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REPORT ON CONSERVATION AND MANAGEMENT OF RAMIN (*GONYSTYLUS SPP.)* IN MALAYSIA

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1.0 INTRODUCTION

1.1 *Gonystylus* (ramin) is one of three genera of plants in the *Gonystyloidae* 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 (Soerianegara & Lemmens, 1994) with the exception of Central and East Java and the Lesser Sunda Islands. Eastward, the distribution area extends towards the Solomon Islands, Nicobar and Fiji. The vast majority of species are found on Borneo (27 species), especially in Sarawak. Peninsular Malaysia and Sumatra come second with 7 species each, and the Philippines possess 2 species. Other areas are occupied by a single species. There were also reported that twenty seven (27) species found in the Borneo island especially in Sarawak but only seven (7) species so far being reported occurring in Peninsular Malaysia. Cockburn (1976) described eight (8) ramin species that are found in Sabah. Ramin is also found in peat swamp forest up to the hill areas. Throughout Sarawak, *Gonystylus bancanus*, locally known as ramin telur occurs gregariously in coastal peat swamp forests, mixed swamp forest, in alan (*Shorea albida*) forest as well as padang paya forest and heath forest. that is common in peat swamp forests and can be found at altitudes up to 100 m. There are seven (7) ramin species in the Peninsular Malaysia, most of the species occur in the inland dipterocarp forests except *G. bancanus* that can be found peat swamp forest (Whitmore, 1972).

1.2 Generally, G. bancanus occurs in areas with a uniform rainfall regime with a mean rainfall of 200 – 400 cm, mean annual temperature of 24^{o}C – 27^{o}C and sometimes infertile soils (Van der Meer *et al.* 2004). This species also has pneumatophore (breathing roots) to adapt to water-logged areas (Tawan 2004).The mature ramin trees are usually medium-sized (c. 27 m tall and 60 cm dbh) but can reach up to 50 and 100 cm dbh (Whitmore, 1973). Ecologically, under natural conditions ramin seedlings are relatively shade tolerant and grow rapidly in partial shade (10 – 40% full sunlight per day). Nevertheless, the seedlings are intolerant of extreme shade and direct sunlight.

1.3 Six species are currently known to be commercially valuable (CITES 2002). These species include: *G. affinis, G. bancanus, G. forbesii, G. macrophyllus, G. maingayi* and *G. velutinus. G. bancanus* is the most commonly traded of the six species. However, ramin products are used not only for the timber or wood products, but also in some cases for the agarwood used as incense like those of *Aquilaria* spp. However, this trade does not appear to be significant in comparison to the timber trade. Due to its commercial value and widespread abundance in peat swamp forest, *G. bancanus* has been selected for this study. Therefore, onwards when ramin is mentioned in the proposal, it is referring to *G. bancanus*.

2.0 THE RESOURCE

2.1 Ramin represents the most important timber species produced by Malaysia. Most of the timber species is extracted from the permanent reserve forests designated for sustainable timber production. In 2003, there were about 190,757 ha of Peat Swamp Forest (PSF) or 4.1% from the total area classified as Permanent Reserved Forest. The Southeast Pahang Peat Swamp Forest with an area of 97,441 ha are regarded by far the largest PSF tracts located In Peninsular Malaysia, Southeast Pahang Peat Swamp Forest is the largest source of ramin timber, contributing around 90% of the total timber from the peat swamp forest. Other major areas of PSFs in Peninsular Malaysia are situated in the States of Johore (3,796 ha), Selangor (75,763 ha) and Terengganu (13,757 ha) (JPSM 2007). At the end of 2007, the total area of peat swamp forest for both Sabah and Sarawak were estimated at 0.12 million ha and 0.94 million ha respectively. Specifically for Sarawak, the peat swamp forest area within the Permanent Forest Estate (PFE) was estimated at 320,161 ha as summarized in **Table 1**. In Planted Forest area, forest plantations, usually other than Ramin, are established for the supply of pulpwood and timber. Part of the Planted Forest has been reserved as conservation Area which may later be designated as Totally Protected area (TPA) such as the Bukit Sarang–Binyo Penyilam National Park. As for the proposed TPAs, at least five (5) have been identified, namely the Sedilu National Park, Bruit National Park, Ulu Sebuyau National Park, Batang Lassa National Park and the Mud Volcano National Park. Besides, large portion of PFE has been reserved as water catchment and they are the Batang Jemoreng Protected Forest (7,416 Ha), Setuan Forest Reserve (11,128 ha), Balingian Forest Reserve (8,072) ha) and the Batang Lassa Protected Forest (5,634 ha) and the Balingian Forest reserve (18,072 ha. No logging is allowed in TPAs and Water catchment. Another area of PFE totaling about 2,000 ha is reserved for community use. It is only in the Residual Natural Forest that Ramin is produced on sustainable basis.

Table 1: Peat Swamp Forest in Sarawak according to Forest Classifications

PFE	Area (Ha)
1. Planted Forest	239,980
2. Proposed TPAs	34,686
3. Water Catchment	32,254
4. Community Use Area	2,000
5. Residual Natural Forest	11,241
Total:	**320,161**

Source: *Wong 2003 & SFD2008*

2.2 According to the recent Fourth National Forest Inventory (NFI4), ramin was enumerated and analysed into three (3) species; namely ramin (*Gonystylus spp.*), ramin melawis (*G. bancanus*) and ramin pipit (*G. maingayi*). The results of NFI4 estimated that a total of 5,774,255 stems of ramin trees (≥ 15 cm dbh), in which an average of 0.479 trees per hectare were recorded from forested area in Peninsular Malaysia (FDPM, 2008). Using the NFI4, further analysis registered the average density, basal area and volume of 2.3 trees, 0.22 m^2 and 2.79 m^3 per every hectare respectively for *Gonystylus spp.* (≥10 cm dbh) in the peat swamp forests in Peninsular Malaysia (FDPM, 2008; unpublished). In conservation areas of Sarawak, it is estimated that the population of ramin trees (≥ 10 cm dbh) of about 213,040 trees (41,630 ha) in the Mixed Swamp Forest or 250,000 trees in all forest types in Maludam National Park, Loagan Bunut National Park, proposed Sedilu National Park, Proposed Ulu Sebuyau National Park and proposed Bruit National Park. But if proposed Bukit sarang-Binyo Penilam National Park, Mud Volcano National Park and water catchment area included, the total trees are about 400,000 ramin trees (≥ 10 cm dbh) in conservation areas in Sarawak (SFD 2008). The population of G. bancanus in Totally Protected Areas in Sarawak is shown in **Table 2**.

Table 2: *Gonystylus bancanus* Population (≥ 10 cm dbh) in Totally Protected Areas (TPAs) in Sarawak [After SFD 2008 & Sia 2005]

TPA*	Tree Density	Mixed Swamp Forest	No. of Trees	Remarks
Maludam National Park (43,147 ha)	2	25,370	50,740	Good regeneration
Loagan Bunut National Park (10,736 ha)	10+	510	5,100	Localized regeneration
Proposed Ulu Sebuyau National Park (14,275 Ha)	14	10,000	140,000	Good regeneration
Proposed Sedilu National Park (5,970 ha)	2++	5,450	10,900	Low regeneration
Proposed Bruit National Park (3,871 ha)	21	300	6,300	Good regeneration
Total		41,630	213,040	

Note: *1 Excluding the proposed Bukit Sarang – Binyo Penyilam National Park and the proposed Mud Volcano National Park; + Estimate based on the Report On the Vegetation of Loagan Bunut National Park (Chai, 2004); and ++ Tan 2008

2.3 There are considerable amount of research of *Gonystylus spp.* in the country. Whitmore (1973) and Yunus (2000) described the silvicultural characteristics and distribution of five (5) of the species as shown in **Table 3**. Browne (1955), Cockburn (1976) and Soerianegara & Lemmens (1994) also described the silvicultural characteristics and distribution of thirteen (13) of the species. (**Table 4)**.

Table 3: Silvicultural Characteristics and Distribution *of Gonystylus* spp. in Peninsular Malaysia

Species	Silvicultural Characteristics (Average max. tree height and diameter size)	Distribution
Gonystylus affinis	Medium size tree up to 33m tall and bole up to 76cm diameter.	Dryland forest and undulating area.
G. brunnescens	Big size tree up to 36m tall and bole up to 95cm diameter.	Dryland forests and low lying area.
G. confuses	Medium to big size tree up to 30m tall and 70cm diameter.	Dryland forests and lowland area.
G. maingayi	Small to big size tree up to 40m tall and 76cm diameter.	Dryland forests and foothills of mountains up to 600m altitude.
G. bancanus	Medium size tree up to 27m tall and bole up to 67cm diameter. (Record shows that the tree could grow up to 45m tall and bole up to 80cm diameter)	Found in Peat swamp forest.

