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Licensee Practices on Forest Regeneration in Kuala Balah Permanent Reserve Forest, Kelantan, Peninsular Malaysia

Pakhriazad Hassan Zaki*, Mohd Hasmadi Ismail, Mohd Hafiz Hamzah and Nur Ayuni Roslam

Faculty of Forestry, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia

ABSTRACT

Forest regeneration is important to ensure adequate residual stand for the next cutting cycle in poorly stocked logged-over compartment. A regeneration activity has been implemented at abandoned areas to restructure forest contents for quality and healthy composition of timber species. At the skid trails, logs are drag for preparation, stacking and loading out to the log yard. In such areas, trees could not survive naturally as a result of soil compaction. The areas need to be ploughed prior to planting. Forest licensee is responsible for replanting timber trees at log yards, skid trails and ex-logging camp. This study was carried out to determine forest regeneration activities and to identify issues on sustaining timber yield in Kuala Balah Permanent Reserve Forest, Kelantan. The compartment is managed by Kelantan Integrated Timber Complex (KPK). Primary data were collected from 150 respondents from field staff of KPK, sub-contract field workers and nursery labourers who were engaged in the activities. The respondents were given a questionnaire to survey and identify the problems faced during replanting activities. The study found that forest regeneration activities inevitably allowed proportion of vigorous and quality indigenous timber species and artificially increased the volume of specific regeneration into the logged-over forest for the next cutting cycle.

Keywords: Forest licensee, sustainable forest management, regeneration, sustaining yield

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E-mail addresses:
uniputra1@gmail.com (Pakhriazad Hassan Zaki),
mhasmadi@upm.edu.my (Mohd Hasmadi Ismail)
* Corresponding author

INTRODUCTION

Sustainable Forest Management (SFM) was developed by the Ministerial Conference on the Protection of Forests in Europe (MCPFE) in 1993, and has been adopted by FAO. It defines SFM as the stewardship and use of forests and forest lands in a way,

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and rate that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems (MCPFE, 2007). It was recognized by the parties at the Convention on Biological Diversity in 2004 (Decision VII/11 of COP7) to be a concrete means of applying the ecosystem approach to the forest. Both concepts aim at promoting conservation and management practices which are environmentally, socially and economically sustainable, generate and maintain benefits for both present and future generations.

The term "sustainable" was derived from Latin word, "*sus-tenere*" which means uphold. The concept of sustainability comes from the concept of sustained yield forestry (Pearce *et al*., 2003; Ferguson, 1996). It balances between forest products and services, and the preservation of forest health and diversity. SFM maintains or enhances the contribution of forests to human well being, both of the present and future generations without compromising their ecosystem integrity that is their resilience, function and biological diversity (Sayer *et al.*, 2005). Obviously, the ecological and economic impacts of SFM depend on a variety of variables - everything from the type of forests involved to the structure of regional economy (Jenkins *et al*., 1999). SFM means not only management of wood and non-wood resources, but also their processing and creation of appropriate economical structure (Strakhov, 2000). This balance is critical to the survival of forests and to the prosperity of forest-dependent communities. However, the level of understanding by loggers is still vague. According to Buang (2001), the progress in establishing SFM was very low and had less impact on the tropical forest.

In Malaysia, the federal government serves as the emblem protector and state serves as the forest managers (Marsh *et al.,* 1992; Mc Morrow *et al.,* 2001). As a member of International Tropical Timber Organization (ITTO), Malaysia has adopted ITTO Guidelines for the Sustainable Forest Management of Natural Tropical Forests and its Criteria for the Measurement of Sustainable Tropical Forest Management (CMSTFM). The silviculture systems applied in tropical forest ecosystems are clear felling or clear cutting, selection felling and shelter wood system (Vandana, 1992). It is a formulated tool, which can be used to conceptualize, evaluate and implement SFM practices. In Malaysia, conventional harvesting of production forests is undertaken on a rotational cycle and a sustained yield management system. Mature trees are tagged for felling at each cycle, thus allowing the logged over area to recover and regenerate before the next harvesting. Under selective logging system, natural forests will return to their former characteristics for better biological functioning. From the point of views of forest licensee, managing a forest in sustainable manner means ensuring for a better benefits for future forest product and services.

