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MANAGEMENT OF TEAK FORESTS IN THAILAND

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บทคัดย่อ

ป่าสักธรรมชาติเกิดอยู่ในอินเดีย พม่า ไทย ลาว และอินโดนีเซีย ป่าไม้สักของประเทศไทยแต่เดิมเคยมีถึง 170,000 กม.^{2} แต่ในปี 2527 เหลือเพียงประมาณ 25,000 กม.^{2}

ก่อนตั้งกรมป่าไม้ ป่าไม้สักอยู่ในความครอบครองของเจ้านายฝ่ายเหนือ มีการอนุญาตให้แก่เอกชนและบริษัทฝรั่งโดยผู้รับอนุญาตเพียงจ่ายค่าเปิดป่าและค่าตอเป็นการตอบแทน เมื่อรัฐบาลตั้งกรมป่าไม้ขึ้นในปี 2439 ได้เรียกกรรมสิทธิ์เหนือป่าคืนเป็นของรัฐ ได้มีการแบ่งป่าให้เช่าโดยมีข้อกำหนดกฎเกณฑ์รัดกุมมากขึ้น มีการควบคุมกำลังผลิตตามแบบของบรันดิส ใช้รอบตัดฟัน 30 ปี กำหนดขนาดจำกัดของไม้สักให้ตัดฟัน ใช้วนวัฒนวิธีระบบเลือกตัดแบบดัดแปลง

ในปี 2510 แผนการจัดการป่าไม้สักได้รับการปรับปรุงให้ทันสมัยขึ้น มีหน่วยจัดการป่าไม้ 18 หน่วย ในจังหวัดภาคเหนือเป็นผู้รับผิดชอบ ใช้ระบบวนวัฒน์แบบเลือกตัดพร้อมด้วยการตัดไม้บำรุงป่า ในการศึกษานี้ได้อธิบายหลักการของวิธีบรันดิสไว้ด้วย ในระยะหลังกรมป่าไม้ได้ทดลองใช้วิธีตัดหมดแล้วปลูกทดแทนในที่หลายแห่ง รายงานจากประเทศข้างเคียงมีการใช้ระบบยูนิฟอร์ม แต่ยังไม่มีข้อสรุปที่แน่นอน

เนื่องจากป่าไม้สักของไทยได้ถูกทำลายและเสื่อมโทรมลงตามลำดับ และไม่อาจพึ่งพาการนำเข้าจากประเทศเพื่อนบ้านต่อไปได้ จึงจำเป็นต้องรีบจัดการป่าไม้สักโดยเลือกระดับของวัตถุประสงค์ในการจัดการ ซึ่งมีอยู่สามระดับว่าจะเลือกระดับใด คือ หนึ่งรักษาสภาพเดิม ใช้วิธีเลือกตัด พร้อมด้วยการตัดไม้บำรุงป่าได้ผลผลิตต่ำ สองเปลี่ยนแปลงป่าบางส่วนโดยปลูกสวนป่า, ใช้ระบบตัดไว้ร่ม, ส่วนที่เหลือคงใช้ระบบเลือกตัด ผลผลิตปานกลาง และสามระดับเข้มข้น คือพิจารณาปลูกสวนป่าในบางส่วนประกอบกับใช้วิธีการทางวนวัฒน์ เช่น เลือกตัดเป็นหมู่, ตัดไว้ร่ม, หรือกำหนดการตัดฟันโดยพื้นที่-ปริมาตร

ABSTRACT

Natural occurrence of teak is found in India, Myanmar, Thailand, Lao and Indonesia. In the olden days, teak forests of Thailand covered 170,000 km,^{2} but in 1984, shrunk to about 25,000 km.^{2}

Before Royal Forest Department was established, teak forest belonged to the princes of the North. Teak leases were granted to individuals, private and European companies. Grantees paid only bidding fees and stump fees. In 1896, Royal Forest Department was established; the teak forests were revoked as public domain. Teak forests were leased with more proper rules and regulations, employing Brandis yield regulation method. Cutting cycle was 30 years, minimum girth limit was prescribed and Modified Selection Silvicultural System was used.

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In 1967, teak forest management plans were revised and updated. Eighteen forest management units in the North, responsible for management works, were practicing Selection cum Improvement Felling. This study includes the principles of Brandis method. Later, Royal Forest Department experimented with clear cutting system with artificial regeneration (reforestation) in some places. Some neighboring countries report application of Uniform System, but there is no evident conclusion.

