

## **Ecological Factors Affecting Taungya Farmers Behavior in Teak Plantation Projects: A Case Study in Bago Range, Union of Myanmar**

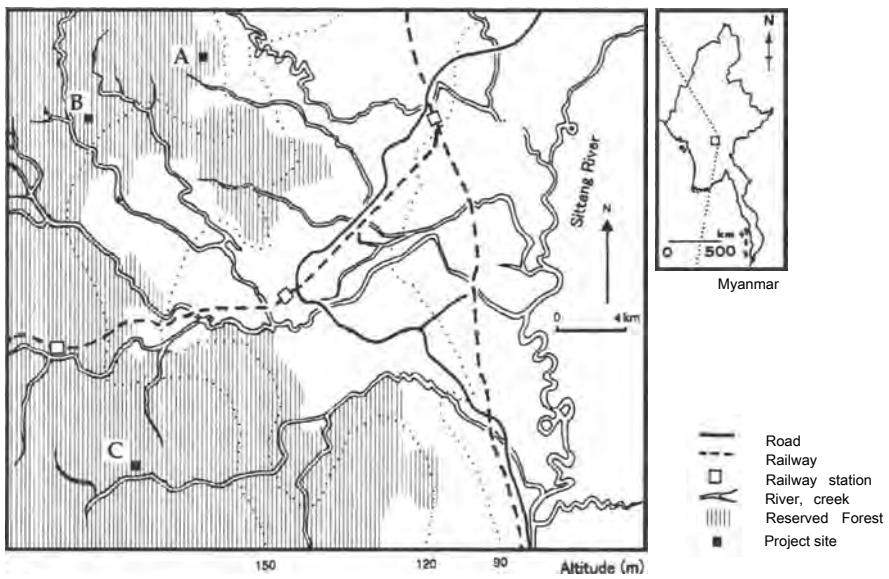
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**ABSTRACT** Taungya system that originally started in 19th century British Burma is now applied in many countries to serve as a tool for reforestation of degraded areas. Understanding the behavior of taungya farmers is crucial for better management of taungya plantation projects but so far little research has been conducted on this subject. Through a case study in the Bago Range of Myanmar, this paper argues that ecological factors and the Burmans' customary land tenure were affecting the taungya farmers attitude towards the project. In the Reserved Forests (RF) there are cultivators who live on agriculture utilizing lowlands as well as uplands. Some of these cultivators were recruited by the Forest Department for the project, but at the same time the project itself was distributing taungya farmers as new cultivators in the RF, since the lowland was not involved in the project. Through this procedure the department was achieving plantation targets in remote areas, and virtually demarcating the boundary of the RF. However, the recruitment of cultivators is uncertain, and the lowlands escape from forest legislation. The cultivators are granted no legal right to live in the RF and they receive little administrative support from the government. Therefore, to ascertain sustainable man-made forest management, more investment in forest administration and social welfare might be required, and the department may face the necessity of seeking a way to accommodate more funding.

**Key words:** *Tectona grandis* / taungya / Myanmar / Burmans / lowland

Today, taungya system is applied in many countries to serve as a tool for reforestation. There are various versions and definitions of this system [Nair, 1993], though one significant characteristic in common is that ' it involves intercropping of agricultural crops at the early stage of the plantation' [Masuda, 1993: 145]. Taungya system originated in 19th century Burma who was under British colonial rule at that time <sup>1)</sup>. The object of implementing the system was mainly in the interest of forest administration, meaning that the government, the manager of the forests, intended to control shifting cultivation, as well as to reforest the degraded areas in government-managed forests, the so called Reserved Forests (hereafter RF) [Brandis, 1860. Brandis, 1896. Bryant, 1997]. At present, taungya system is classified as a typical variation of agroforestry, and used for wider interests [Lowe, 1987. Corvanich, 1974. Boonkird, Fernandes and Nair, 1984]. However, apart from their contribution to forest vegetation, there has been a long term debate on taungya system whether it benefited the

1) The Union of Burma changed her name to The Union of Myanmar in 1989. In this paper, Burma will be used for the period before 1988 and Myanmar for the years after 1989.



**Fig. 1. Research sites (1995).**

Source: Goverment of Burma (1945), one inch map 94A1 and 94A2.

people or the forests since the government has been administrating the forests in these areas historically [Vergara, 1985: 27. King, 1989: 5]. Anyhow, to manage the system in stability, it has to have mutual benefit for the manager and the taungya farmer.

Although the word taungya is well known, merely 5% of the total number of researches on agroforestry deals with taungya system, and that on socio-economic aspects are limited to less than 1% of the total [Mercer & Miller, 1998]. The focus has been on technical aspects, and only since the 1990's, the importance of land tenure, participants motivation, etc., has been recognized and research in socio-economic fields have become active [Jordan, 1992].

