

**ACTIVITY PROPOSAL TO THE
INTERNATIONAL TROPICAL TIMBER ORGANIZATION (ITTO)**

Submitted by the Government of Malaysia

TITLE: Sawn Timber and Plywood Recovery Study of Ramin (*Gonystylus bancanus*) in Peninsular Malaysia.

SUMMARY

In the world of tropical timber trade, Malaysia is currently the largest exporter of logs and sawn timber and a major exporter of other products, such as plywood and other wood-based panels, wooden furniture, builders' carpentry and joinery (BCJ), and mouldings. Of the total world tropical log and sawn timber exported by 1,770 producers which amounted to 14.2 million m³ and 10.4 million m³ in 2001, Malaysia accounted for about 34% and 23% respectively. The sawmilling sector is the largest and oldest wood processing industry in Malaysia. Whilst sawmilling is mainly produced for the export market, the industry is also a source of sawn timber for the domestic market, especially for the construction industry, as well as a source of raw materials for the downstream wood processing industries, notably the moulding, joinery and furniture industries. Sawn timber is produced in various sizes and species and exported as either graded or ungraded sawn timber. Malaysia's total production of sawn timber in 2001 was 4.98 million m³, a decrease of 10.3% from 2000. The government has expected a further reduction in output from the natural forest by 2020 and increasingly wood from forest plantation will replace it, thus affecting the nature of the wood-base industries in Malaysia. However, ITTO has forecasted that Malaysia, principally, Peninsular Malaysia, is already an importer of hardwood logs. This trade will grow over time with most of the processing are for meeting domestic consumption or for further processing into value-added products. As resource scarcity becomes more and more severe, the sawmills and plywood mills, especially in Peninsular Malaysia, will have to undergo restructuring to compete with the other composite board plants, such as those involved in the manufacturing of medium-density fibreboard (MDF) and chipboard. There is a need for the sawmill and plywood mills to maximize their processing recovery rates as the size of timber for the next decade will also be reduced as forecasted. The objectives of the proposed Activity are to (i) determine the recovery rate of Ramin logs for the manufacture of sawn timber and plywood; and (ii) develop a technique for quantifying wood waste from sawmilling and in plywood production. The expected outputs from the proposed Activity are (i) improvement of the recovery rate and maximize the utilization of Ramin timber; and (ii) calculation of the quantum of wood waste for estimating the recovery rate of Ramin log in the production of sawn timber and plywood.

EXECUTING/IMPLEMENTING AGENCY: Ministry of Natural Resources and Environment, Malaysia (NRE)

COLLABORATING AGENCY: Forestry Department Peninsular Malaysia (FDPM)

DURATION (months): 12 months

PROPOSED START DATE: First Quarter of 2010

BUDGET AND PROPOSED SOURCES OF FINANCE

(a)	ITTO Contribution	US\$8,478.00
(b)	Government Contribution (direct and in-kind)	US\$ 847.00
(c)	Other Sources Contribution	-
TOTAL :		<u>US\$9,325.00</u>

This activity is submitted to ITTO for consideration under its Work Program activity "Ensuring international trade in CITES-listed timber species is consistent with their sustainable management and conservation," with primary funding provided by the European Commission and additional support from the USA, Japan, New Zealand and Norway.

PART I: CONTEXT

Origin/Background

1.1 Characteristics and availability of Ramin

- 1.1.1 *Gonystylus bancanus* (Ramin) is one of three genera of plants in the *Gonystylus* sub-family of Thymelaeaceae family. At present, the genus *Gonystylus* consisting of about 30 species of tall trees and some shrubs, is distributed throughout the Malesian area (Indonesia, Malaysia, the Philippines, Papua New Guinea, Singapore and Brunei Darussalam) with the majority of species found in Borneo, but with the exception of central and east Java and the Lesser Sunda Islands.
- 1.1.2 It was found that most of the seven species of Ramin in Peninsular Malaysia occur in the inland dipterocarp forest, except for *G. bancanus* that can be found in the peat swamp forest. There are also six Ramin species that can have commercial value.
- 1.1.3 It was also reported that in general, diameter is higher for light heavy hardwood (LHW), followed by medium heavy hardwood (MHW), and heavy hardwood (HHW), with Ramin belonging to the LHW.
- 1.1.4 Diameter of Ramin can be classified into 3 classes, namely, >15 cm, >30 cm, and >45cm. The Forestry Department Peninsular Malaysia (FDPM) noted that the stocking of *Gonystylus* spp. for trees >15cm diameter at breast height (dbh) in Peninsular Malaysia, on average, have 1-3 stems per hectare in all forest types, while for dry inland forest the tree stocking is <1 stem per hectare.
- 1.1.5 Even though the Ramin species is widely distributed in Peninsular Malaysia, there is no guarantee that the logs supply will increase. Furthermore, with increasing demand for timber, certain species, such as Ramin has been subjected to over-exploitation and thus the long-term sustainable production of the timber is at risk. Table 1 below indicates that the production of Ramin had fluctuated over the years. As such, the industries need to adapt with greater efficiency in managing the timber resources, especially in the wood processing sector.
- 1.1.6 Efficiency of the mills can be asses in three ways, namely, log conversion efficiency (recovery rate), labor productivity, and mill capacity utilization.