Source: *Whitmore (1973), Wyatt-Smith (1979) and Yunus (2000)*

Table 4: Silvicultural Characteristics and Distribution *of Gonystylus* spp. in Sabah and Sarawak

Species	Silvicultural Characteristics (Average max. tree height and diameter size)	Distribution
Gonystylus affinis	Small to medium size tree up to 33m tall and bole up to 90cm diameter.	Plains, hillsides and ridges up to 330 m altitude.
G. brunnescens	Medium to big size tree up to 36 (-45) m tall and bole up to 95cm diameter.	Low-lying land and hill, up to 350 (-1500) m altitude.
G. consanguineus	Medium to big size tree up to 40m tall and bole up to 80cm diameter.	Lowland on loamy or clayey soil or even limestone rock, up to 400 m altitude.
G. maingayi	Medium to big size tree up to 40m tall and bole up to 76cm diameter.	Peat swamp forest and lowland, up to 150 (-200) m altitude.
G. bancanus	Medium to big size tree up to 40 (-45) m tall and bole up to 120cm diameter.	Lowland freshwater swamp or peat swamp forest. It occurs up to 100 m altitude.
G. forbesii	Medium to big size tree up to 40 m tall, up to 85 cm diameter.	Swamp and dryland, up to 400 m altitude.
G. keithii	Shrub or small to medium size tree up 26 m tall and bole up to 90cm diameter.	Mostly on sandy soils, up to 400 m altitude.
G. lucidulus	Medium to fairly big size tree up to 36m tall and bole up to 40cm diameter.	Low undulating hill, on yellow sandy soil, up to 300m altitude.
G. macrophyllus	Medium to big size tree up to 45m tall and bole up to 100cm diameter.	Low and medium altitude, ascending 1500 m.
G. velutinus	Medium to large size tree up to 35m tall and bole up to 70cm diameter.	Sandy soil and clayey swampy soil, very low altitude.
G. xytocarpus	Medium to big size tree up to 36 m tall and bole up to 75cm diameter.	Heath and lowland forest, up to 100 m altitude.
G. stenosepalus	Small size tree up to 15m tall.	Lowland and hill, up to 1350m altitude.
G. bornensis	Small to medium size tree.	Lowland and hill, up to 1350m altitude.

Source: *Browne (1955), Cockburn (1976) and Soerianegara & Lemmens (1994)*

2.4 Yunus (2000) had reported the growth rates for all tree species for dryland / inland forests as in **Table 5**. He also noted in general the diameter increment is higher for light heavy hardwood (LHW), followed by medium heavy hardwood (MHW) then heavy hardwood (HHW), and ramin is belongs to the LHW. Shaharuddin (1997) provided an overview of the growth studies carried out in Peninsular Malaysia. A summary of general growth rates for all species are provided in **Table 6.** Bach (2000) reported the average annual diameter increment for all tree species of diameter class >15cm in two study sites of logged over peat swamp forest in Selangor, Malaysia were 0.51cm and 1.02cm.

2.5 Although some of tropical rain forest trees in flower and fruit all the time, most species bear flower and fruit only periodically, and many of them annually. Phonologically, they also show a single distinct and marked annual peak of flowering between March and July then fruiting from about July to October (Whitmore, 1984). Dipterocarps species in general fruit heavily every 2 – 3 years with occasional intervals of up to 5 years. *G. bancanus* is reported no difficulty to produce flowers and it fruits regularly. Four to five years were observed to be the interval for gregarious flowering and fruiting at the Pekan Peat Swamp Forest.

Table 5: General Growth Rates for All Species for Dryland Forests

Stem Size	Diameter Growth (cm/year)	Mortality (%/year)	Ingrowth (%/year)
Small pole (≥5-15cm diameter)	0.30	3.0	-
Big pole (≥15-30cm diameter)	0.42	3.6	2.1
Small tree (≥30-45cm diameter)	0.48	1.1	2.2
Big tree (≥45cm diameter)	0.53	1.9	2.6

Source: *Yunus (2000)*

Table 6: General Growth Rates for All Species in Peninsular Malaysia

Study	Year	Diameter Class (cm)	Diameter Growth (cm/year)	Annual Mortality (%)
FAO	-	>30	0.8-1.1	0.9
Borhan	1976-80	>10	0.6-0.9	-
Ashaari	1984-91	>10	0.5-0.8	6.6
Young	1974-88	>30	0.3-0.6	2.7
Chung	1976-88	>30	0.4-0.7	-
Karkee	1978-91	>15	0.4-1.0 0.4-0.8	1.9 1.9
Rahman	1979-89	>10(30)	0.4-0.7 0.3-0.5	3 3

Source: *Shaharuddin (1997)*

2.6 *G. bancanus* is one of common emergent trees of the peat swamp forest in Peninsular Malaysia together with Kempas (*Koompassia malaccensis*) and Durian Paya (*Durio carinatus*). Lee and Chai (1995) noted in Sarawak among the three ramin species in the peat swamp forest are *G. baccanus, G. maingayi* and *G. forbesii*, the most common is *G. baccanus.* Other *Gonystylus* species are often confined to a more restricted area and occur in more scattered (Soerianegara & Lemmens,1994).

2.7 *G. bancanus* is the most studied *Gonystylus spp*. because of its commercial importance and one of the common emergent tree species in the peat swamp forest. The seeds will germinate rapidly once they dropped to the ground but percentage of survival of seedlings in the natural forest is low. The seedlings were also reported to grow very slow under natural forest conditions and were classified as shade tolerant species (Lee, et. al. 1996). On the other hand, studies by Shamsudin and Ismail (1999) have shown that the species responded very well to rich soil and open conditions. A study conducted in Naman Forest Reserve and Batang Reserve in Sarawak, areas that had been logged 20 years ago, reported the seedlings survival rate was rather high [92%-94%] in the

first year but lower in the second year. Similar results were reported in the rehabilitation of grassland area in peat swamp forest (FDPM, 2004). Van De Meer et. al. (2004) observed that where remnant ramin trees have developed into new seed trees, there is abundant ramin regeneration. Indeed, Mohd Hizamri (2007) also found that peat swamp forest trees showed a good growth response, as the residual trees were enhanced in a relatively short period of just three (3) years after logging.

2.8 Analysis of ramin growth in logged over peat swamp forest had shown a mean annual diameter increment of 0.57cm dbh with a standard deviation of 0.36cm (FDPM, 2004). The analysis also showed highest diameter increment of 0.79cm was observed for the 30 - 39cm diameter classes and 0.64cm for 20 - 29cm diameter classes. However, in larger diameter classes, annual diameter increment declined to 0.49cm and smaller diameter classes to 0.40cm. Sia (2004) noted mean annual diameter increment for ramin in mixed swamp forest of Sarawak is 29cm for trees ≥30 cm dbh, highest diameter increment in the 30-40 cm class (achieving a mean of 0.45 cm) but slowed down slightly to 0.34 cm in the next diameter class of 40-50 cm and the increment in the intermediate size class (10-20 cm) averages 0.16 cm. The seedling in the enrichment planting in Kalimantan, Indonesia was reported to have an average growth in height of 12.5cm/year and an expected mean annual diameter increment of 0.5 - 0.7cm among the young trees, attaining 1 cm under optimal conditions (Soerianegara & Lemmens, 1994). Seedling planted at Forest Research Institute Malaysia (FRIM) after ten years planting have an average annual height increment of 100 cm and 0.79 cm diameter increment per year (Shamsudin and Ismail, 1994). In term of mortality, peat swamp forest species occurring in natural and logged-over forests recorded relatively similar rate with other inland forests at the average of 1.7% and 2.4% of tree stem $\geq$ 15 cm.year^{-1} respectively (Mohd Hizamri, 2007).

3.0 NATIONAL STATUS

3.1 At the end of 2006, the total area of forests in Malaysia was 19.4 million hectares or 59.5% of the total land area as shown in **Table 7**. There are approximately 1.55 million hectares of swamp forests in Malaysia. Of this total, 0.31 million hectares or 19% are in Peninsular Malaysia, 0.12 million hectares or 8% in Sabah and 1.12 million hectares or 73% in Sarawak. The peat swamp forest cover in Sarawak is about 0.88 million hectares and for the case of Peninsular Malaysia is approximately 0.31 million hectares.