This paper aims to add information about ecological factors that cannot be neglected in recruiting taungya farmers through a case study in Myanmar. Focus will be put on remote areas where labor is usually difficult to be supplied especially when population pressure is relatively low. These areas are also far from the political center and customary land tenure is generally still dominant. Local people who in usual belong to an ethnic group, in a certain ecological environment, have developed customary land tenure through the long history of land use.

## METHOD

### Overview

After giving brief information about the research site in this section, the behavior of the taungya farmers will be described, and then the factors influencing their behavior will be analyzed. Lastly, the potential and constraints of taungya as a sustainable forest plantation system will be discussed. The description is limited to the research site since there are not enough references to mention about the

whole country. Another limitation is that general villages that are not under the administration of the Forest Department could not be visited, and the interviews were held only at taungya projects sites.

Interviews using a uniform questionnaire were carried out twice in the selected sites. The questions were mainly on the household's income, expenditure, and life history. Only the household heads were interviewed, since they are who contract with the Forest Department and presumably are the most conversant in the project. The total number of the taungya farmers interviewed was 103.

### **Research site**

The research site is on the eastern slope of Bago Range which is located at the middle of Myanmar (Figure 1)<sup>2)</sup>. Bago Range is 450km long from north to south, and 80km wide from east to west. It lies between Yangon and Mandalay, the two main cities of Myanmar. The maximum altitude is approximately 800 meters and it is not so difficult to cross the mountains. Therefore, many people, such as the Karen have been living in and cultivating the forests since immemorial time.

The topography is undulated due to upheaval. This forms various sizes of lowland, and scatters them all over the forest. The soil is mainly of 'loose, coarse, reddish brown gritty sandstone, and yellowish sandrock, with beds of gravel, and occasionally with partings of shale' [WP Yamethin, 1951: para.12]. The rainy season is from May to October and the annual rainfall is around 1,200 mm. The dominant forest type is mixed deciduous forests which contains economically valuable trees such as teak (*Tectona grandis* Linn.) and other hard woods. Owing to these geographical conditions, the slope, which is well drained, is suitable for growing teak and the lowland that is wet during the rainy season is suitable for paddy.

Three plantation sites were selected according to the distance from the road and the type of available public transportation. People in this district normally walk or use cow / buffalo cart as a mean of transportation. Reserve A<sup>3)</sup> is only 0.5 km away from the tarmacked road and is the nearest to the Town <sup>4)</sup> . Therefore a temporary forest village was established in 1989 to prevent the taungya farmers from leaving the project to towns or other villages. The other two, Reserve B and Reserve C, are about 8 km away from the road . But in Reserve C, there is a railroad station that is linked to the Town and Mandalay. In Mandalay there are many textile factories, and in another Town, which is on the way, trading of cotton is one of the main economic activities.

## **RESULTS**

### **Outline of taungya plantation projects**

According to the 1974 Constitution, all land including forests belongs to the government [Weller, 1993:107-141]<sup>5)</sup>. Forest-land is under the control of the Forest Department, Ministry of Forestry, and

- 2) On the west side, the impact from the lowland seems to be more strong, and therefore different factors such as change in agricultural policy are sometimes more important in understanding taungya farmers behavior [San Win, 1995], These regional aspects should be taken into consideration when a project is to be implemented.
- 3) The name of the reserve is covered from political and social concern. Same for the other two reserves.
- 4) The population of this Town is approximately 20,000. It is located along the trunk road and main railway of Yangon-Mandalay, and is functioning as a local trading center. Various products from Yangon, Mandalay, the Shan States, and the Bago Range are exchanged here.
- 5) A new constitution for the 1989 government was under discussion at the time of this research, and the 1974 Constitution was still valid.

Table 1. Outline of the taungya plantation project in the research area (1995).

|                                   |   |
|-----------------------------------|---|
| Managerial Organization           | The Forest Department   |
| Main Tree Species                 | <i>Tectona grandis</i>  |
| Main Agricultural Crop            | Upland rice, sesame, ground nut, cotton.                                      |
| Rented Area per<br>Taungya Farmer | 0.8~2.0 ha (2~5 acres)  |
| Intercropping Term                | 1 year (in some cases 2 years)  |
| Spacing of Trees                  | 2.5m X 2.5m (8.5 feet X 8.5 feet), 603 trees per ha                           |
| Method of Planting                | Transplanting seedlings raised in nursery. Payment for plantation operations. |
| Final Harvest                     | Over 80 years   |