Because teak forests are deteriorated gradually, coupled with no more reliance on imports, it is urgent to manage the teak forests by choosing among three levels of objectives, viz., status quo management, use Selection cum Improvement Felling, low yield; convert some areas in plantation, use of shelterwood system, the rest in selection system, medium yield; and intensive management, deliberate plantations plus intensive silvicultural practices such as group selection, shelterwood system, or area-volume allotment, high cost but high yield.

INTRODUCTION

Teak owes its importance and value not so much to its aggressive silvical characteristics, hardiness and good growth, as to the desirable properties of its timber, such as strentgh, durability, stability, noncoroding properties and ease of working and seasoning. Teak is not only several times more valuable than the best of its hardwood associates but its cost of extraction, ton for ton, is considerably cheaper (Haig, Huberman and Aung Din, 1958).

Teak is a tropical deciduous tree species and its natural occurrence is limited only to India, Myanma, Thailand, Loas and Indonesia (mainly in Java). Based on the discontinuous distribution, three major sources of the species fall on the Indian Peninsula, the Myanma-Thai-Laos area and the Indonesian area (Kaosa-ard, 1986). Cambodia is also reported as its natural occurrence (Haig, Huberman and Aung Din, 1958).

OCCURRENCE IN THAILAND

According to Kaosa-ard (1986), teak occurred naturally throughout the northern part of the country covering an area of 170,000 km^2 (in the old days). RFD statistics showed that the total area of the remaining teak forest in 1984 was about 25,000 km.^{2}

Report by Mahaphol (1954) states that teak is found extensively all over the North and extending, in interrupted stretches down South along the west border into the provinces of Nakhon Sawan, Uthai Thani, Kanchanaburi and as far down to central part as Phetchabun. To the Northeast it grows in a few small detatched areas in the provinces of Khon Kaen, Nong Khai and Nakhon Phanom. The main teak zone, however, is confined to the hilly or mountainous region of the North in province of Mae Hong Son, Chiang Mai, Chiang Rai, Lamphun, Lampang, Phrae, Nan, Tak, Sukhothai, Uttaradit, Phitsanulok, Phetchabun and Kamphaeng Phet. It was assumed at that time that the teak bearing area would be 23,243 km^2 compared with report by Banijbhatana [1957] estimated the total area of teak forests in Thailand about 30,000 km.^{2} See Figure 1.

MANAGEMENT BEFORE THE ESTABLISHMENT OF RFD

Prior to the establishment of the Royal Forest Department in B.E. 2439 (1896), teak forests in the North were regarded as private properties of the local Chiefs or

Chows. Any person who wished to exploit teak forests had to obtain permits from the Chief. In exchange for this right, certain fees called "stump fees" had to be paid to the Chief. Admittedly, during the initial period there was no control on the working of teak, either on the locality of cutting or the girth limits of teak to be removed at all (Banijbatana, 1962).

The Thai (Siam) government in 1874 tried to exercise some control by promulgating a law requiring that any agreement between the local Chiefs and foreigners could not be valid unless they are duly ratified by the government. Closer control on the working of teak forests was attempted further by including in the Treaty A.D. 1893 between Thailand (Siam) and Great Britain prohibiting British subjects, most of which were Shans and Burmans, from working teak forests without registered permits. The local Chiefs could not issue permit to more than one person to work on the same tract of forest. However, bidding from the British and foreign companies to obtain the working right was more competitive, disputes and complaints were brought to the government to mediate and settle the matter (Banijbatana, 1962).

As reported by Mr. Slade in 1895, the teak lease contracts used at that time covered a period of 6 years, girth limit was 6 kam (around 213 cms), if the leasee felled one teak tree, he must replant with one young teak tree. Other regulations such as pevention of fire damage to teak trees, prohibition of clearings of forest land in the leased district, etc., are enforced. Violation of these regulations are subject to certain amounts of fines (Public Relations Sub-Division, N.D.).

Figure 1. Teak-bearing provinces of Thailand (after Loetsch, 1957).

THE EARLY YEARS OF RFD

When RFD was established in 1896, the major concern was to organize teak forests in a systematic way. Government could settle disputes as to the rights and ownership of teak forests and has finally taken the teak forests over from the Chows and local Chiefs of the North. The teak leases, which were about a hundred in number were reduced to about a score of them. The longer felling cycle of 12 years was adopted by dividing teak forests into two halves and the leasee was allowed to work only in the open half for a period of 6 years (Banijbatana, 1962).