3.2 **Table 8** shows the Malaysia's total forest area by year reported by FAO (FAO, 2007). The forest area for year 2005 in **Table 8** is included rubber tree plantation. Statistics of **Table 7** and **Table 8** show the stability of Malaysia's forest area for 15 years. Since Malaysia is Party to many Multilateral Environmental Agreements such as CITES, CBD, UNFCCC, UNFF, ITTA 1994, Ramsar and CCD, Malaysia is committed to these agreements objectives among others managing its forest resources in a sustainable manner and reverse biodiversity loss. On this score, Malaysia's forest area is believed to be stable in the future.

Table 7: Distribution and Extent of Major Forest Types in Malaysia, 2005 (Million hectares)

Region	Land Area	Natural Forest			Plantation Forest	Total Forested Land	Percentage Total of Forested Land
		Dry Inland Forest	Swamp Forest	Mangrove Forest			
Peninsular Malaysia	13.16	5.40	0.31	0.10	0.09	5.90	44.8
Sabah	7.37	3.83	0.12	0.34	0.11	4.40	59.7
Sarawak	12.30	7.92	1.12	0.14	0.06	9.24	75.1
Malaysia	**32.83**	**17.15**	**1.55**	**0.58**	**0.26**	**19.54**	**59.5**

Table 8: Malaysia's Total Forest Area

Year	Forest Area (1000 Ha)	% Of Land Area
1990	21661	65.9
2000	19292	58.7
2005	20690	63.6

Source: *State of The World's Forests 2007 (FAO)*

3.3 During the implementation of the New Economic Policy in 1970, particularly with two prime objectives, that is the eradication of poverty and distribution of wealth among the races. This also formed one of the strategies which are to develop large-scale agricultural program, particularly in rural areas. This has resulted in the opening up of forest areas for plantation crops such as palm oil and rubber in tandem causes reduction of

forested areas in Peninsular Malaysia. However, there was a significant increase in the gazettment of PRFs. In 1970, the total forested areas which was approximately 8.0 million ha had dropped to 5.90 million ha in 2006 or a decrease of 26 %. During the same period, the area gazetted as PRFs was 3.3 million hectares and it was increased to 4.7 million ha in 2006. This indicates an increase of 42 %. **Table 8** illustrates this trend.

3.4 In 2006, natural forest cover in Peninsular Malaysia was 5.81 million ha or 44.1 % of the total land area of the country. The bulk of these forested areas comprises 5.4 million ha of Dry Inland Forests, 0.31 million ha of Peat Swamp Forests, 0.10 million ha of Mangrove Forests and 0.09 million ha of Planted Forests.

Table 9: Forested Area and Permanent Reserved Forests (PRF) in Peninsular Malaysia (1970 – 2006)

Year	PRF (ha)	Forested Area (ha)		Year	PRF (ha)	Forested Area (ha)
1970	3,337,708	8,009,000		1989	4,866,201	6,320,000
1971	3,307,770	7,875,000		1990	4,866,470	6,270,000
1972	3,434,326	7,583,000		1991	4,748,057	6,111,000
1973	3,412,113	7,450,000		1992	4,675,021	6,042,000
1974	3,412,113	7,319,000		1993	4,698,459	6,024,008
1975	3,448,007	7,290,000		1994	4,687,463	6,003,000
1976	3,448,007	7,199,000		1995	4,684,904	5,991,000
1977	3,164,439	6,968,000		1996	4,684,094	5,820,547
1978	2,948,351	6,839,000		1997	4,731,927	5,852,869
1979	2,932,943	6,588,000		1998	4,730,216	5,838,860
1980	3,124,045	6,505,000		1999	4,853,646	5,938,068
1981	3,083,103	6,438,000		2000	4,837,500	5,979,649
1982	3,064,837	6,378,000		2001	4,840,431	5,924,407
1983	3,064,837	6,373,000		2002	4,701,858	5,892,901
1984	2,999,655	6,353,000		2003	4,696,211	5,879,723
1985	3,274,008	6,353,000		2004	4,683,505	5,866,876
1986	4,617,010	6,455,000		2005	4,711,264	5,888,190
1987	4,288,408	6,348,000		2006	4,738,035	5,913,242
1988	4,928,646	6,288,000		-	-	-

Source: FDPM (2007)

3.5 Recognizing the crucial role of forests not only in the production of timber, but more importantly in the conservation of soil, water and wildlife, as well as in the protection of the environment, Malaysia has designated a total of 14.39 million hectares of forested land as Permanent Reserved Forests (PRFs) managed under strict principles of sustainable forest management.

3.6 Based on the final National Forest Inventory Four (NFI 4) result that was carried out by the Forestry Department Peninsular Malaysia (FDPM) between 2002 and 2004, there are estimated 5.76 million trees of ramin [15cm diameter at breast height (dbh) or more] in Peninsular Malaysia, with an estimated volume of 5.49 million $m^{3,}$, refer to **Table 10**. A brief note on NFI 4 is in **Appendix 1**. Referring to **Table 10,** it can be seen that 70.2% of the total number of trees is between 15-30cm diameter sizes, 17.5% is 30 - 45cm diameter size and 12.3% is >45cm diameter size. The timber volume for the >45cm diameter size trees is 2,717,102 m^3 or 49.5% the timber volume for trees diameter size +15cm. **Table 11** is a subset of **Table 10** highlighting the *G. bancanus* species stocking by Forest Classes. Deliberation on the forest classes is presented in **Table 12**. From **Table 11,** for *G. bancanus* it can be seen that 40.7% of the total number of trees is between 15-30cm diameter sizes, 30.4% is 30 - 45cm diameter size and 28.9% is >45cm diameter size. The timber volume for the >45cm diameter size trees is 1,735,275 m^3 or 70.3% the timber volume for trees diameter size +15cm. Timber volume of *G. bancanus* (1,735,275 m^3) made-up 63.8% for trees of diameter size >45cm.

Table 10: Summary of *Gonystylus* spp. Stocking in Peninsular Malaysia by Forest Classes

Forest* Classes	Diameter Class 15-30 cm		Diameter Class 30-45 cm		Diameter Class > 45 cm		Total	
	Stem	Volume (M^3)	Stem	Volume (M^3)	Stem	Volume (M^3)	Stem	Volume (M^3)
1	12,837	9,024	121,678	90,567	26,517	161,205	161,032	260,796
2	773,629	339,883	163,242	166,285	15,499	85,460	952,370	591,628
3	320,314	130,019	58,971	54,708	13,436	26,526	392,721	211,253
4	0.0	0.0	101,823	135842	6032	57,911	104,855	193,753
5	789,552	269,804	77,280	72,431	108,876	348,347	975,708	690,582
6	284,527	124,279	24,461	32,607	17,923	65,162	326,910	222,048
7	211,029	111,994	284,893	330,692	369,520	1,515,645	865442	1,958,331
8	405,205	136,849	178,921	150,079	70,095	214,886	654,220	501,814
9	433,891	168,912	0.0	0.0	64,467	168,291	498,358	337,203
10	5,699	3,487	0.0	0.0	1,467	4,744	7,166	8,231
11	814,154	447,351	0.0	0.0	15,317	68,925	829,471	516,276
Total	4,050,837	1,741,602	1,011,269	1,033,211	709,149	2,717,102	5,768,253	5,491,915

Table 11 : Summary of *Gonystylus bancanus* Stocking in Peninsular Malaysia

Forest* Classes	Diameter Class 15-30 cm		Diameter Class 30-45 cm		Diameter Class > 45 cm		Total	
	Stem	Volume (m^3)	Stem	Volume (m^3)	Stem	Volume (m^3)	Stem	Volume (m^3)
7	211,029	111,994	284,893	330,692	369,520	1,515,645	865,442	1,958,331
8	405,205	136,849	178,921	150,079	70,095	214,886	654,221	501,814
10	5,699	3,487	0.0	0.0	1467	4744	7,166	8,231
Total	**621,933**	**252,330**	**463,814**	**480,771**	**441,082**	**1,735,275**	**1,526,829**	**2,468,376**

Table 12: Forest Classes Used In NFI 4

Forest Classes	Forest types
1	Good Virgin Inland Forests
2	Poor and Moderate Inland Forests
3	Logged over Forests (1-10 years)
4	Logged over Forests (11-20 years)
5	Logged over Forests (21-30 years)
6	Logged over Forests (> 30 years)
7	Virgin Peat Swamp Forests
8	Logged over Peat Swamp Forests
9	State land Inland Forests
10	State land Peat Swamp Forests
11	Protection Forests

3.7 The Malaysia/UNDP/GEF project (2001-2006) in Pahang has shown that the Pekan Peat Swamp Forest in Pahang Peninsular Malaysia, the volume of ramin trees 50 cm dbh and above is about 14 m^3 per hectare which is equivalent to 3.5 trees per hectare. The estimated number of ramin trees according to diameter classes >15 cm dbh, >30 cm dbh and >45 cm dbh is in **Table 13**.

