

# FOREST HARVESTING PRACTICES TOWARDS ACHIEVING SUSTAINABLE FOREST MANAGEMENT IN PENINSULAR MALAYSIA \*

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## ***Abstract***

*Peninsular Malaysia has long recognized the need for sustainable management and development of the invaluable forest resources. In attaining sustainable forest management (SFM), conservation measures for implementation environmentally, socially and economically forest harvesting practices is one aspect that needed to be achieved in the management of production forest. In this regard, forest harvesting in Peninsular Malaysia is carried out in accordance with the principle of SFM and the prescribed forest management and harvesting plans. In addition, emphasis on reduced impact logging harvesting technologies as a systematic approach to planning, implementing, monitoring and evaluating forest harvesting had also been intensified in recent years. This paper highlighted the progress and challenges of forest harvesting practices in the dry inland forest towards achieving SFM in Peninsular Malaysia.*

*Key words: Peninsular Malaysia – forest harvesting - reduced impact logging – sustainable forest management*

## **1. INTRODUCTION**

Malaysia forested area at the end of 2001 was estimated to be 20.20 million ha or 61.5% of the total land area, of which 14.45 million ha which covers 44.0 % of the total land area are designated as Permanent Reserve Forest (PRFs). Out of 14.45 million ha, approximately 3.81 million ha are classified as Protection Forests while the remaining 10.64 million ha are Production Forests. For Peninsular Malaysia, the total forested areas at the end of 2001 was estimated to be 5.90 million ha or 44.9% of the total land area, of which 4.84 million ha under PRFs to be managed sustainably for the benefit of both the present and future generations. These forest land are secured in their tenure as they are gazetted in accordance with the National Forestry Act 1984 (Amended 1993).

Malaysia is fully committed to achieve sustainable forest management (SFM) in the overall context of sustainable development. Malaysia's commitment to the ITTO Year 2000 Objective necessitates tremendous effort including changes at the policy level and the allocation of financial resources to carry out forest development activities, as well as projects and studies related to sustainable management.

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In affirming the commitment to SFM, Malaysia has also developed a set of Malaysian Criteria, Indicators, Activities and Management (MC&I) in line with ITTO's C & I for monitoring and assessment SFM and also the purposes of forest management certification to be undertaken at the forest management level.

For Peninsular Malaysia the need for sustainable management and development of the invaluable forest resources has long been recognized. Over the years, the forest management practices in Peninsular Malaysia had been subjected to constant review and refinement to keep abreast with the latest development in forestry and to meet the changing forest and market conditions. Thus, it is recognized that in achieving SFM, there are several critical factors that are deemed to be essential need to be addressed and one of it is forest harvesting practices. In this respect, Forestry Department Peninsular Malaysia (FDPM) has taken conscientious efforts directed towards research and development to formulate more environmentally friendly harvesting technologies such as the use of reduced impact logging (RIL) so as to minimize the negative impact to the environment.

This paper highlighted the progress and challenges of forest harvesting practices in the dry inland forest towards achieving SFM in Peninsular Malaysia.

## **2. CURRENT FOREST MANAGEMENT PRACTICES**

In Peninsular Malaysia, the Dry Inland Forest or Dipterocarp Forest of the production forest of the PRFs is mostly managed under the Selective Management System (30-year cutting cycle). SMS was implemented in Peninsular Malaysia due to the change in forest harvesting to the hill Dipterocarp forest where conditions such as steeper terrain and lower species richness do not favor a drastic opening of forest in one cut. The implementation of the SMS involves conducting forestry activities that could distinctly categories into three stages, namely pre-harvesting, during harvesting and post-harvesting activities. In brief, the Selective Management System (SMS) entails the selection of optimum management (felling) regimes. However, the success of the SMS will depend on the way the forest harvesting practices was implemented.