Source: Interview

*1) Schedule for the first year*

| Operation                            | Month   |
|--------------------------------------|---------|
| Allocation of plot                   | —       |
| Cutting undergrowth                  | 15 — 15 |
| Cutting trees                        | 16 — 16 |
| Burning                              | 31      |
| Second burning                       | 5 — 15  |
| Making stakes                        | 16 — 30 |
| Staking                              | 16 — 15 |
| Nursery work                         | 1 — 30  |
| Transplanting seedlings              | 15 — 15 |
| First weeding                        | 15 — 31 |
| Second weeding                       | 15 — 15 |
| Third weeding                        | 15 — 15 |
| Planting agricultural crops          | 1 — 15  |
| <b>Harvesting agricultural crops</b> |         |

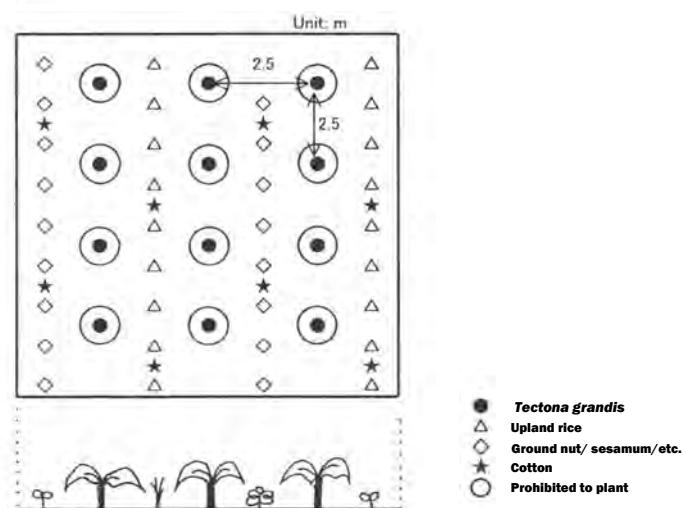
*2) Lay out of a plot*

Fig. 2. Schedule and lay out of a Taungya plantation project in Reserve C (1995).

Source: interview. Note: the numbers in the schedule stands for the date.

is managed principally by the Forestry Act of 1902 [Govt, of Burma, 1961]<sup>6</sup>. There are no statistics showing the plantation area by the type of neither enterprise nor methods. However, nearly the whole area of taungya plantations is assumed to be established by the Forest Department [interview, Feb. 1995: Forest Department].

Table 1 shows the outline of a taungya plantation project in the research area, and Figure 2 is the calendar and layout of that in Reserve C. Shifting cultivation is combined with tree planting. The main tree species is teak while the main agricultural crops that are grown between the trees are upland rice, usually for home consumption, and sesame, corn and cotton, for cash. The size of the plot allotted to one taungya farmer is from 0.8 ha to 2.0 ha, depending on the project size and skill of the taungya farmers. Crops rely on rain, and neither pesticides nor fertilizers are given. The taungya farmers are usually allowed to grow their crops for only one year in the plot.

The taungya farmers will; 1) prepare the ground, i.e. to cut down the vegetation, pile them up and burn them, 2) plant the trees, i.e. to collect bamboo for stakes, to make stakes, to plant seedlings at the stakes, 3) weed the plot three times, for the first year. The Forest Department pays them wages for these operations according to the size of the plot. There are also additional jobs such as watering the seedlings at the nursery. For these works, wages will be paid on daily basis. The rate of wages compared to those paid in the village for agricultural daily labor were approximately half. This discount can be understood as the fee for renting governmental land.

The taungya farmer's agriculture is also simple. The tools such as knives, sickle, plough, etc., that the taungya farmers use are mostly made by themselves or purchased in local markets, and seeds are usually sown directly on the ground or into a hole. Few farmers utilize cows or buffaloes to plough their plot. Under such situation, the yield is easily affected by natural conditions like land fertility and the amount of rainfall. However, the crops harvested from the plot are exempted from governmental purchase<sup>7</sup>.

These wages and preferential terms are functioning as incentives for taungya farmers to participate in the project. But as we shall see later, the topographical feature was also an important factor determining their attitude towards taungya in this area.

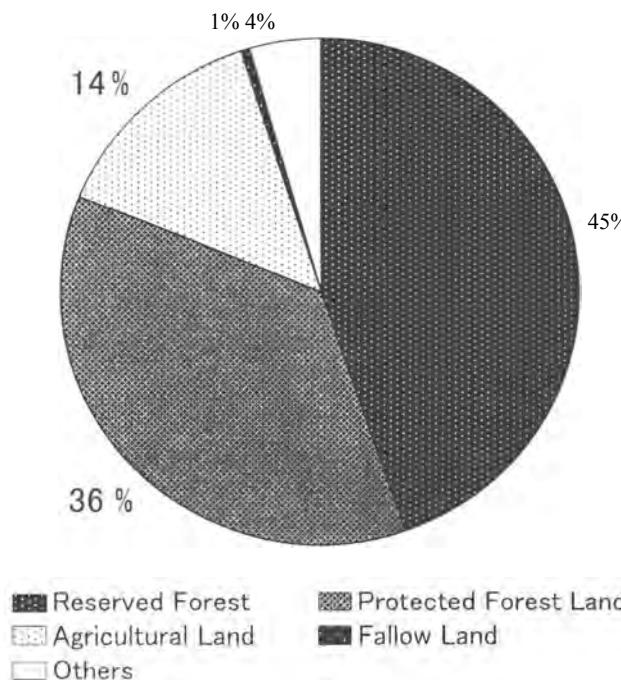
### **Degradation of Reserved Forest**

The reason why the Forest Department implements taungya teak plantation is mostly because forest resources, especially teak, are diminishing in the RF.