Table 13: **Ramin Density By Diameter Classes Of Pekan Peat Swamp Forest, Pahang**

Diameter Classes	> 15 cm	> 30 cm	> 45 cm
No. of Trees / Ha	9.7	8.0	5.2

3.8 The Malaysia/DANCED project (1997-1999) conducted a pre-felling inventory study in the North Selangor Peat Swamp Forest and found that the number of ramin trees per hectare by diameter classes >15 cm dbh, >30 cm dbh and >45 cm dbh is in **Table 14**.

Table 14: **Ramin Density By Diameter Classes Of North Selangor Peat Swamp Forest, Selangor**

Diameter Classes	> 15 cm	> 30 cm	> 45 cm
No. of Trees / Ha	9.3	5.4	2.9

3.9 Lee (2004) stated that the stocking of ramin in the old growth stand in the peat swamp forests of Sarawak could be gauged based on a series of inventories carried out in the past. Among studies that had been done on ramin stocking were reported by Wood and Johnson (1964), Wood (1971) and Chai (1989).

3.10 Sixty-four (64) yield plots were established in Sarawak between 1971 and 1987, each consisting of 100 x 10 x 10 m quadrates, have been established at a sampling intensity of 0.25 % in the logged and silviculturally treated mixed swamp forest. Yield plots were designed to monitor forest recovery through providing information on recruitment, growth and mortality of ramin and predict timing of the next harvesting. Sia (2004) reported that the volume of ramin from the yield plots ranged from < 1m3 to 30 m3 ha-1. [**Table 15**]

Table 15: **Ramin Density, Volume Mean Annual Increment (VMAI) And Volume Content**

SITE	VMAI (m3/ha/yr)	Stem/ha	Volume (m3/ha)
Pulau Bruit PF		21	28.4
Naman FR	1.15	24	27.1
Simunjan FR		16	30.1
Triso PF		2	5.8
Sebuyau PF	0.42	14	27.0
Saribas FR		3	6.4
Daro FR	0.05	6	8.2
Tatau PF		19	5.5
Batang Lassa PF(YPs 30-36)		4	1.7
Loba Kabang PF	0.03	2	2.7
Bawan FR (YPs 43-48)	0.86	8	6.6
Bawan FR (YPs 65-72)	0.11	4	3.8
Batang Lassa PF(YPs 73-79)	0.04	7	2.9
Retus PF	0.01	1	0.9

Source: *Sia (2004)*

3.11 Lee (2004) also described inventories that had been carried out by the Forest Department of Sarawak in a few peat swamp forest which had been logged for ramin ≥48cm diameter ten years after exploitation, with a view to assessing present stocking and regeneration. Two type of inventory were completed, namely forest inventory and diagnostic sampling. Forest inventory sampled the upper limit growing stock while the diagnostic sampling sampled the growing stock of desirable species < 20 cm dbh. See **Table 16**.

Table 16: **Tree Density And Volume Of Ramin In Forest Logged 10 Years Previously**

SITE	Stem ha^{-1}	Volume[m^3 ha^{-1}]
Daro Forest Reserve	4.2	2.27
Loba Karang (North) Protected Forests	3.4	2.63
Loba Karang (South) Protected Forests	6.5	4.58

3.12 FDPM (2004b) noted that the *Gonystylus* spp. density for trees >15cm dbh in Peninsular Malaysia on average 1 - 3 stems per hectare in all forest types and also noted that for dryland forest the tree density is <1stem per hectare. Soerianegara & Lemmens (1994) noted in Sarawak the number of ramin trees over 20 cm in diameter is estimated at 2-20 trees/ha in mixed swamp forest and the standing stock of ramin may be as high as 35

m3/ha. Mixed swamp forest is the most extensive of the five peat swamp forest types in Sarawak (Lee and Chai, 1995).

3.13 A major threat to the species is the conversion of forested land to other land uses, especially peat swamp forests. In the process of land conversion, extensive drainage work to drain the water out from the peat swamp forests is carried out prior to commencement of other land preparation activities. All woody vegetation is completely cleared to allow for site preparations of planting a monocrop such as oil palm tree. Since *G. bancanus* is endemic to peat swamp forests will have tremendous impact on the regeneration and survival of the species in the surrounding forest area and may possibly derive the species to extinction. This type of land use activity will cause a major threat to all species that are endemic to peat swamp forests and should be avoided at all costs in the future. Hence, the major threat facing the species is habitat loss and alteration. For stateland peat swamp forests, habitat loss as s result of land development is a major threat and this is irreversible whereas timber harvesting which causes alteration in Permanent Reserved Forests is reversible. At the end of year 2005 about 50% of the peat swamp forests area is Permanent Reserved Forests and other reserved areas, which is managed under sustainable forest management.

3.14 There is no doubt that logging has a major impact on the natural processes occurring in the peat swamp forest and affect its long term stability by changing the drainage patterns and soil moisture content in the top peat layer by excessive canopy opening. Without the greatest care, logging could irrevocably accelerate the recovery of the forest stand. Similar impact will also happen in inland forests if sound management practices are not implemented. Under Malaysian management system, logging is regulated through a prescribed cutting regime that takes full account the adequacy of residual trees, species composition and their distribution that will respond to canopy opening by logging activities. Through management regime (e.g. cutting regime option) the stand content fluctuation can be controlled by controlling the degree of disturbance. The Malaysian management system is in line with the system stability of the ecological theory, which is clearly elaborated by Whitmore (1990), 'The time climax rain forest takes to return on a site depends on the severity of the disturbance. Low intensity selective logging on a polycyclic system closely mimics the natural processes of forest dynamics and scarcely alters the composition. Monocyclic silvicultural systems and polycyclic systems with many stems felled per hectare shift species composition to increase the proportion of the more light-demanding, faster-growing tree species.' Further deliberation on the sustainable forest practices is in the next section.

3.15 The production of ramin round log has fluctuated around 30,000 m^3 for the last few years. It should be noted while ramin log can be obtained from the inland forests the production of the ramin log per unit area in the peat swamp forest is much higher. In year 2005, ramin log production was about 32546 m^3 and **Table 17** shows the ramin log production by year.

Table 17: Ramin Log Production By Year (m^3)

Year	Pen. Malaysia	Sarawak	Total
2000	70,337	67,042	137379
2001	45,076	57,334	102410
2002	51,033	32,045	83078
2003	49,499	25,095	74594
2004	29,203	21,372	50575
2005	23,892	8,654	32546
2006	15933	4964*	20897*

Note: * January – November 2006

4.0 MANAGEMENT OF RAMIN

4.1 Since the early 1970's there has been wide spread public concern about the rate in which tropical forests are being degraded or destroyed. The rate accelerated with the introduction of the mechanization in timber harvesting, improved transport methods and land-use changes from forest to agriculture to support socio-economic development and increasing populations. Present concerns include increasing demand for timber from industries both local and international as well as the threats from illegal logging. Apart from these factors, deliberate fire, and land conversion leading to forest fragmentation possess new threats to the survival of the forest. In the peat swamp forest, alteration of hydrological regime of river systems may cause serious problem to the integrity of the ecosystem. Given this concern, the challenge is to manage the forest on a sustainable manner. Malaysia has high resource availability and high level of forest industry development. With increasing demand for timber, certain species such as ramin has been subjected to over-exploitation and thus long-term sustainable production of these timbers are at risk.

4.2 In Malaysia, the National Forestry Policy 1978 laid a firm foundation for the development of the forestry sector. It was revised in 1993 in recognition of the role of forests in providing a multiplicity of goods and services. The revised policy has had direct impacts on the management of forests through the establishment of permanent forest estates (PFE), large-scale forest plantations, importation of logs, greater incentives for downstream processing, promoting the utilization of lesser-known species and small-diameter logs, and manufacturing of value-added products. The National Forestry Policy 1978 and the National Forestry Act 1984 provide Malaysia

with a strong policy framework and laws to support sustainable forest management. Both the national policy and act provide a sufficient basis for the protection against harmful activities, promote establishment of wildlife parks and reserves and reduce activities that may cause detrimental impacts on the environment.