In Peninsular Malaysia, forest harvesting and all related infrastructure development in the PRFs are carried out in accordance with the principle of SFM and the prescribed forest management and harvesting plans minimize the detrimental effects of forest harvesting on the environment, This is done to ensure a sustainable level of log production with minimal damage to the residual stand, as well in safeguarding environmental quality and the maintenance of ecological balance. In addition, the harvesting of conversion forests are also coordinated and regulated to ensure its compliance to environmental standards and full resource utilization.

### **3. PROTECTION MEASURES IN THE MANAGEMENT OF PRODUCTION FOREST**

In managing the production forests of the PRFs during forest harvesting, FDPM have taken conservation measures for environmental protection and biological conservation. Amongst the conservation measures taken during forest harvesting are:

- (i) The use of Selective Management System as opposed to Clear Felling System.
- (ii) A limit on the extent of forest areas to be harvested yearly based on the approved Annual Coupe.
- (iii) A Forest Harvesting Plan detailing out the harvesting blocks, road network, alignment and construction, as well as rehabilitation measures, which would serve to minimize negative impact to the environment and reduce biological degradation, is a prerequisite and necessitated by law before the commencement of any logging operations.
- (iv) Determination of cutting limits for trees to be felled (diameter at breast height) based on the Pre-F Inventory carried out. The criteria for cutting limits prescription are as follows:
  - The cutting limit prescribed for the group of dipterocarp species should not be less than 50 cm dbh, except for *Neobalanocarpus heimii* when the cutting limit prescribed should not be less than 60 cm dbh;
  - The cutting limit prescribed for the group of non-dipterocarp species should not be less than 45 cm dbh;
  - The residual stocking should have at least 32 sound commercial trees per ha from the diameter class 30-45 cm;
  - The difference in the cutting limits prescribed between the dipterocarp and that non-dipterocarp species should be at least 5 cm;
  - The percentage of dipterocarp species in the residual stand for trees having 30 cm dbh and above should not be less than that in the original stand;and
  - The retention of mother trees and certain species of wild fruit trees for fauna conservation

- (v) All trees above the prescribed cutting limits are marked (with direction) and tagged for felling. This activity is carried out to ensure that only marked trees are felled, as well as to control the amount of timber output from the forest.
- (vi) During actual harvesting, matters given due consideration include:
  - Directional felling to ensure minimal damage to residual stand;
  - Construction of forest roads, skid trails and log landings according to prescribed standards to ensure minimal adverse environmental impact. Amongst the prescriptions in forest road construction currently enforced include:
    - ◆ Road alignment to be approved by FDPM prior to construction;
    - ◆ Limit on density of road and skid trails to be constructed;
  - Demarcation of adequate buffer zones along rivers and streams to mitigate soil erosion
- (vii) After harvesting, a Post-F inventory will be carried out. Based on the results, the following types of treatment would generally be applied. They include girdling of defective trees (G), climber cutting (CL) or enrichment planting (EP) for areas that are poor in natural regeneration. A similar inventory is conducted at year 10 to assess the status of the regenerated forest.

#### **4. PROGRESS IN IMPLEMENTATION OF REDUCED IMPACT LOGGING (RIL)**

RIL can be described as an intensively planned and carefully controlled implementation of a collection of forest harvesting techniques which result in low level of damage to the residual stand, soil, water and wildlife so that the productive capacity on the forest after logging is sustained, besides maintaining the ecological integrity of the forest.

The activities usually associated with RIL include pre-harvest forest inventory, the planning of forest roads, skid trails and log landings; the construction of forest roads; log landings and skid trails; the use of appropriate felling and bucking techniques, including directional felling; the winching of logs to planned skid trails; and an assessment of the logged-over forest through post-felling forest inventory.

In Peninsular Malaysia, the implementation of reduced impact logging (RIL) has long been realized since the established of the Forestry Department. In fact, the need and importance to implement RIL in the PRFs has generated a strong commitment among foresters in ensuring that the forest resources are sustainably managed. The progress in implementation of RIL can be categories below:

**(i) Relevant Forest Policy and Legislation**

Among the earliest efforts taken by the Forestry Department, Peninsular Malaysia (FDPM) to address this commitment has been the enforcement of the various forestry enactments and ordinances by the State since the early 1900s and the formulation of an interim national forestry policy in 1952. This culminated in the formal adoption in 1978 of a National Forestry Policy by the National Forestry Council which was endorsed by the National Land Council, a national policies for the promotion and control of utilization of land for mining, agricultural and forestry. This National Forestry Policy which is currently being implemented by all the States in Peninsular Malaysia was further revised in 1992 to take into account the latest development in forestry, in particular, the involvement of local community in forest development and the conservation of biological diversity.