New contracts of the lease were used, some features were : 6 year concession, stump fee was charged at $4\frac{1}{4}$ Rupees, marked trees must be girdled for two years before felling. Girth limit was 6 feet $4\frac{1}{2}$ inches measured at breast height 4 feet 6 inches above the ground (Siriwan, 1954).

Later, in 1908, it was felt that the 6 years working period was too short for investment. With the knowledge from Brandis, it takes about 30 years for teak tree of the next lower classes to grow to the upper class. The scattered teak forests are then consolidated into a larger tract extensive enough to be the self-contained unit and could be put under the 30 years felling cycle. Each felling series was divided into two blocks, the opened and the closed blocks. Each time only one block was opened for working for a period of 15 years. Mahaphol (1954) called these blocks "periodic blocks."

In 1953, at the termination of the third period of the 15 years teak lease, a remarkable improvement was made. The whole teak bearing area of about 23,000 km^2 was divided into 40 felling series and each series is subdivided into 30 annual coupes, disregarded of the opened and closed blocks. Before the forest will be opened for working, the forest officers have to go all over the area of the opening coupe for selecting, marking and girdling teak trees which have attained 213 cm girth at breast height, and the defective undersized teak trees which could not grow vigorously or will not survive during the 30 years cycle. With the exception of about 15% of the sound teak are to be reserved for emergency use and some other categories of teak trees to be retained for silvicultural reasons, namely the isolated, ridge and seed bearing teak trees. In fact, cultural treatment such as improvement felling should be made, owing to the shortage of funds and personnel only climber cutting is made. From the beginning, the so called "Modified selection System" is used for teak forests (Banijbatana, 1962).

RECENT MANAGEMENT

In 1960, Champion (1960) proposed the "Working Plan for Mae Ngao Forest B.E. 2504-14 (1961-70)." This comprehensive plan was, however, implemented in 1964 under the Demonstration Forest Project. In 1967, the Forest Management Project with the aim to establish permanent management (working) plans for the teak forests and undertaking more modernized and intensive management, merged with the former project. Eighteen forest management units were under the project. The inventory and management plan works finished in later years. For examples, Pradang Wangchao management plan was approved by RFD in 1967, Mae Ta plan in 1971. Brandis method of yield calculation was used, the silvicultural system practised was the so called "Selection cum Improvement Felling," since in these forests trees below girth limits are allowed to log out.

THE PRINCIPLES OF BRANDIS METHOD

According to Schlich (1925), the method is termed with some confusing names as Brandis' System, sometimes called the Indian System, and a Modified Selection System. More rigorously, it is a method of yield calculation under the silvicultural practice of Modified Selection System. In Schlich's words, "There are as yet many forests on the earth containing a mixture of many species of which only one or a few are of value. For such forests a modified selection system is required, and one of the kind was evolved by Sir Dietrich Brandis soon after his appointment as superintendent of the Pegu teak forests in Burma, in the year 1856." The method was put in use in 1858 (Brasnett, 1950).

The principle on which the Brandis method is based assumes the linear relationship of the number of exploitable size trees and number of years in the cutting cycle. Suppose, for example, that the cutting cycle is set at one year, and that the felling of the full number of the recruitment rate (i.e., the tree reaching exploitable size) is to be done over the whole forest each year. Ordinarily, when felling is done throughout the year, half of a year's recruits can be cut, and a number of exploitable trees equal to half the annual recruitment rate will be needed as a working stock at the beginning of the year. These will be cut and replaced by the uncut half of the year's recruitment to form the working stock for the beginning of the next year, thus,

working stock = annual recruitment × 1/2 felling cycle where,

annual recruitment = those trees which have entered an exploitable size (class I) during each year

To gain an insight of the principle, understanding of diagram and examples such as delineated by Brasnett (1950, 1953) is needed.

Validity of the method is commented by Schlich (1952) : "The method does not claim to be theoretically quite correct, but it is correct enough wherever large areas have to be dealt with in a short time. It works expeditiously, and, if judiciously applied, prevents a deterioration of the forest ... It is a method to be strongly recommended for adoption in countries where systematic forest administration is in its earlier stages, and where only a limited number of species are as yet of commercial value."