Figure 2 shows the area by land type according to statistical data of the local office [Govt, of

6) The 1902 Forest Act was amended in 1948 but the contents of the sections are principally the same. Although a new Forest Law was established in 1992, it was not in effect until December 1995, since the rules and regulations were not yet enacted [personal communication]. Regarding the ownership of forests, the 1992 Forest Law basically followed the previous act that declared all forests to be governmental land [section 2-(a)(b)(c)(d)].

7) Since 1964, the government held a policy to purchase part of the agricultural produce at a price that the government fixed, for export and distribution to civil servants. The crops consisted of stable food and cash crops, and at one time it was applied to 21 types of crops [Takahashi, 1992: 109]. The purchasing price dropped significantly compared to the market price [interview: taungya farmer, May 1995], and since the amount to be sold increased, in the 1980's it became a social problem [Takahashi, op.cit.: 6]. Therefore after several steps, finally in 1988, the government stopped purchasing the crops to improve the situation. In the research site, the government was now encouraging the farmers who cultivate paddy, sugar cane and cotton, to sell a part of their harvest to her voluntarily [interview: cultivator, March 1996].



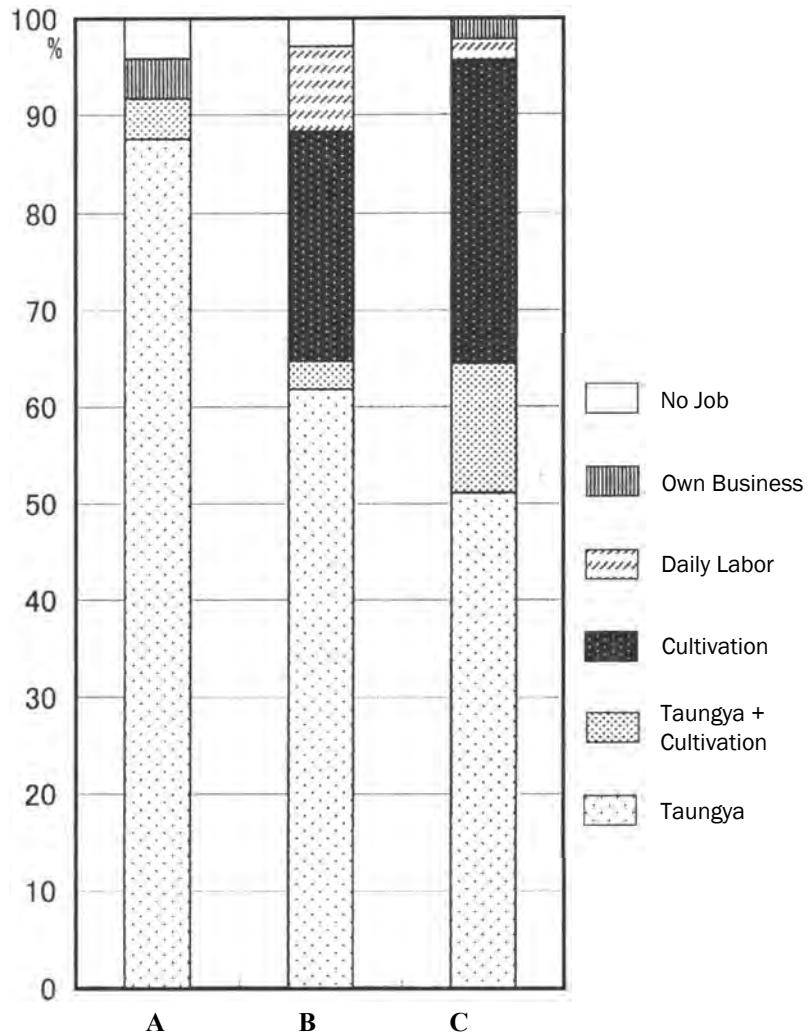
**Fig. 3. Area by land type in the townships that research sites are located.** Source: Goverment of Myanmar (1993,1994)

Myanmar, 1993. Govt, of Myanmar, 1994], The main land type is forest-land. This covers approximately 70% of the total area.