In its endeavor to further effective forest management and the implementation of the National Forestry Policy, 1978, as well as to uniformise the various forestry enactments and ordinances and strengthened forest management planning and operations, a National Forestry Act was adopted in 1984 which is also currently being enforced in all the States in Peninsular Malaysia. This Act was later amended in 1993 to include more stringent penalties for the commission of forest offences, especially in illegal logging, encroachment of forested areas and timber theft, and has included a mandatory jail sentence of at least one year for convicted illegal logging operators.

**(ii) Availability Environmental Management Prescriptions and Assessment**

Beside, the forest management and harvesting plans, various regulations and guidelines with special emphasis on environmental conservation measures for forest harvesting had also been adopted. They include the 'Forest Harvesting Guidelines', 'Forest Engineering Plan' and the 'Forest Road Specifications'. In fact, a revised document on Forest Road Specifications has been formulated in 1999 which, among others, contains more precise and practicable specifications, such as the use of excavator in forest road construction. These regulations and guidelines are incorporated into harvesting licenses and their implementation are closely supervised and monitored by the Forestry Department's staff. The forest engineers of the Forestry Department play an active role in providing technical advice and services on all matters pertaining to infrastructural development of the logging sector, such as in the design and construction of forest roads so as to enhance environmental stability and quality. In addition, the Forestry Department Peninsular Malaysia has implemented MS ISO 9000: 1994 for sustainable timber production from PRFs while the major activities identified to ensure the achievement of this core process are Boundary Demarcation, Pre-Felling Forest Inventory, Timber Tagging, Forest

Harvesting, Post –Felling Forest Inventory and Silvicultural Treatments. Furthermore, the Environmental Quality Act 1974 was amended to include Environmental Impact Assessment (EIA) in 1985 which came into force in 1987 that prescribed for activities that involved forest land uses. An EIA guideline for forest harvesting activities in the natural forest has been developed by a Working Committee on *EIA for Forest Harvesting of Natural Forest in Peninsular Malaysia*. The Working Committee comprises members from the relevant forestry and environmental agencies in Malaysia.

### **(iii) Strengthening Procedures in Forest Harvesting Operation**

In terms of forest harvesting, Peninsular Malaysia has pioneered a number of practices aiming at reducing logging damage on the forest stand. They include tree marking for felling, timber tagging for identification and log removal, and directional felling to reduce the negative impact of logging on the residual stand. In fact, the Forestry Department Peninsular Malaysia was awarded the Public Service Innovation Award in 1997 for her efforts in developing an efficient system for the implementation of timber tagging in forest harvesting operations within the PFE.

Currently, for Peninsular Malaysia, the guidelines to carry out the activities of RIL can be found in various documents of the Department, as well as directives given by the Director of the State Forest Department and the District Forest Officer on actions to be taken in the field with regards to RIL. These guidelines are as follows:

- i) Field Guide for Pre-Felling Forest Inventory,
- ii) Guidelines for the Implementation of Tree Marking using Timber Tagging,
- iii) Guidelines for the preparation of a Forest Harvesting Plan as elaborated in the Code of Practice for Harvesting of Natural Inland Forest, 1997,
- iv) Forest Roads Specification (Feeder Road and Skid Trail) for Peninsular Malaysia, 1999, and
- v) Field Guide for Post-Felling Forest Inventory.

In order to amalgamate these guidelines into a single document for ease of reference, the Department had formed a committee in August 2001 with the task of producing such a document entitled “Guidelines for Reduced Impact Logging”. The guidelines are ready and awaiting publication. It should be noted that these guidelines will be revised and updated periodically in the light of experience gained and the availability of cost-effective techniques, as well as to reflect the evolving knowledge about the functioning of forest ecosystem and the changing demand placed on forest by society for its various goods and services.