4.3 Various initiatives have been undertaken to ensure the sustainability of forest resources through improved forest management strategies such as introduction of Reduced Impact Logging (RIL), establishment of permanent forest estate certification, etc. In Malaysia, a selective cutting approach based on minimum diameter limits has been adopted. Currently, the production forests of the Permanent Reserved Forests (PRFs) in Peninsular Malaysia are managed under the Selective Management System (SMS) which entails the selection of optimum management (felling) regimes based on pre-felling forest inventories (Pre-f) and the retention of at least 32 sound commercial trees per hectare for diameter class of 30cm dbh up to the cutting limit. The System is designed to achieve sustainability of the forest with minimum forest development costs and to optimise the management objectives of economic and efficient harvesting under prevailing conditions. The cutting cycle under the System is approximately 30 years with an expected net economic outturn of 40-50 m^3/ha. After the first cut, the residual stand should be enriched with dipterocarp species. A flexible cutting limit approach has been adopted for three timber group namely, chengal (*Neobalanocarpus heimii*), dipterocarps and non-dipterocarps. Ramin falls into the non-dipterocarp group. The minimum cutting limits are set at 60 cm, 50 cm and 45 cm dbh for chengal, dipterocarp and non-dipterocarps, respectively. Under SMS, the cutting limit of dipterocarps will always be higher than non-dipterocarp by at least 5 cm.

4.4 Application of blanket cutting limits to all species or broad species group will not be appropriate as it does not provide a means for the sustainable utilization of ramin, except for Sarawak. As in the case of ramin, it is unique to peat swamp forests and in some instances large trees predominates the stand. Applying broad species grouping to these forests may affect the long-term sustainability of ramin population, as ramin is grouped under non-dipterocarps. A revision of the species grouping that will make ramin its own group is needed to ensure the sustainable utilization in peat swamp forests.

4.5 Besides the application of the cutting limits, several key growth parameters need to be reviewed such as the stocking density of healthy residual trees, growth, mortality and recruitment rates for ramin. The analyzed data from permanent sample plots will be used to assess the population dynamics parameters and developing population projection models. Currently, a study is being carried out in Malaysian peat swamp forest to determine ramin population structure to prescribe the appropriate cutting limit that will support sufficient residuals. This will also include applying a revised logging damage factor for peat swamp forest as new long haulage machine has been introduced that causes less damage to the site and residual trees.

4.6 In Sarawak, *G. bancanus* trees are currently conserved in the Totally Protected Areas (TPA's) in the Permanent Forest Estate (PFE), of which many are reserved as water catchment areas. The species are conserved particularly in Maludam National Park (NP), Loagan Bunut NP, the proposed Sedilu NP, the proposed Ulu Sebuyau NP and the proposed Bruit NP of about 77,999 ha. 41,360 ha of these forests are Mixed Swamp Forest. In additions, other conservation ramin areas that are reserved as water catchment include the proposed Bukit Sarang-Binyo Penyilam NP (23,145 ha), Mud Volcano NP (2,000 ha), Batang Jemoreng Protected Forest (&,416 ha), Setuan Forest Reserve (11,128 ha), Balingian Forest Reserve (8,072 ha) and Batang Lassa Protected Forest (5,634 ha).

5.0 HARVEST MANAGEMENT OF RAMIN

5.1 Malaysia is fully committed to combating illegal logging and trade in illegally-source timber and supportive on initiatives which are aimed at curbing such activities. Malaysia has taken much effort to put an end to illegal felling and to a very large extent this work has been successful. In term of law enforcement of ramin harvesting and trade/export, there are several agencies tasked to enforcing related forestry laws in Malaysia such as FDPM, The Sarawak Forest Department, The Sabah Forest Department and supported by key agencies such as the Malaysian Timber Industry Board (MTIB), Sarawak Forestry Corporation (SFC), Sarawak Timber Industry Development Corporation (STIDC) and Harwood Timber Sendirian Berhad, apart from the assistance from the Police and Army that also active not only to curb illegal logging but also in flushing out and intercepting illegal logging activities, especially along border areas. Thus, a study on illegal logging in Malaysia, conducted by the Worldwide Fund for Nature, Malaysia which was sponsored by the World Bank and presented at the Workshop on Illegal Logging in East Asia in Jakarta, Indonesia from August 27-28, 2000 had found that the level of illegal logging in the states of Sabah and Sarawak to be small (in the order of 1% or less) compared to the legal wood products trade, while illegal logging in Peninsular Malaysia is well under control. To ensure only legal logs go into processing mills, Malaysia implements a system of recording and monitoring of both all logs entering mills and for the outgoing products. This system ensures that logs from illegal sources cannot enter the chain-of-custody of illegal sourced logs.

5.2 Prior to uplisting of ramin under Appendix II of CITES, Malaysia has long recognized its importance and place several restrictions to control its harvest and trade. The Ramin Logs Prohibitions of Export Order 1980 and followed by The Ramin Shorts and Ramin Squares Prohibition of Export Order 1991were proactively enforced in Sarawak before the issue of ramin was ever brought up. Both orders controlled the rate of ramin harvest by encouraging more local processing of ramin instead wholesale export of logs. Stringent measures are also in place to control the export of ramin whereby CITES export permits are required by the authorities. Furthermore, an export license issued by the Controller of Wild Life, Schedule of Timber Shipment and Sales Contract are all

required for ramin export. Further steps including administrative ban on imports of all types of logs and large squares and scantlings (LSS) from Indonesia has been put into place since 2002 and 2003. The ban was incorporated into law in the Customs Prohibition (Amendment) Order 2006, and thus, it is an offence to import Indonesian logs and LSS into Malaysia. Particularly for Sarawak, only five (5) points of entry have been authorized for timber products to ensure effective monitoring and control of log movements to or from the state. Authorisation of imports of permitted timber products is subject to valid documentations such as the Indonesian transport permits (SKSHH) and customs documentation (PEB).

5.3 One of the most important measures taken to safeguard and protect the forest resources from encroachment and illegal logging in Malaysia is through the further strengthening of the provisions of the National Forestry Act 1984 in 1993. In this regard, the penalty for the commission of any forest offence has been increased from the maximum penalty of RM10,000 (±US$2,940) or an imprisonment for a term not exceeding three years or both to a maximum penalty of RM500,000 (±US$147,060) and imprisonment not exceeding 20 years with a mandatory imprisonment of not less than one year. The amended National Forestry Act has also enacted provisions for the Police and Armed Forces to undertake surveillance of forestry activities, especially in curbing illegal logging, encroachment of forested areas and timber theft. This has proven to be very successful in arresting illegal logging and timber theft in Malaysia. Worldwide Fund for Nature (WWF), Malaysia which was sponsored by the World Bank and presented at the Workshop on Illegal Logging in East Asia in Jakarta, Indonesia from August 27-28, 2000 had reported the average number of illegal logging several years shows a declining trend, where average number of illegal logging cases dropped cases dropped from 223 for the period 1987 – 1993 to about 28 for the 1994 – 1999 period. At the regional level specific on ramin, Malaysia, Indonesia and Singapore have worked effectively to curb trading of illegal ramin through the Tri-National Task Force on Ramin.

5.4 An Act called International Trade in Endangered Species Act 2007 *[Act 686]* to provide for the administration and management of international trade in endangered species to ensure that the trade does not threaten the survival of any species of wild fauna and flora has been passed by the Parliament on 24 December 2007. The Act will be gazzetted soon and a number of regulations will be drafted to ensure smooth implementation of the Act. Beside the informal day-to-day communication between lead MA and MAs, National Steering Committee on Trade of Wild Flora and Fauna consists of not only the MAs but other related agencies from the enforcement side, Scientific Authorities and also trade and foreign affair-related Ministries has also been established. The Committee has met regularly to ensure consistency with the position of the Convention. There are also two task force committees on flora and fauna to discuss matter in details before bring up to the Steering Committee. Malaysia also established MY-WEN in support to ASEAN WEN initiative.

5.5 Since the beginning of the last century, the forests of Malaysia have been systematically managed whereby ecologically and environmentally sound forest conservation and management practices have been developed to ensure forest renewal and sustained yield. The Selective Management System (SMS) practiced in Malaysia has already embedded the elements of precautionary principle which is based on the sustained yield principles and system stability of the ecological principles. Under this management system among fundamental principles in determining the annual harvest quota or annual coupe are as follows (Anon, 2002):

(i) Annual coupe is calculated based on harvestable production area, and

(ii) Annual volume removed be less than or equal to mean annual increment.

5.6 Mohd. Darus (1983) stated that the SMS is a flexible timber harvesting regime with the objectives to safeguard the forest ecosystems, to maintain the forest productivity and to take advantage of the demands of the timber markets. Under this system of forest management, growth rates, residual stand and the required stand determine the length of the cutting cycle. By contrast higher growth rates and residual stand contents will lead to a shorter cutting cycle and higher annual coupe (Thang, 1988).