Table 1: Ramin log production by year (m³)

Year	Pen. Malaysia	Sarawak	Total
2000	70,337	67,042	137,379
2001	45,076	57,334	102,410
2002	51,033	32,045	83,078
2003	49,499	25,095	74,594
2004	29,203	21,372	50,575
2005	23,892	8,654	32,546
2006	15,933	4,964*	20,879

Note : * January – November 2006

PART II: THE ACTIVITY

2.1 Sawn Timber and Plywood Recovery Study of Ramin

(a) *Overview on sawmilling and plywood mills in Malaysia*

2.1.1 In 2005, there were 1,132 sawmills in operation, mainly in Peninsular Malaysia (58.7 %), followed by Sarawak (25.6 %) and Sabah (15.7 %). Production of sawn timber from natural forest had shown a decrease from 7.2 million m³ in 1997 to 5.1 million m³ in 2005, mainly due to lower supply of logs. In contrast, production of rubberwood sawn timber had increased from 137,084 m³ in 1997 to 289,259 m³ in 2004, mostly in Peninsular Malaysia.

2.1.2 Sarawak is the major producer and exporter of plywood. In 2005, there were 174 plywood mills in operation in Malaysia, with most of the larger mills located in Sarawak and Sabah. The production of plywood had recorded an increase from 4.4 million m³ in 1997 to 5.1 million m³ in 2005. Export of plywood had also increased as reflected in the value of export from RM 4.5 billion in 1996 to RM 5.6 billion in 2005. Major export destinations were Japan, USA, Republic of Korea, UK and the People's Republic of China.

(b) *Factors Affecting Recovery Rate*

There are many factors that affect the recovery of sawnwood from the log which are as follows:

- (i) log quality;
- (ii) log size;

- (iii) cutting patterns;
- (iv) species characteristics;
- (v) machine types; and
- (vi) log deck.

(c) *Plywood and sawmill recovery rates*

2.1.4 Recovery rates vary with local practices as well as species. After receiving the logs, about 12% is waste in the form of bark. Slabs, edgings and trimmings amount to about 34% while sawdust constitutes another 12% of the log input. After kiln-drying the wood, further processing may take place resulting in another 8% waste (of log input) in the form of sawdust and trim ends (2%) and planer shavings (6%). For calculation purposes a yield factor of 50% has been used (38% solid wood waste and 12% sawdust).

2.1.5 Plywood manufacturing is a large-scale operation that involves debarking and cleaning the logs, as well as cutting them to the required length. After this preparatory operation, the logs are sliced or rotary peeled. Recovery rates vary from 45% to 50% with the main variable being the diameter and quality of the log. Of the log input, the main forms of waste are log ends and trims (7%), bark (5%), log cores (10%), green veneer waste (12%), dry veneer waste (8%), trimmings (4%) and rejected plywood (1%). These represent the largest amount of waste while sanding the plywood sheets results in another loss of 5% in the form of sander dust.

2.2 Study of Sawmilling

2.2.1 Currently, there are about 30 sawmills which use Ramin as their main raw materials for timber processing. Three (3) sawmills will be selected for the study from the States of Johore, Pahang and Terengganu.

The volume of logs will determine using the formula:

$$\text{Gross Volume of logs } V = 0.3927 \times (D^2 + d^2) \times L \times F \dots \dots \dots (1)$$

where,

- V = Log volume in m³
- D = Average diameter of large end of log in cm
- d = Average diameter of small end of log in cm
- L = Length of log in m
- F = Conversion factor 10⁻⁴

2.2.2 Defects of log such as split, knots, and hollow heart will be estimated using the formula:

$$V_d = 0.3927 \times (Dd^2 + dd^2) \times L \times F \dots \dots \dots (2)$$

where,

- Vd = Volume of decay in m³
- Dd = Average diameter if decay of large end in cm
- dd = Average diameter if decay of small end in cm
- L = Length of hollow heart in meter
- F = Conversion factor, 10⁻⁴