Forest-land is classified into two categories under the Forest Act [Govt, of Burma, 1961]. One is RF which is declared by the government, and then demarcated on the land as well as on the map. These forests are managed to remain as a forest permanently. In law, people's access and use are prohibited in these forests, but in fact the people in and around the RF are utilizing the forests. The research area was first demarcated as a RF in 1891. The other category is called Public Forest Land (hereafter PFL). This type is a land with no clear purpose and temporarily classified as forest-land. It will be cancelled if necessity arises to transform the land into another usage such as agriculture or housing. The large amount of forest-land reflects the importance of forests as a source of valuable teak and other hard woods. These have been one of the main commodities for export, and have contributed to the national economy.

In contrast to the vast area of forest-land, there is only 15% of agricultural land, and only 1% of fallow land. The population density is around 72 people per square km, which 90% of the population are estimated to live in the rural area practicing agriculture [Govt. of Myanmar, 1993. Govt. of Myanmar, 1994]. Since 'free land' exists in the form of forest-land, the pressure to promote more intensive agriculture is low. As population grows and social conditions change, farmers clear the forests for new fields, instead of intensifying their land use. As they have no legal recognition of RF and PFL, they clear both types of forests. This is causing trouble to the Forest Department whose main economic activities are carried out in the RFs.

Under such a situation, the Forest Department is applying taungya to regenerate degraded areas in the RF and also to demarcate the boundaries by planting trees. The reason for applying Taungya,



**Fig. 4. Taungya famers' way of living in the previous year in the research sites (1995).**

Source: interview.

explained by the Forest Department, is that because under this method the department can expect a higher survival rate of trees and lower cost for planting, compared to direct employment of plantation labor [interview: Feb.1995]. Though it can be also considered that this is a way to absorb a number of people who are searching for land. Therefore, what kind of people they are, and how the taungya plantation is functioning for them, would be important questions in order to understand the system.

#### Composition of taungya farmers

Figure 4 shows the type of living that the taungya farmers were taking in the previous year to the interview. The main types were taungya, cultivating in the RF and daily labor.

Approximately 60% of the taungya farmers were working at a taungya plantation in the previous

**Table 2.** Way and time of occupation of land in reserved forests: Taungya farmers of research sites (1995).

|                           |                          | Time compared to participation in taungya projects |        |                         |        | Under occupation in 1995 |        |
|---------------------------|--------------------------|--|--------|-------------------------|--------|--------------------------|--------|
| Reserve Way of Occupation | Before<br>Lowland Upland | Simalta-neous                                      |        | After<br>Lowland Upland |        | Lowland                  | Upland |
|                           |                          | Lowland  | Upland | Lowland                 | Upland |                          |        |
| A Clear                   | 0 0                      | 0  |        | 1 0                     |        | 1                        | 0      |
| B Clear                   | 6 7                      | 0  |        | 0 0                     |        | 6                        | 0      |
| Rent                      | 0 0                      | 0  |        | 1 1                     |        | 1                        | 1      |
| C Clear                   | 0 2                      | 0  |        | 6 13                    |        | 5                        | 1      |
| Total                     | 6 9                      | 0  |        | 8 14                    |        | 13                       | 2      |

Source: Interview

Note: Three cases in which data was not available (2 in reserve B and 1 in reserve C) are omitted.

year, too. This forms the largest source of labor supply for the project. The next portion consisted of farmers who were cultivating the RF without any official permission. These people made about 20% of the total composition and were also an important source for the project.

The share of each type of livelihoods showed a difference between locations. In all reserves, the largest portion was taungya farmers. However, in remote areas, Reserve B and Reserve C, there was higher percentage of 'cultivators'. This consisted 24 to 31 percent of the total, respectively.

This difference seems to reflect how much land is still available to clear and occupy in the project site. Like in Reserve A, villagers surrounding the project site already occupy the lowlands that are omitted from tree planting, and there is no more land that the taungya farmers can clear. Approximately 50% of the taungya farmers in Reserve A were participating in taungya plantation projects since their father's generation. This high percentage of the second generation indicates that there is small possibility for the taungya farmer to find another way of living including 'private' cultivation in the RFs or outside, except for taungya projects. As for Reserve B and Reserve C, there were less numbers of second generation taungya farmers. This is considered to be because there is still some unoccupied land in these remote areas, and also the administrative control of the Forest Department was not effective until the plantation project started.

#### Occupation of land in RFs

As seen above, the cultivators were an important source of labor for the department in remote areas. Therefore, here, we will examine how they are involved in the project. The way of obtaining the land in the forests reflects their basic concept of land tenure and ownership.

Table 2 shows the time and way of occupying the land in the RF and the situation in 1995. The land types were lowland and upland. The former were mainly used for growing paddy and the latter for upland crops.