5.7 Yunus (2000) concluded that the SMS satisfies the ecological sustainable harvest management outlined by Cannon, *et. al.* (1994) – 'Ecologically based on management for sustainable harvest requires, at a minimum, three (3) essential types of data: (1) the effects of logging practices on the composition and structure of the residual stand; (2) estimates of the parameters of growth and survival that determine recruitment into harvestable sizes during stand development after logging; and (3) density and composition of regeneration.'

5.8 In practice the control and regulation of forest resources is carried out using the Area Control and/or Volume Control methods as prescribed in the forest management plan. In this regard, the allocation of the annual felling coupe for the Permanent Reserved Forests (PRFs) is based on forest inventory data, the net area of production forest and the current silvicultural management practices that are being prescribed. The annual coupe is determined for every five years period which is decided by the National Forestry Council. This council is chairs by the Honorable Deputy Prime Minister and the members are the Head of The State Government and a number of keys Ministers. This council seat one every year and one of the agendas is monitoring the compliance of areas licensed for logging. The annual coupe for 2006 – 2010 is 266,940 hectares, which is about 2.4% of the production forest area. **Table 18** shows the annual coupe by period:

Table 18: **Annual Coupe by Period for the Permanent Reserved Forests**

Period	Annual Coupe (ha.year^{-1})
1996 – 2000	276,040
2001 – 2005	272,870
2006 – 2010	266,940

5.9 The Director of the State Forestry Department is required under Part II Section 4 of the National Forestry Act, 1984 to prepare and implement a 10-year Forest Management Plan. The Director is also required to, prepare and implement a 5-year Forest Development Plan at the state level and at every required to prepare an Annual Forest Operation Plan. These plans spell out covering the management, conservation and sustainable development of the forest resources in the State and its Forest Districts.

5.10 The peat swamp forests in the Permanent Reserved Forests (PFRs) are also managed under Selective Management System. The cutting cycle for peat swamp forest is 40-60 years. While the minimum cutting limit is 45 cm dbh for non-dipterocarps and 50 cm dbh for dipterocarps. On the other hand, Sarawak is working on an empirical harvesting period rotation of 45 years with a minimum cutting diameters fixed at 40 cm dbh. In Pahang State Peninsular Malaysia, the cutting prescribed for the peat swamp forests are 50 cm dbh for non-dipterocarps and 60 cm dbh for dipterocarps. However, in actual practice, trees of a much higher diameter (>70 cm dbh) are removed. Besides the 10-year Forest Management Plan, a management plan for the peat swamp forests of Selangor was also prepared by the Malaysia/DANCED project in 1999 while a management plan for the south-east Pahang peat swamp forest is being prepared under the Malaysia/GEF/Danida project (2001-2005).

6.0 NON-DETRIMENTAL FINDINGS ON RAMIN FOR MALAYSIA YEAR 2008

6.1 At the Thirteenth Meeting of the Conference of the Parties of CITES, Malaysia together with all Parties agreed that ramin (*Gonystylus* spp. be uplisted from Appendix III to Appendix II, which entered into force on 12 January 2005. In this regard, Malaysia as one of the range states is taking actions to implement the conditions associated with the trade in Appendix II CITES species. This includes the issuance of CITES export and import permit and re-export certificate and making non-detrimental findings (NDF) to assist in determining whether the export of the species will not be detrimental to the survival of the species.

6.2 This NDF on ramin is prepared based on the CITES document Inf. 11.3 "CITES Scientific Authorities: Checklist To Assist In Making Non-Detrimental Findings For Appendix II Exports". The NDF on ramin is as at Appendix 2 [Table 1 and Table 2 for all ramin species (*Gonystylus* species), where as Table 1B and Table 2B only on *Gonystylus bancanus*].

6.3 The determination of the cautious harvest quota was based the current scientific information and stocking data, such as silvicultural characteristics, growth data, inventory data, forest acreage, forest type and stand density. Precautionary principles are also applied to ensure the harvest level is not detrimental to the survival of the species. The report also contains deliberations on the Malaysia's forest sustainable management system and practices, such as the Selective Management System and harvesting control.

7.0 CAUTIOUS HARVEST QUOTA DETERMINATION

7.1 The approach applied to determine the cautious harvest quota of ramin is based on volume, tree size, area, and species group control. The tree silviculture parameters taken into account in the approach, *inter alia* tree growth rate, species distribution and population, and forest recovery capacity.

7.2 In order to ensure a conservative cautious harvest quota for ramin, precautionary principle has also been applied by taking into the calculation the following parameters, among others:

(i) The trees of the Protection Forests are excluded in the calculation as the function of the forests is for conservation.

(ii) General tree growth rate used in SMS for natural forest, that is 0.8 – 1cm per year. However, for the determination of the harvest quota, the tree diameter growth rate used is 0.3 – 0.6cm per year. There are studies that have shown the growth rates to be higher.

(iii) The forest harvesting rotation used for dryland and peat swamp forest in Peninsular Malaysia are 30 – 55 years and 40 – 60 years respectively. In the case of ramin production, the rotation period used in determining the harvest quota is 50 years. In Sarawak, the rotation period practice for peat swamp forest is 45 years and the lowest cutting limit for ramin is not less than 40 cm diameter.

(iv) Using a lower growth rates and long rotation period in the growth projection, it will not only lower the harvest quota but would further ensure that the crop trees for the next harvest will grow to the targeted size of >45cm diameter and it is likely to be >50cm diameter. It is projected that the next harvest crop will be 60cm diameter and above.

(v) In accordance to SMS practiced in Peninsular Malaysia, trees allowed to be harvested are not less than 45cm diameter and in Sarawak is not less than 40cm diameter. These minimum allowable cut are higher or at least equal to the allowable cut recommended by SGS Qualifier Programme for PT Diamond Raya Timber Indonesia (Anon, 2000 and Anon, 2003).

(vi) Most of the forested areas (dryland forests) in Sarawak and all forested areas in Sabah were not taken into calculation to determine the cautious harvest quota for Malaysia.

7.3 The calculation method used to calculate the cautious harvest quota for Peninsular Malaysia for *Gonystylus* species and *G. bancanus* are as follows:

7.3.1 *Gonystylus* species

(i) The timber volume of ramin (dryland and peat swamp forest) is approximately **2,648,177m^3**. [Exclude trees from the Protection Forests areas (Refer to **Table 3.6**)]

(ii) The harvesting rotation period used is 50 years. [Refer to **paragraph 7.2 (iii)** above]

(iii) Annual production of round log = (2,648,177 ÷ 50) = **52,963m^3** per year

(iv) Estimated sawn timber production based on 70% recovery
= (52,963 x 0.70) = **37,074** m^3

For 2008, the cautious harvest quota for ramin (*Gonystylus* spp.) for Peninsular Malaysia is proposed as for year 2007, which **43,000m^3 .**

7.3.2 *Gonystylus bancanus*

(i) The timber volume of ramin (dryland and peat swamp forest) is approximately **1,735,275m^3**. [Exclude trees from the Protection Forests areas (Refer to **Table 3.7**)]

(ii) The harvesting rotation period used is 50 years. [Refer to **paragraph 7.2 (iii)** above]

(iii) Annual production of round log = (1,735,275 ÷ 50) = **34,705m^3** per year

(iv) Estimated sawn timber production based on 70% recovery
= (34,705 x 0.70) = **24,293m^3**

For 2008 the cautious harvest quota for *G. bancanus* for Peninsular Malaysia is **24,000m^3**

7.4. The calculation method used to calculate the cautious harvest quota for *G. bancanus* (peat swamp forest species) for Sarawak is as follows:

(i) Production peat swamp forest area is approximately = 880,000 – 53880 = **826,120 hectares**.
[Peat swamp forest is about 880,000 hectares and out of it 53,880 hectares is National Park. (Refer to **Paragraph 3.0**)]

(ii) Harvesting rotation practice in Sarawak is 45 years
(Cutting limit is ≥40 cm diameter)

(iii) Annual harvesting coupe = 826,120 / 45 = **18,358.2 hectares**
(Assuming that the current extent of peat swamp forest will remain stable for the next five years)

(iv) Based on **Table 3.10**, it is calculated that the average mean annual volume increment is 0.33 m³/ha. [Refer to **Paragraph 3.0**]

(v) Annual production of round log = (18,358.2 * 0.33) = **6,058**m^3 per year

(vi) Estimated sawn timber production based on 70% recovery
= (6,058.2 x 0.70) = **4240**m^3

Therefore, the proposed 2008 cautious harvest quota for *G. bancanus* for Sarawak peat swamp forest is **6000m^3.**

7.5 Ramin (*Gonystylus* spp.) cautious harvest quota for year 2008 for Malaysia is proposed as for year 2007, **50,000 m^3**. This quota has taken into account the derived quotas of paragraph 5.31 and 5.4 above. Also taken into account significant acreage of forested areas were not taken into account in calculating the cautious harvest quota for the country. Based on 70% recovery rate it is estimated the sawn timber production is **35,000 m^3**.