2.2.3 During the breakdown process, every piece of sawn timber produced will be counted, measured and recorded using the formula:

Vg= L x T x W x F.....(3)

where,

- Vg = Volume green in m³
- L = Length of sawn timber in m
- T = Thickness of sawn timber in cm
- W = Width of timber in cm
- F = Conversion factor, 10⁻⁴

2.2.4 Total sawn timber yield from each log is the sum of the green volume of all pieces of sawn timber from each log. The percentage of recovery will then be calculated using the formula:

Recovery rate: $\sum Vg / V \times 100$ (4)

where,

- Vg = Volume of sawn timber in m³
- V = Log volume in m³

2.2.5 To determine the volume of sawdust removed, the following formula will be used:

Total Volume sawdust:

Total adjacent board kerf volume + Total kerf adjacent of edging volume.

Thus, the total coarse residue will be:

Gross volume of log – total volume of sawn timber – total volume of sawdust.

2.3 Study of Plywood Mills

2.3.1 The study will be carry out in two states, namely, Kedah and Terengganu.

Volume of block will be determined using the formula:

Block volume in m³:

Gv= 0.7854 x D² x L(5)

where,

- Gv = Gross volume in m³
- D = Average middle diameter of block in m
- L = Length of block in m

2.3.2 The volume of rounded-up blocks will be determined using the formula:

$$V_r = 0.7854 \times D^2 \times L \dots\dots\dots(6)$$

where,

- V_r = Volume of rounded-up block in m³
- D = Diameter of rounded-up block in m
- L = Original length of sample block in m

2.3.3 Round-up losses will be determined by the formula:

$$\text{Round-up losses} = \text{Total block volume} - \text{Volume of rounded-up block size, when veneer is being produced.}$$

2.3.4 The further study in processing recovery rate will assist the wood-based industries in managing the waste, as well as in determining the best way to fully use the raw materials, and thus raise the future prospect of increasing their utilization.

2.4 Activity Objectives

The objectives of the project are as follows:

- (i) to determine the recovery rate of Ramin logs for the manufacture of sawn timber and plywood; and
- (ii) to develop a technique for quantifying wood waste from sawmilling and the plywood mills.

3.1 Justification

3.1 *Problems to be Addressed*

The wood-based industries require a regular and easy access to raw materials, especially forest logs. However, there is a rising concern on the long term availability of this resource. To sustain the development of the industries, knowledge regarding important species, such as Ramin (*Gonystylus bancanus*), need to be carried out. General observations have indicated that processing of logs has left a high degree of waste. The waste comprises small, short-sized residual, and sawdust. It is necessary to reduce this waste through having higher recovery during log processing. Furthermore, inefficiencies in wood processing have led to large economic losses, which could be linked to the unwise use of natural forest. Improving the efficiency of sawmilling and plywood milling could contribute to more efficient management of the natural forest.

3.2 ***Intended Situation after Activity Completion***

The Activity is very crucial for modernizing the production process of sawn timber and plywood through minimizing the waste in the current production systems. This will also enhance the revenue collected by the government through more taxes as a result of maximizing the utilization of timber.

3.3 ***Target Beneficiaries***

At the completion of the Activity, the results will assist the various sawmill and plywood operators, as well as the relevant agencies to address the issue of low supply and high wastage of Ramin timber incurred during sawmilling and in plywood production.

3.4 ***Risks***

The only risk in implementing the Activity is the unwillingness of the selected sawmill and plywood operators to be involved in the study. However, this is only a perceived risk as all sawmills and plywood mills in Malaysia are licensed by the respective State Forestry Departments.

4.1 **Outputs**

4.1.1 **Objective 1:** - Determine the recovery rate of Ramin logs for the manufacture of sawn timber and plywood.

Output 1.1 - Improvement of the recovery rate and maximize the utilization of Ramin timber.

4.1.2 **Objective 2:** - Development of a technique for quantifying wood waste from sawmilling and in plywood production.

Output 2.1 - Calculation of the quantum of wood waste for estimating the recovery rate of Ramin log in the production of sawn timber and plywood.

4.2 **Activities**

4.2.1 **Output 1.1** - Improvement of the recovery rate and maximize the utilization of Ramin timber.

Activity 1.1.1 - Documentation and procedure to appoint consultant(s).

Activity 1.1.2 - Acquisition of equipment, such as vernier calipers, tapes, diameter tapes, paints, data logger and other related hardware.

Activity 1.1.3 - Inventory work in the field.

4.2.2 **Output 2.1** - Calculation of the quantum of wood waste for estimating the recovery rate of Ramin log in the production of sawn timber and plywood.

Activity 2.1.1 - Documentation and reports.