#### **(iv) Intensified Research on RIL**

It is increasingly being realized that environmentally, socially and economically sound timber harvesting is one fundamental aspect of wise forest use. Hence, in recent years, research into reduced impact logging (RIL) and low impact logging (LIL) harvesting technologies as a systematic approach to planning, implementing, monitoring and evaluating forest harvesting had been intensified. The principal aim of the new technologies is to improve forest management by minimizing the negative impacts of forest harvesting on the residual stand and the environment.

Peninsular Malaysia has also undertaken a number of collaborative projects to explore the feasibility of RIL technologies. They include the Malaysia-German technical cooperation project involving studies on finding the best management practices for ground skidding operations and also on the redesigning and retooling the logging system. Currently, Putra University Malaysia is carrying out joint study with the department on RIL in Weng Forest Reserve in State of Kedah. In addition, Forest Research Institute Malaysia (FRIM) together with a private Japanese company undertaking a collaborative project to test the use of skyline mobile yarder so as to reduce the negative impact on the environment.

#### **(v) Enhancement on Capacity Building**

Training of field operators and supervisors has been identified as the key to achieving sustainable forest management practices. In this regard, three officers from the Forestry Department Peninsular Malaysia have undergone training in directional felling techniques and the use of Mobile Training Unit in Denmark in early 1999 under the Malaysian-DANCED collaboration project entitled “Extraction and Processing of Forest Residues and Small Dimension Logs”. Part of the training included a course on the basic measures and the equipment required for the safety of chainsaw operators. Through the project, a model Mobile Training Unit was created by the Forestry Department with the assistance of two technical advisers from the Danish Forestry College. Currently, the Mobile Training Unit is used for training of field operating staff of the Forestry Department Peninsular. To date, some 150 tree fellers have been trained throughout the Peninsula Malaysia.

To further enhance human resource capability, the department through the Forest Engineering Unit is conducting in-house training to the forestry officers, Forest Ranger and field staff to upgrade their supervisory skill and knowledge especially on the aspect of road planning and construction and also directional felling. Meanwhile, training for forest workers involving private sector was conducted by the Forestry Training Unit located in Terengganu on the aspect of forest harvest techniques. In order to enhance the knowledge of the workers involve in the logging operation, the SFD and DFO officer had taken a proactive role by regularly held discussions with the licensee, contractor and logging operator matters pertaining to procedures and guidelines on forest harvesting..

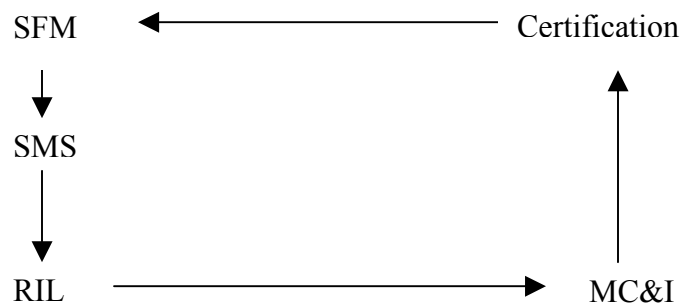
**(vi) Active Involvement of Private Sector**

Besides the government’s efforts, the private sector has also contributed to the improvement of forest harvesting technologies. For example, Kumpulan Perakayuan Kelantan (KPK) has initiated the building of crusher-run all-weather forest roads in its concession areas, while Kumpulan Pengurusan Kayu Kayan Terengganu (KPKKT) has modified an excavator for log extraction which was found to reduce the amount of logging damage substantially when compared to the conventional method. A similar modified excavator called RIMBAKA has also been developed by a private company, RIMBAKA Forestry. From the foregoing are noteworthy development needs emphasis – the positive response by the industry to implement RIL.