7.6 Out of **50,000 m^3** cautious harvest quota for *Gonystylus* species, it is proposed the cautious harvest quota for *G. bancanus* is **30,000 m^3** for Malaysia for 2008. Based on 70% recovery rate it is estimated the sawn timber production is **21,000 m^3**. This quota has taken into account the derived quotas of paragraph 7.3.2 and 7.4 above.

8.0 CONTROL OF HARVEST

8.1 Protected areas in Malaysia are areas that have been legally gazetted or registered by either State or Federal legislation. The protected areas cover both terrestrial and marine environments. Almost half of the total land area covers both terrestrial and Permanent Reserved Forests (PRFs). Of this, about 76% of the total PRFs are considered 'production' forests, where forests may be commercially harvested. The remaining areas under PRFs are given protection status, where commercial logging is prohibited, and are regarded as totally protected areas. As forestry is a state matter, all forest lands belong to the State. Hence, the issues of resource ownership / tenure of local communities are not applicable in Malaysia. In view of this, there is no open access to harvesting by local communities except by license.

8.2 At the end of 2005, total PRFs area is 14.39 million hectare or 43.8% of the land area. Approximately 11.18 million hectares of the PRFs are production forests with the remaining 3.21 million hectares being protection forests. This protection forest is excluding other protection forests outside the PFRs such as national parks and wildlife sanctuaries. In total Malaysia has designated more than 5 million hectares of it forest cover as protection forest, which is more than 15.3% of it land area. This protection area covers various forest types such as peat swamp forest, mangrove forest, lowland forest, hill forest and montane forest.

8.3 For forested areas identified to be harvested, there are a set of pre-harvest activities that have to be carried out prior to harvesting operations which culminates in the preparation of the Forest harvesting Plan. The guidelines for implementation are available. In this regard, the activities carried out include conducting a pre-felling forest inventory, determine the cutting limits, marking of trees for felling, marking of mother trees for retention, demarcation of buffer strips, planning and the construction of feeder roads and skid trails, and the preparation and implementation of a forest harvesting. **Table 8.1** shows the sequence of operations of the Selective Management System practices in the Peninsular Malaysia.

8.4 Hence, once a forest area has been approved for logging and the premium paid by the successful tendered, the issuance of a forest logging license will commence. First, the boundary earmarked for logging is marked and approved on the ground. Then a pre-felling forest inventory with 10% sampling intensity and using systematic-line plots is a carried out one to two years before forest harvesting to collect information on trees of all sizes from seedlings to big and mature trees, as shown in **Table 19**. The results of the pre-felling forest inventory are than analyzed and used to determine the prescribed cutting limits for the area to be harvested. One consideration that is taken into account when determining the cutting limits is to ensure that the residual stand after harvesting contains at least 32 sound trees per hectare of class 30-45 cm diameter at breast height (dbh) that will yield a final crop of 25 commercial trees per hectare at the next harvest in 25-60 years, covered inland forests and peat swamp forest.

Table 19: Selective Management System: Sequence Of Operations Practice in Peninsular Malaysia

Year	Operation
n-2 to n-1	Pre-felling forest inventory of 10% sampling intensity using systematic-line-plots to determine appropriate cutting limits (cutting regimes)
n-1 to n	Tree marking incorporating directional felling ▪ Marking of trees to be felled ▪ Marking of seed / mother trees ▪ Marking of protection and protected trees ▪ Marking of trees for roads construction ▪ Demarcating boundaries of buffer zone for watercourses
n	Felling of trees
n¼ to n½	Forest survey to determine damage to residuals and royalty on short logs and tops
n+2 to n+5	Post-felling forest inventory of 10% sampling intensity using systematic-line-plots to determine residual stocking and appropriate silvicultural treatments
n+10	Forest inventory to determine regeneration status of the Forest

8.5 Based on the prescribed cutting limits, all trees to be felled are than marked and its felling direction determined. It is carried out at least a year prior to forest harvesting. Besides these trees, other trees marked include mother trees, protected trees and trees along the boundary of buffer strips, as shown in **Table 8.1**. Tree marking is implemented as a mean to control output and to prevent illegal felling and excessive removal of the timber stand.

8.6 A forest harvesting plan is then prepared. The plan also contains a map showing pre-determined feeder roads (railways or canals) and skid trails to be constructed to comply with various specified guidelines. Once the forest harvesting plan is approved by the Department, harvesting can then commence.

8.7 Harvesting is usually carried out using traxcavator and canal systems and the second stage is to haul the logs to the river or main road for transportation to outside landing sites or sawmills. Recently, a modified excavator with a long arm and cable winching capabilities has been used in Pahang. This equipment is used to winch logs from the stumps to the feeder road where they are transported to a central landing. In Sarawak logging using '*kuda-kuda'* though labor intensive is used and considered more environmental friendly than inland forests logging (uses heavy machineries).

9.0 MONITORING OF HARVEST

9.1 Under the law all movement of logs must be accompanied by a removal pass. The removal pass is issued by the Forestry Department officer as a prove document that all government fees have been paid and the logs came from license area. This paper-based system is one of the control mechanisms in place to monitor harvesting operation and movement logs. To enhance further ramin species conservation through stricter harvesting control, especially for peat swamp forest species, the logs of the *Gonystylus bancanus* will be recorded in the removal pass at a species level. For other ramin species, of inland forest, will be recorded at genus level due to practicality reasons.

9.2 It has been the practice of the Department to conduct periodic monitoring of forest harvesting operations once a month to prevent over-cutting the area and thus violating the very principle of sustained yield management. At the completion of the harvesting operations, a Closing Report is prepared to check log wastage and ensure that no protecting the integrity of the environment and in minimizing the loss of forest biological diversity during forest harvesting operations, as well as to further strengthen the monitoring process, the procedures for monitoring forest harvesting operations and those on the preparation of the Closing report have been revised and updated.

9.3 In this context, the current procedures for monitoring forest harvesting operations are contained in the document entitled "Checking and Monitoring Forest Harvesting' (*Pemantauan dan Pengawalan Pengusahasilan Hutan*), while that for the preparation of the Closing Report on Forest harvested can be found in the document entitled "Preparation of Closing Report on Forest Harvesting' (*Penyediaan Laporan Penutup Pengusahasilan Hutan*). Each document outlines the steps to be taken and identify the persons responsible in implementing them.

9.4 This is followed by a post-felling forest inventory using systematic-line-plots with a 10% sampling intensity. Its' objective is to gather information on the actual condition of the residual stand after harvesting and the types of silvicultural treatment needed. The guidelines to conducts the inventory is clearly spelt out in the field guide for post-felling forest inventory.

9.5 The implementation of the above standard prescription will not only provide but also ensure conducive forest conditions for the growth of the residual stand for the next cut with minimum damage to the environment and the loss of forest genetic resources.

9.6 To ensure the management practices and procedures are implemented accordingly, Malaysia through Malaysian Timber Certification Council (MTCC) has developed and put in place a forest management certification scheme. This scheme is based on the ITTO 1998 criteria & indicators of sustainable forest management. The current MTCC forest management scheme is based on the FSC template. MTCC forest management certification scheme is one of the tools in place in Malaysia to ensure the implementation of sustainable forest management. Currently in Malaysia about 33% of the PRF areas are subjected to the 3rd party auditing under this scheme. The other tool that implemented supporting SFM is MS ISO certification. In Peninsular Malaysia the forest harvesting procedures is subjected to MS ISO 3rd party auditing.

9.7 The Forestry Department full recognized that monitoring the growth of trees is essential for yield regulation in the overall context of sustainable forest management. The accuracy of the data and projections of the ability of the forest to grow is thus important to enable the forest manager to formulate management, conservation and development strategies needed to achieve the goal of sustainable forest management. Towards this end, the Department has established two types of permanent sample plots (PSPs) to monitor growth. They are growth plots and growth and yield plots. Growth plots are established in logged-over forest areas of varying ages to monitor the growth of harvested forests, while growth and yields plots are established in forest areas which have been harvested based on a set of pre-determined cutting regimes to enable the Department study the response of forest growth under various cutting options.