Regeneration is a silviculture tool proposed to rehabilitate and to manage harvested forest contents at the maximum level. In particular, it is to enrich the poorly stocked residual stand of logged-over dipterocarp forest by regeneration. Regeneration is when forest licensee selects indigenous commercial species to restore timber trees at post-harvest compartments, i.e. when timber stock and species are inadequate. The activities were devised from the fact that planting was done merely to increase the value per hectare of a forest. Thus, the objectives of this study were to determine forest regeneration practice by licensee and to identify issues on sustaining timber yield in Kuala Balah Permanent Reserve Forest, Peninsular Malaysia.

MATERIALS AND METHODS

Study Area

The study was conducted in Balah Permanent Reserve Forest, in the state of Kelantan, Peninsular Malaysia. The reserve forest is located at 5°16' to 5° 19N and 101° 42' to 101°45'E (see Fig.1). The areas managed under Kelantan Integrated Timber Complex (KPK) are as follows: compartments 42 (70 ha), 43 (258 ha), 46 (215 ha), 114 (198 ha) and 148 (251 ha.) The topography of this area is undulating with slopes ranging from 8 to 55 degrees and elevation above 600 meters. The average rainfall is 2,664 mm per year, while the temperature varies from 27° to 32°C. The driest months are from April to September with an average temperature of 34°C, while the wettest months are from October to February with the average monthly maximum temperature of 30°C. The distribution of rainfall occurs with a major peak in November and a minor peak in March. The area comprised of hill dipterocarp forest. The Dipterocarpaceae family dominates the forest canopy with *Shorea curtisii* as the dominant species. Other economical valuable commercial species are *Shorea parvifolia, Shorea platyclados* and *Sapotaceae*. This ridge forest is characterized by large trees, which are semi-gregarious that forms a dominant stand of large canopy trees along the ridge gigantic soil (FRIM, 2006).

Data Collection

Both primary and secondary data were recorded. Primary data were collected from 150 respondents, namely, the field staff at Kelantan Integrated Timber Complex (KPK) (48), sub-contract field workers (62), and nursery labourers (40), who are engaged in inventory and silviculture activities. The respondents were given a questionnaire each to identify the problems during the replanting activities. In addition, personal interview and site observation were also conducted. Meanwhile, secondary data were compiled from state gazettes, official documents, published report, and other references related to this study. The data were gathered, reviewed and analyzed.

RESULTS AND DISCUSSION

Hill dipterocarp forest of Peninsular Malaysia was characterized by poorly stocked natural regeneration and lack of seedlings in the original residual stand. The