**5. RIL IN RELATION TO MALAYSIAN CRITERIA AND INDICATORS (MC&I)**

The implementation of MC&I also involve an independent assessment of forest management operations, according to specific economic, social, environmental and ecological criteria, indicators, activities and management specifications. This forest assessment typically includes an evaluation of the economic viability of the operation, the social and environmental impact of the forest management activities and the ecological health of the forest. It covers forest inventory, management planning, silviculture, harvesting, road construction and other related forest management activities. The MC&I have identified a total of 7 criteria, 56 indicators and 171 activities for monitoring and assessing SFM at Forest management unit level. Since most of the forest harvesting activities was incorporated in MC&I, the implementation of RIL will be in tandem with the MC&I which further helped in compliance to the standard set for the purpose of forest certification at the FMU level. Figure 1 illustrated the relationship between RIL, SMS, MC&I and SFM. The success of RIL through MC&I, enable us to obtain certification, which eventually achieve SFM.

Figure 1: Relationship between RIL, SMS, MC&I and SFM





## **6. CHALLENGES**

Despite the progress has been made in forest harvesting practices toward RIL, there are challenges need to be address as below:

### **(i) Cost of Reduced Impact Logging.**

Although RIL is an emerging harvesting system, its cost higher than conventional logging even though the benefits it brought about by greater efficiency and encourages long term planning and investment. However many studies (Mattsson & Jonkers, 1981, ITTO, 1996, Ahmad et al, 1999) have demonstrated conclusively that proper planned and supervised harvesting operations not only meet conditions for sustainability but also reduce harvesting costs by a substantial margin as compared to conventional logging. The difficulty is that this costs savings are due to better planning, better supervisory control, and better utilization of felled timber which is directly related by necessary to have technically competent planners, loggers and supervisors.

### **(ii) The need to intensify Training**

This is the most critical single requirement for the successful application of reduced impact logging is the availability of skilled and competent logging personnel at all levels. Hence, training to the ground staff and also the forest workers in carrying out their duties correctly need to be intensified. Jonsson and Lindgren (1990) in their study on logging technology for tropical forests concluded that to achieve more efficient and environmentally sound logging practices, training is urgently needed; if logging training is not given a higher priority; very little progress will be achieve in improving forest management and environmental protection.

### **(iii) Supervision of Loggers.**

The implementation of RIL need closed supervision and sound technical knowledge. This is because RIL involves logging guidelines for implementing good management practices to reduce the damage to the forest, which include specifications for pre-harvest planning, forest harvesting operation, road construction, post-harvest planning and environmental management. Well-trained loggers need equally well-trained supervisors to ensure that their work is carried out properly and to provide feedback that will help them continually improve their practices. It is important that supervisors or forestry staff understand what to do and why it should be done that way in order to communicate with forest workers.

#### **(iv) Promoting Aerial Logging System**

Most logging operation in Peninsular Malaysia relies on ground-based skidding machines. Such systems can achieve acceptably low impacts when are properly trained and slopes are of low moderate steepness. However, forest harvesting is now going toward steeper terrains and alternative harvesting method need to be considered. Aerial logging such as cable systems and helicopters can substantially reduce direct impacts associated with ground disturbance but both cable systems and helicopters require highly skilled crews and higher cost of production.

### **7. CONCLUSION**

With the ever-increasing pressure to ensure sustainable forest management, environmentally, socially and economically sound forest harvesting practices is one of the fundamental aspects that is pertinent and cannot be avoided in the future. In view of that, the Forestry Department Peninsular Malaysia has taken concerted effort to address the issues by adopting various regulation and guidelines with special emphasis on environmental conservation measures for forest harvesting to supplement the forest management and harvesting plans. In addition, the department had intensified research on reduced impact logging harvesting technologies as a systematic approach to planning, implementing, monitoring and evaluating forest harvesting. However, the success of RIL depends on the commitment of those that involve in forest harvesting operation from the government, forestry staffs, licensee, logging contractor and forest workers especially in understanding and knowledge on RIL. Challenges in the implementation of RIL need to be address and if there is a need of policy on RIL, due considerations should be given.

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