 2,795 acres annually for 1920-'30 to 1933-'34; 1,729 acres yearly for 1934-'35 to 1938-'39; and 1,448 acres in 1939-1940.

#### *Present policy:*

The Forest Department of the Union of Burma is pursuing the same policy enuncia-

ted in 1935—that of limiting regeneration of the forests by taungya plantation to local supply areas. The remaining forests are to be regenerated naturally. Improvement fellings in favor of teak and other valuable species are quite important operations. As a general rule, improvement fellings follows extraction and cover the whole area once in a girdling cycle.

*Observation:*

It appears that in Burma a practical solution has been evolved at least in restricting the spread of shifting cultivation in reserved forests. Under adequate supervision, taungya cultivation may be confined in definite areas so that encroachment of valuable teak forests has been brought down very considerably.

Permanent cultivation has been encouraged as well as settlement in the plains. A system of control over the population in forest reserves through the establishment of forest villages seems to be workable—to furnish steady source of labor for forest work and for effective control of the activities of those merely engaged in shifting cultivation for their livelihood.

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**THE END**