In Reserve B and Reserve C, except for one cultivator who rented the land free from a villager, all of the cultivators started to occupy the land by clearing the forest. This is an activity which has been carried out by the Burmans since they migrated from the north, and is called *dama-u-gya* [Furnivall, 1957: 50. Saito, 1985] <sup>8)</sup>. *Dama-u-gya* literally means 'big-knife first cast'. Furnivall explains that '

8) Similar customs are known in other countries, such as *cap-coong* in Thailand that dates from ancient times, when population density in terms of cultivated land was low. [Yano, 1968: 856].

(u)nder the Burmese rule any person had been allowed to clear and cultivate any land to which no previous occupant laid claim. Such land, held by the right of having been the first to clear it, was known as dama-u-gya.' [Furnivall, 1957: 50].

Another word reflecting the Burmans' concept of land tenure is Bobabaing which stands for 'grandmother grandfather ownership<sup>1</sup>. It is explained as '(w)here the same man continues in occupation, it passed on to his descendants and became bo-ba-baing (ancestral property) land' [Furnivall, 1956: 110]. These lands were not the same as the land with private ownership as in the 20th century western legal system, since 'customarily, if a man left land unoccupied for twelve years, another might take it up.', and this was called thuwin-ngathwet (he comes in, I go out) [Furnivall, 1956: 109],

Where transportation is limited and governmental control is just partially effective, these customs are still dominant. Even today, some of the taungya farmers use the terms to explain how they obtained their land in the RF. None of the cultivators could correctly define a RF, and in some cases their reply was that a RF is 'a land which is planted with trees'. These facts suggests that they, especially in remote areas, are still not aware of the government's legal system, and besides that the land classification is not recognized by the cultivators, and further more that the migration from one place to another is not institutionally prevented.

A difference by reserves was seen in the time of occupation and type of land. In Reserve B, except for one, all of the cultivators cleared and occupied the land before they started to participate in the project. The land type was lowland as well as upland. They had been living in the forests for a relatively long time, the maximum being 20 years, which is though after the demarcation of the RF. These people still used the lowland even after they had started to participate in the project. Six cultivators who held paddy field were not intending to participate in the project for 1996, since they were 'too busy taking care of their paddy field'.

On the other hand, in Reserve C, the cultivators cleared and occupied the land after they started to participate in the project, and the land type was mainly upland. This suggests that the project itself is functioning as an opportunity to find 'empty' land for the taungya farmers, and to distribute them in the RF. The reason why lowland is less seen in Reserve C is probably because the weather is dryer than Reserve B. However, this dry condition favors the growth of cotton. There were in total six cultivators who were still using the land after participating in the project, among them five were occupying lowland as well. Some of these five farmers seemed to settle down in that area as 'ordinary farmers'.

The Forest Department lets the taungya farmers cultivate lowlands since they are not suitable to plant teak trees. The taungya farmers keep on cultivating the lowlands as they expect to get higher and more stable yield of rice. But as it is examined in the next section, high yield in the lowlands is not always the rule, and this output by land types seemed to affect the attitude of the taungya farmers.

#### **Output by land types**

Table 3 shows the output by land types, i.e. taungya plot, lowland and upland. Here, in each land category the output is represented by the average value per hectare. The total value was calculated assuming that the whole amount of the yield of the main crops was sold at local market price. Regarding to the plantation plot, an assumption was made that half of the land was used for growing agricultural crops.

**Table 3.** Estimated output by land types in the research sites (1995).

| Reserve Type of Land | Type of Crop  |         |            |         | Total value | Average Value<br>(kyats/ha) | Unit: kyats |
|----------------------|---------------|---------|------------|---------|-------------|-----------------------------|-------------|
|                      | Unhusked rice | Sesame  | Ground nut | Cotton  |             |                             |             |
| A                    | Taungya plot  | 60,218  | 175,519    | 20,647  | -           | 256,383                     | 17,207      |
|                      | Lowland       | 22,483  | -          | -       | -           | 22,483                      | 37,471      |
| B                    | Taungya plot  | 52,875  | 129,145    | 44,438  | -           | 226,459                     | 8,951       |
|                      | Lowland       | 232,920 | 1,000      | 115,484 | -           | 349,405                     | 35,654      |
|                      | Upland        | 8,453   | 87,010     | 75,940  | -           | 171,402                     | 15,035      |
| C                    | Taungya plot  | 257,202 | 90,536     | 289,059 | 481,556     | 1,118,354                   | 28,566      |
|                      | Lowland       | 87,592  | 4,001      | -       | -           | 91,593                      | 20,817      |
|                      | Upland        | 95,865  | 28,655     | 107,260 | 62,513      | 294,293                     | 12,685      |

Source: Interview

Note: An assumption was made that in taungya plots, half of the ground was utilized for agricultural crops.

Comparing the results, the highest value 37,471 kyats per ha was realized at Reserve A's lowland, followed by the lowland of Reserve B, 35,654 kyats per ha. The third was the taungya plot at Reserve C which was 28,566 kyats.