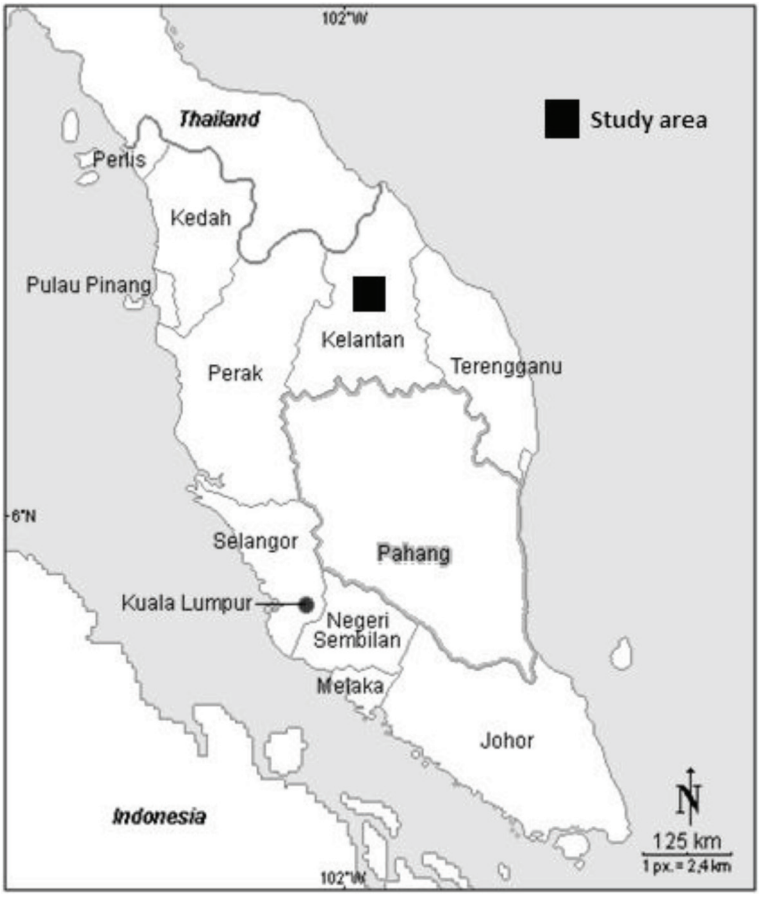

Fig.1: A map of Peninsular Malaysia showing the location of Kuala Balah Permanent Reserve Forest, Kelantan

seedlings are slow in-growth and shade demanding in nature. The objective of Selective Management System (SMS) is to regenerate and to save sufficient number of young potential tree species which vigorously survive from damage during harvesting of the merchantable timber. It is a flexible system which allows determination of the most appropriate cutting regime based on the analysis of pre and post-felling forest inventory data, considering the need of leaving behind sufficient stocking of intermediate sized trees, optimal growth rates and maintaining species composition of the residual forest stand at minimal damage (Hassan-Zaki *et al*., 2004).

The current forest regeneration practice in this area is conducted based on the prescriptions of post-felling inventory imposed in forest compartment. It is an effort to manage the forest resources in a sustainable manner. The regeneration activities focus on various major aspects related to the technical requirement such as selection of species, prime area in logged-over forest, field operation methods, as well

as silviculture and map of replanting areas. Activities on regenerating the forest have become more prominent and important in the effort to ensure that relatively poor stocking of logged-over forests is enriched. Several potential commercial indigenous timber tree species that are suitable for regeneration include *S. parvifolia, S. curtisii, S. platyclados, Sapotaceae, K. malaccensis, D. costulata, H. odorata, D. aromatica, Pentaspadon spp., S. wallichi, Heriteria spp.* and *A. borneensis*. In this study, the highest number of trees regenerated was in compartment 46. A total of 2,879 trees were planted in the compartment log yards and 4,097 were regenerated in the skid trails. Only 1,841 trees were planted in the log yards in compartment 42 and 903 trees were planted in the main log yard. At the skid trails, there were about 938 trees planted. The difference in the total trees regenerated was due to the size of both the compartments. The size of compartment 46 is 215 ha, while compartment 42 is 70 ha. Five dominant species planted in this compartment are *S. parvifolia, Anisoptera*, *S. leprosula, S. ovalis* and *S. guiso*.

Among the selected species, *S. parvifolia* is the most desired species planted in the compartments because of the soil and temperature suitability in the areas. In addition, the species has a high growth rate, produce quality wood with high economic values and also market demand. Nonetheless, compartment 148 failed to achieve the target in the main log yard areas, where only 55.14% of the planted trees survived. A total of 72.25% trees in the skid trails survived as a result of the topography characteristics and difficult terrain surrounding the log yard areas. The planted yields could not tolerate desiccation to low moisture contents and remained viable only for a short of period (Chin *et al*., 1988). The highest achievement in the log yard areas is in compartment 42, with 82.5% survival rate, followed by compartments 43 (80.82%), 114 (76.38%), 46 (76.1%) and 148 (55.14%). In the skid trails, the highest achievement was in compartment 46 with 72.66% survival rate, and this was followed by compartments 148 (72.25%), 114 (67.71%), 42 (67.66%) and 43 (63.21%). However, compartments 42, 43 and 114 had failed to achieve the target of 70.0% survival rates.