5.0 Work Plan

The Activity will be carried out over a 52-week period (12 months) according to the Work Plan as in **Table 1**.

Table 1: Work Plan of Sawn Timber and Plywood Recovery Study of Ramin (*Gonystylus bancanus*) in Peninsular Malaysia

Objective/ Output	Activity	Period in months											
		J	F	M	A	M	J	J	A	S	O	N	D
Objective 1:	Determine the recovery rate of Ramin logs for the manufacture of sawn timber and plywood.												
Output 1.1	Improvement of the recovery rate and maximize the utilization of Ramin timber												
	Activity 1.1.1 - Documentation and procedure to appoint consultant(s).												
	Activity 1.1.2 - Acquisition of equipment, such as vernier calipers, tapes, diameter tapes, paints, data logger and other related hardware.												
	Activity - 1.1.3 Inventory work in the field.												
Objective 2:	Development of a technique for quantifying wood waste from sawmilling and in plywood production.												
Output 2.1	Calculation of the quantum of wood waste for estimating the recovery rate of Ramin log in the production of sawn timber and plywood.												
	Activity 2.1.1 Documentation and reports.												

6.0 Budget

6.1 Budget Components

A total of US\$9,325.00 is needed to implement the Activity, of which a sum of US\$ 8,478.00 is required as the contribution from ITTO as shown in **Table 2**.

Table 2: Total Activity Budget (US\$)

NO.	ITEM	TOTAL
10.	Project Personnel	
	11. National Experts	-
	12. National Consultants (professional consultant fee)	2,286.00
	13. International Experts	-
	14. International Consultants	-
	Component Total	2,286.00
20.	Sub-contracts	
	21. Sub-contract (with A)	-
	22. Sub-contract (with B)	-
	Component Total	-
30.	Duty Travel	
	31. Daily Subsistence Allowance	4,514.00
	32. International Travel	-
	33. Transport Costs (Local travel)	1,100.00
	Component Total	5,614.00
40.	Capital Items	
	41. Premises	-
	42. Land	-
	43. Vehicles	-
	44. Servers and computers	-
	45. Printers and other related hardware	-
	Component Total	-
50.	Consumable Items	
	51. Raw materials	289.00
	52. Spares	-
	53. Fuel and Utilities	-
	54. Office Supplies (incl. Sundry and miscellaneous)	-
	Component Total	289.00
60.	Miscellaneous	
	61. Sundry	-
	62. Others (meeting and final report)	289.00
	Component Total	289.00
70.	Executing Agency Management Costs*	847.00
	Component Total	847.00
	GRAND TOTAL	9,325.00

Note: * Contribution by the Government of Malaysia

6.2 Activity Budget by Source

Budget Components	Source			
	ITTO	Government of Malaysia	Other Source(s)	Total
10. Activity personnel	2,286.00	-	-	2,286.00
20. Sub-contracts	-	-	-	-
30. Duty travel	5,614.00	-	-	5,614.00
40. Capital items	-	-	-	-
50. Consumable items	289.00	-	-	289.00
60. Miscellaneous	289.00	-	-	289.00
70. Executing Agency Management Costs (10% of Total of Overall Activity Budget by Activity)	-	847.00	-	847.00
Total	8,478.00	847.00	-	9,325.00

PART III: OPERATIONAL ARRANGEMENTS

1.0 Management Structure

The Activity will be implemented by the Forestry Department Peninsular Malaysia. An Activity Technical Working Committee (TWC) will be established to oversee the implementation of the Activity. The TWC will provide guidance on matters pertaining to the implementation of the Activity and ensure that the Activity is directed towards achieving its intended objectives. The representation in the TWC is as in **Table 3**.

Table 3: Members of the Activity Technical Working Committee (TWC)

Activity Technical Working Committee (TWC)	Members
Forestry Department Peninsular Malaysia	- Director General of Forestry
	- Deputy Director General of Forestry (Policy and Planning)
	- Director of Technical and Industry Division (Project Coordinator/Secretary)
	- Director of Forestry Management Division
	- Director of Pahang State Forestry Department
	- Director of Terengganu State Forestry Department

	- Director of Johor State Forestry Department
	- Director of Kedah State Forestry Department
Other Institutions	- Consultant(s)

2.0 Monitoring, Reporting and Evaluation

The progress in implementing the Activity will be monitored through the TWC. Quarterly progress reports will be submitted to the TWC for consideration. The Director of Technical and Industry Division will act as the Activity Coordinator and who will be guided by the TWC and be responsible for the preparation of reports. Short monthly progress reports and a final report will be prepared by FDPMP within two months of Activity completion for submission to ITTO.