This result points out the fact that the output depends on the type of crop. In general, the lowland has a comparatively high output and this makes the taungya farmers to seek for unoccupied lowlands in the forest and leads them to stay in the RF even after the plantation project has moved to a new site. But in regard to Reserve C, there was a specific condition to raise the average value in the taungya plots. Cotton that grows best in the taungya plot, collected a good price, since this area was tied to the market in other towns by the railway. This made the output higher than the lowland. In such a case, taungya farmers might prefer to continue participating in the project unless they find an 'empty' lowland where they can settle down. Most of the taungya farmers wished to obtain a piece of lowland, but taungya farmers need to move on if they keep on participating. Thus, it can be presumed that the taungya farmer will decide whether he / she should participate in the project, not only for economic reasons but also for social reasons.

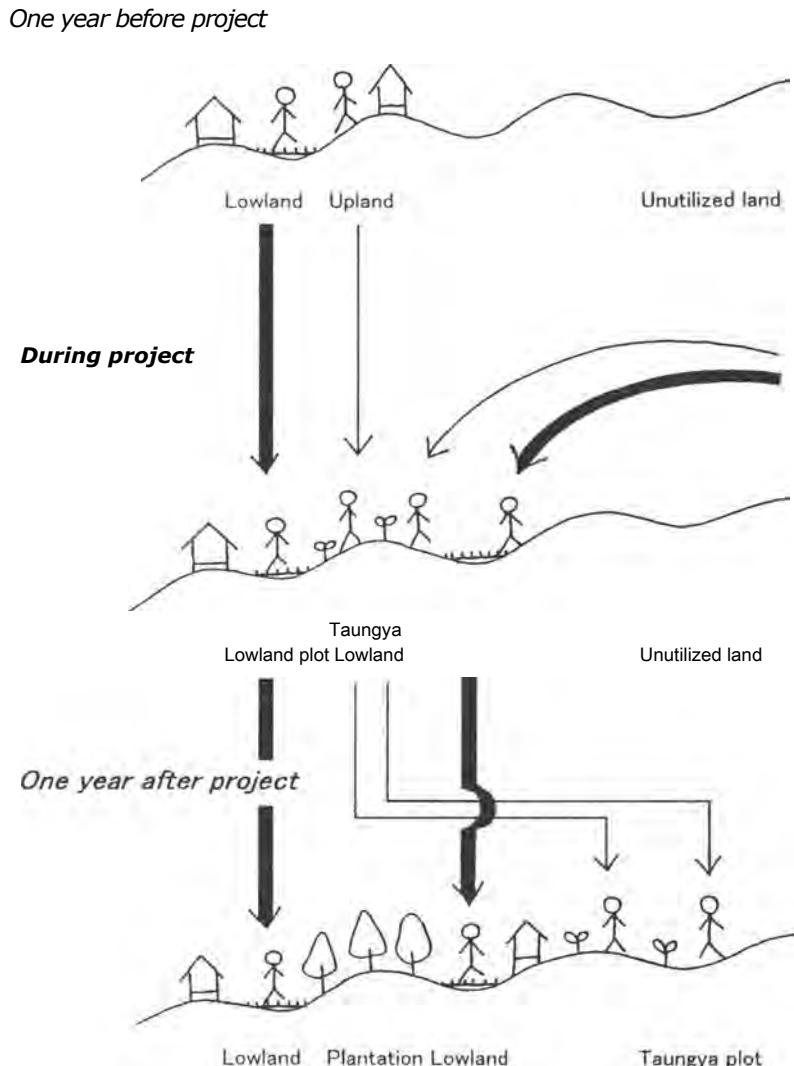
## CONCLUSION AND DISCUSSION

### Ecological factors affecting taungya teak plantations

As examined above, the ecological factor such as the topography and water condition that formed patches of lowlands in the forests, were important factors affecting the taungya farmers' attitude towards the project. Additionally, their customary land tenure system was supporting their attitude to occupy lowlands.

Figure 5 describes the process of the project. The first line shows the situation in the year before the project. The second, during the project, and the third, the year after the project. On one hand the cultivators were absorbed into the project, but on the other the project itself was creating new cultivators.

In the year prior to the project, there was some land in the RF that was not yet planted, and some land, lowland as well as upland, that farmers were living on and cultivating their own crops. They normally did not work regularly for taungya projects.