This study revealed that the problems faced by the forest licensees are as follows:

1. Inadequate support (43.0%): Inadequate support had made some forest staff to become dependent on the goodwill of concession holders. Yield regulation is very important to ensure sustainability under the SMS. Stocking of yields was not sufficient to sustain the continuity of dipterocarp regenerations in the forest. Seeds have to be quickly sowed in the nursery to restore a higher germination percentage. In addition, proper nursery technique and the preparation of planting stock for seeds are highly required to restore higher germination and critical during the regeneration period. Moreover, since different states make different policies, there is no standard procedure used in executing the forest regeneration techniques. Different

treatments will give incomparable results and make it difficult for further study. A comprehensive review of growth and yield (G & Y) data is also essential. The objective of yield regulation is to determine and to ensure that there are sufficient areas for harvesting sustainably during the specific period. The amount is stated as the allowable cut for that period and is usually averaged to a year as the Annual Allowable Cut (AAC). The determination of the AAC is central to SFM as it is to ensure a continuous supply of timber.

2. Climatic or weather conditions (20.0%): The regeneration activities could only be executed during raining seasons and could not to be proceeded when there was no rain for a period of the three consecutive days. The seasons in some areas might be very short. The loggers were much wary of it and thus worked hard to utilize that short period of time to the maximum. For example, the planting months were usually from late August to January in the east-coast states according to the rainy seasons. In particular, the inherent constraints were related to unseasonable climate, which would be overcome to some extent by improving the respective techniques. The areas that were very poor in species composition and wood content are usually in the deeper compartments and remote portions of the forests and need to be enriched.
3. Team work (16.0%): A key factor for SFM is the consideration and involvement of the different stakeholders in various activities. Human factors, such as encouragement of team work, good skill in recognizing appropriate silviculture tools and able to handle work efficiently, can be considered as important elements to ensure the success of regeneration activities.
4. Cost (10.0%): To execute the regenerating activities, the study revealed that the high cost of operation and maintenance was a major problem encountered. Problems related to cost include manpower and labour cost, seedling and yields, fertilizers, silviculture activities, etc.
5. Transportation (7.0%): Transport problem existed when reforestation activities were carried out during bad weather and when logging road is not well maintained by the contractors. Transportation of seedlings to the compartments is one major problem. Distance and shock that had to be endured would render the seedlings as not suitable or ready for planting. Some of the compartments are inaccessible. The only other prerogative to plant in this area is by manual labour to take the seedlings to the planting site which will result in higher seedlings mortality. Healthy seedling is selected through a proper culling process to ensure that those selected can withstand transportation and transplanting shocks.

6. Wildlife disturbances and illegal cultivation (5.0%): Planted seedlings are sometimes mutilated or destroyed completely by wild animals such as wild elephants, wild boars, porcupine etc. Moreover, unscrupulous act of cultivating illegally has been rampant in the states. This is one of the major setbacks faced by the loggers in their effort to execute the regeneration activities. Areas that were once put through regeneration were suddenly cleared and razed to the ground by illegal cultivator. Variable high quality trees were intruded with the planting of fruit trees and other cash crops by the villagers or aborigines, which shifted around searching for fertile areas for upland rice cultivation. Their nomadic culture is an accepted norm. Their next destination of cultivation area could be predictable in some instances, but that this is not necessarily possible in certain cases. Hence, studies that emphasize on effective enforcement of a few simple and basic rules are useful than the proliferation of complex working plans and mathematical yield control methods.

CONCLUSION

Sustainable forest management is a process of managing forest for a continuous flow of desired forest products and services without undue reduction of its inherent values and future productivity, as well as undesirable effects on the physical and social environment. Composition, constitution and structure of logged-over forest do not support polycyclic systems and stocking is not sufficient to sustain continuity of dipterocarp management in future. Since the regeneration dynamics and growth of commercial residual trees is not as high as expected, regeneration activities by forest licensees are essential as a means to improve residual stocking that will definitely be able to overcome some of the forest management issues. From the view of forest licensee, managing a forest in sustainable manner means to ensure better benefits for future forest products and services. Based on our study at compartments 42, 43, 46, 114 and 148 in Kuala Balah Permanent Reserve Forest, it could therefore be concluded that forest regeneration activities inevitably allowed proportion of vigorous and quality indigenous timber species and artificially increased the volume of specific regeneration into the logged-over forest for the next cutting cycle. This balance is critical to the survival of forests and to the prosperity of forest-dependent communities. Good forest governance and policy formulations have to be guided through proper long-term management of the forest resources by maintaining an optimum equilibrium between resource utilization and the need to protect the environment as a pre-requisite for the sustainable production of forest goods and services.

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