The Brandis method was applied to teak forest under the Forest Management Project (Phokan, 1966). The simplified formula is as follows :

$$A = \frac{\text{No. of trees Class I}}{\text{Years in class}}$$

$$W = A \times \frac{1}{2} \text{ Felling cycle}$$

$$S = \frac{\text{No. of trees Class I} - W}{\text{Felling cycle}}$$

(for period of 1 F.C.)

$$\text{or} = \frac{\text{No. of trees Class I} - W}{2 \times \text{F.C}}$$

(for period of 2 F.C.)

(i) $Y = 0.6\,(A + S)$

(where trees Cl. I exceed W.)

(ii) $Y = \frac{\text{No. of trees Cl. I} \times 2}{\text{F.C.}}$

(where trees Cl. I less than W.)

where : A = Average annual recruitment rate

W = Working stock (Trees Cl. I survived in the forest)

S = Surplus trees or surplus stock (trees Cl. I which exceed W. to be cut in 1 year)

Y = Possible yield

0.6 = Correction factor : 15% reserved as safeguard plus 15% reserved for silvicultural reasons, i.e., seed, ridged, isolated trees

It should be noted that from the beginning, the girth limit (at breast height which was 4 feet 6 inches in the old days, 1.30 meter at present) was 213 cm or 7 feet for long time, then changed to 190 cm during the 80's and changed to 220 cm until present.

During the 70's, most of the teak forests were permitted to log out under

concession, 36 felling series went to FIO and the rest of 6 felling series went to the war veteran organizations. The practice of Brandis method was abandoned because yields from the calculation were low and fluctuated, selection of trees is later governed solely by the girth limit. All the concessions were terminated in 1989 by the log ban policy of the government. Only the domonstration forest in Lampang is ongoing under Selection cum Improvement Felling, the logging work is done by FIO.

FUTURE TRENDS

Most people in forestry profession feel the threat to management of teak forests, the theft of teak tress from natural forests and even from the teak plantation. The situation is aggravated by the encroachment into forest lands and occupy for permanent agriculture. It is thought that clear cutting with artificial regeneration such as experimented in Pradang Wangchao forest and carried on large scale in the School Forest of Phrae Forestry School might be part of solutions. In fact, clear cutting with artificial regeneration is practiced in many FIO teak plantations, using the Modified **taungya** System. But the area to permit FIO to expand their programs is now limited for many socio-economic reasons. Plantations are now observed by some people with suspicion. All teak forests can not be converted into plantations but many parts are feasible with some careful measures.

In Burma, system of concentrated regeneration to increase the proportion of teak and other valuable species was done by dividing the area into periodic blocks. Regeneration fellings combined with intensive cultural operations were to be concentrated in the regeneration block, while selection felling both for teak and other saleable species were to be carried out in the remaining periodic blocks. (Blanford, 1917 cited by Haig, Huberman and Aung Din, 1958).

Champion (1960) suggests in the Working Plan for Mae Ngao Forest B.E. 2504-14 that teak plantation work should be the main silvicultural effort and ultimately it will probably be merged with such parts of the rest of the natural teak forests as are suitable for the Uniform System.

On the rather limited areas where natural regeneration methods are employed, or under large-scale trial, the use of even-aged clearcutting and shelterwood methods have come into prominence in recent years. In some cases, as in the Madhaya Pradesh in India, under favorable conditions a more elaborate form of uniform system with advance cutting of bamboos and other advanced growth, followed by systematic cleanings and improvement cuttings, has also been applied (Haig, Huberman and Aung Din, 1958).

CONCLUSIONS

As most teak forests, except the demonstration forest, lay idle and susceptible for deterioration, a plan to develop them to utilize at full potential is in urgent need. Teak is undoubtedly economic species, management (working) plan should stress this point, more efforts should be economically or commercially oriented. It is no use to close the forest, though with vigilance, for their benefits are not captured for use by society. Very soon, supply of imported teak from neighboring countries will be exhausted; domestic supply is necessary. The teak forests working plans can set the objectives at 3 levels :

1. Maintain the status quo management, use Selection cum Improvement Felling, low yield.

2. Convert some suitable areas into plantations or man-made forest, utilizing shelterwood or uniform system, the rest in selection system, medium yield.

3. Intensive management, deliberate plantations plus intensive silvicultural practices such as group selection, shelterwood or uniform system or area-volume allotment, high cost but high yield.

At any level, indirect benefits, biological diversities and sustainability are incorporated in the objectives.

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