**Fig. 5. Procedure of taungya plantation project in reserve B and C (1995).**  
Source: interview.

The project commences in this area and some of the cultivators start working in the project as taungya farmers, or else migrate to other places. Uplands will become under control of the Forest Department. Cultivators who only occupied such land will lose their way of living. However, the lowland on which teak cannot grow will be omitted from plantation. Those who were cultivating lowland will be able to continue their agriculture. Additionally, there are a number of taungya farmers who migrate to this area with the project. Though the detail is not mentioned in this paper, a large portion of these people was born in the dry zone where the annual precipitation ranges from 600 to 900 mm. It is suspected that they left their villages because of crop failure due to the weather and their extensive agricultural technology, and also the migration might be stimulated by their loose land tenure system and social organization. However, more studies will be needed in the village to know

which part of the society left the village and why. A few of these newcomers find a patch of lowland in the project site which is not yet occupied.

After one year of operation, the project shifts to another site. At this time, principally, all of the taungya farmers have to move out of the area. But in fact, those who have been occupying lowlands and those who have newly found a piece of lowland stay in the old project site, while, those who had been prohibited to use the upland follow the project.

In this way taungya plantation has been implemented especially in remote areas, where the cultivators have played an indispensable role in running the project. In Myanmar, taungya seems to have mutual benefits for the Forest Department and the taungya farmers, but as discussed below, a few points might need some improvement to realize better management of man-made forests as well as people's complacency.

#### **The potential and constraints of taungya plantation**

For the Forest Department, taungya plantation has played an important role to reforest degraded areas and also to demarcate the RF. From a forestry point of view, this system has advantages and disadvantages for the Forest Department.

Regarding the advantages, the department will be able to obtain labor for the project even in areas that are hard to access. The department can also fix labor for tending the forests adjacent to or even inside the project site. As far as disadvantages are concerned, it will be difficult to estimate how many cultivators there are in such areas, and this will impede the planning of regular forest management. Further, it will cause confusion to land demarcation. Uplands become RF both nominally and virtually, but lowlands will create a gray zone of forest administration. Therefore, if the population of the cultivators grows, they might clear more RF to support themselves since they do not clearly define RF and PFL. Having such cultivators inside the RF can create risks for sustainable forest management, unless the department gives them appropriate support or / and their agriculture intensifies.

On the farmer side, from the point of social welfare, this system also has some merits and demerits. If the cultivator becomes a taungya farmer and participates in the project, he / she will be able to grow crops in the plot, obtain some wages from planting trees and be provided with preferable terms for their crops. However, they must move yearly to join the project. The taungya farmers' belongings are limited and their lifestyle is durable to mobility at present, but according to the interview, their wish was to settle down and cultivate some lowland. However, staying in the RF is legalized only under the condition of participating in a taungya project. The cultivators' rights to utilize the land are not secured. Additionally, the Forest Act does not oblige the department to supply the cultivators any school, health services, or other social amenities that are usually facilitated in ordinary administrative villages. As the source of information diversifies and cash economy flows into the cultivators life, their desire to change their lifestyle might rise, and the department might need to provide the same services as in the general villages. Therefore, the key for better management may be whether the department can accommodate the capital for the investments, which has been observed to be the bottleneck in some other countries.

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## 谷 祐可子 チーク植林地におけるタウンヤ農民の行動様式に対する生態条件の影響 : ミャンマー連邦バゴー山地を事例として

タウンヤ法は農作物の間作を伴う造林方法であり、19世紀英領ビルマで始まったとされ、現在では荒廃地における造林事業に多数の国々で採用されている。タウンヤ農民の行動を理解することは、タウンヤ法による造林事業をよりよく管理するために重要であるが、これまでタウンヤ農民の行動様式や態度に関する研究は限られていた。本稿では、ミャンマー連邦バゴー山地における事例を通して、生態学的な要因とビルマ人の慣習的な土地制度が、造林プロジェクトに対するタウンヤ農民の態度に影響を及ぼしていたことを論じる。日本における国有林に相当し、法律に基づいた厳重な管理の下におかれるはずのリザーブド・フォレストの中には、山間低地および斜面を利用して農業を営んでいる耕作者がいる。こうした耕作者の何人かは、造林プロジェクトの労働力として森林局に雇用され、造林される斜面での耕作を中止することになるが、他方で同時にこの事業自身がタウンヤ農民に山間低地の利用を黙認することによって彼らを新たな耕作者としてリザーブド・フォレストの中に配置していることが聞き取り調査により明らかになった。耕作者の吸収と創出という過程を通じて、森林局は遠隔地における造林目標を達成し、リザーブド・フォレストの境界を確定してきた。しかしながら、林内の耕作者の採用は不確実であり、山間低地が森林行政から漏れるという事実から計画的な人工林経営は困難であるといえる。さらに耕作者はリザーブド・フォレストの中に住むための法的権利を与えられない上に、教育や医療などの行政的なサポートもほとんど受けられないことから、奥地における潜在的な造林労働力である林内耕作者の生活基盤は不安定であると考えられる。こうした状況の下で、安定した持続的な人工林経営を実現するためには、林野行政および社会福祉への一層の投資が必要となり、森林局は財源を確保するための方策を考える必要があろう。