9.8 For the peat swamp forest, two (2) growth plots in Sungai Karang Forest Reserve, Selangor in 1993/1994 have been established. These plots were established to monitor the growth of residual trees of logged-over peat swamp forests. Under the Eighth Malaysia Plan (2001-2005), further two (2) permanent sample plots were established, one each in the state of Pahang and Selangor. These growth plots were established during an earlier DANCED project in 1998 and the Department undertook the task of re-measuring these plots and would plots would be periodically measures and analyzed to continuously update and for the sustainability of the forest resources. In Sarawak, sixty-four (64) yield plots were established in Sarawak between 1971 and 1987, as deliberated in paragraph 2.8.

9.9 Forest stand content and growth is dynamic dependence on the forest conditions such as canopy opening, species composition and ground disturbance. Hence it requires continuous monitoring on the growth response, especially the peat swamp forest. Changes in the forest types acreage is another key factor needs to be monitored because it determines the capacity production different of species. For Peninsular Malaysia will continue to monitor growth response of ramin species through its growth and permanent sample plots and continue to update its forest acreage especially the peat swamp forest for ramin production. For Sarawak and Sabah on top of what have been mentioned, is to conduct stocking inventory.

10.0 INCENTIVE AND BENEFITS FROM HARVESTING

10.1 As identified in paragraph 2.12 and 2.13 the two major threats to the harvest of these species are the conversion of forested land to other land uses, over exploitation and not control logging operations. Continuous timber production in a sustainable manner that directly contribute to the State government and provides employment to the local provide, as such long-term benefits derived has provided the incentive for the State government to gazette such areas as PRFs rather than earmarking them for development purpose. Sustainable management also ensures the conservation and protection of biological diversity, the rational and sustainable utilization of genetic resources, and ecological and environmental balance.

10.2 Without the greatest care, logging could irrevocably accelerate the recovery of the forest stand. Under Malaysian management system, logging is regulated through a prescribed cutting regime that takes full account the adequacy of residual trees, species composition and their distribution that will respond to canopy opening by logging activities. Through management regime (e.g. cutting regime option) the stand content fluctuation can be controlled by controlling the degree of disturbance. As such, damage to the residual stand is minimized and the forest and the species are able to regenerate for the next harvest. Deliberation on the forest management system and practice has been done in the previous paragraphs.

10.3 Peat swamp forest conservation and to a large extent ramin species and habitat conservation are taken seriously by the Government. It has supported several key conservation initiatives, the latest being the project on the Conservation of Tropical Peat Swamp Forests and Associated wetland Ecosystems. This Malaysia/UNDP/GEF project was initiated in 2001 to better manage the country's peat swamp forest. Its objective is to conservation and sustainable use of globally significant genetic, species and ecosystem diversity in the country's peat swamp forest. The five-year project will contribute to implementation of the Malaysia Biodiversity Action Plan by demonstrating conservation and sustainable management of peat swamp forest in

southeast Pahang together with that of Loagan Bunut National Park in Sarawak and the Klias Peninsula in Sabah. The project will assist State governments in preparing site-specific management plans and facilitate improve land use decision-making processes to ensure the sustainability of the peat swamp forest ecosystem. The project would use multifunctional zoning to propose areas for protection and production within the Pekan peat swamp forest.

11.0 PROTECTION FROM HARVEST

11.1 The four broad categories of the Permanent Reserved Forest (PRFs) include production forest, protection forest, research and recreation forest and amenity forest. Not all PRFs are managed for timber. Forests under PRFs are also maintained and managed for ecological and social benefits. These include protection forest that serve to safeguard water supplies, prevent soil erosion and minimize flood damage. As viable habitats, protection forest conserve biodiversity and soil fertility since disturbances such as logging are not permitted.

11.2 In its efforts to further conserve various forest and ecological types in their original conditions, the Forestry Department has also set aside pockets of virgin forest. These pockets, known as Virgin Jungle Reserves (VJRs), were established to serve as permanent nature reserves and natural arboreta, as controls form comparing harvested and silviculturally treated forests and as undisturbed natural forests general ecological and botanical studies. VJRs have also been established in virgin peat swamp forests. Currently, a total of three (3) VJRs have been established in Selangor (1) and Pahang (2) with a total area of 473 hectares. The VJR in Selangor is located in Kuala Lumpur Forest Reserve with an area of 174 hectares while that in Pahang is in Menchali Forest Reserve (96 ha) and Pekan Forest Reserve (203 ha). In addition, a small area of peat swamp forest is protected within Sungai Dusun Wildlife Sanctuary, Selangor which has an area of 4,330 hectares. No logging is allowed in these protected areas.

11.3 The Forestry Department peninsular Malaysia has also established two (2) growth plots in Sungai Karang Forest Reserve, Selangor in 1993/1994. These plots were established to monitor the growth of residual trees of logged-over peat swamp forests. Under the Eighth Malaysia Plan (2001-2005), a further two (2) permanent sample plots were established, one each in the state of Pahang and Selangor. These growth plots were established during an earlier DANCED project in 1998 and the department undertook the task of re-measuring these plots and would continue to monitor and gather data on the growth of the residual trees.

11.4 Sarawak has designated two peat swamp forest as National Park, namely Loagan Bunut National Park (10,736 hectares) and Maludam National Park (43,147 hectares). An area of approximately 10,000 hectares has been proposed as an extension to Maludam National Park. Two more peat swamp forest areas are being proposed as totally protection areas, namely Sebuyau Forest Reserve (27,275 hectares) and the Batang Lassa Forest Reserve (27,275 hectares).

11.5 In the current Malaysia/UNDP/GEF project, using multifunctional zoning, about 33% of the Pekan Forest Reserve has been proposed as Protection Area where it is exclude from harvesting. Such areas can be further gazetted as water catchments forest under Section 10(1) of the National Forestry Act 1984. In total about 10% of the existing peat swamp forest area in Malaysia has been designated or agreed to be allocated as totally protection area.

11.6 Under current forest management practices, before an area is opened for logging under the Selective Management System (SMS), a pre-felling forest inventory is first conducted to determine whether there is adequate stocking of trees available for the next cut. If the analysis of the results of the pre-F inventory indicates that there in inadequate stocking of residuals, the area would not be opened for logging.

12.0 **TRADE**

12.1 The ramin export quota for Peninsular Malaysia and Sabah in 2007 was at 20,000 m^3 and 3,178 m^3 for Sarawak. About 6,394 m^3 of ramin specimen, products and parts and derivatives was exported from Peninsular Malaysia and 5,674 m^3 of sawn timber and 4,319 m^3 in dowel /moulding specimen for Sarawak in 2007. Products of ramin exported consists of sawn timber (35 %), dressed timber (25 %), picture frame (15 %), moulding (10 %), baby cot (10 %) and various products of finger-jointed S4S, venetian blind, baby crib, louver doors, wood frame, basinet and furniture (5 %). The reduction in export was due to the temporary suspension of export to the European Union (lifted on 7 December 2007) and Australia (still in effect).

13.0 MALAYSIA PROJECTS FOR ITTO-CITES SUPPORT AND FUNDING

13.1 Malaysia is very serious to conserve and sustainably manage ramin. To achieve this, it is important for Malaysia to provide sufficient and credible information on ramin population, biological and ecological status should be made available to determine sustainable level of harvests and assist in designing rehabilitation and conservation programs as well as awareness and capacity building are the mains factor in the conservation, as well as sustainable utilization and management of this species in Malaysia. As such, Malaysia is going to collaborate to carry out projects with the support and funds of International Agencies. In line with this, ITTO has approved six (6) proposed projects submitted by Forestry Departments of Peninsular Malaysia, Sabah and Sarawak and Forest Research Institute of Malaysia through NRE for implementation under the ITTO project on "Ensuring International Trade in CITES-listed Timber Species is Consistent with their Sustainable Management

and Conservation" with the budget that has been tentatively earmarked for Malaysia this year only amounted to about US$ 500,000. The summary of the projects work programme in 2008 are outlined in **Table 20.**

13.2 In general, the proposed projects to comprehensively conduct inventories to collect information of its distribution, population dynamics, status and to estimate the growing stock of ramin in the forest areas in Malaysia. The projects also involve to develop DNA database of ramin to study the genetic variations and differentiation of its populations that also can used to enhance the effort particularly using molecular methods for tracing and tracking of ramin timber and thereby confirming whether the timber is legal or illegal obtained. One component under the projects embarks on the spatial distribution maps of ramin species in the country through the use of the recent hyperspectral technology. On the other hand, Malaysia also will strengthen and improve the efficiency of ramin tree marking operations and forest revenue system as well as to expedite the issuance removal pass during timber transportation from logging areas using a customized cost-effective RFID based timber monitoring under the ITTO-CITES project.

13.3 The proposed projects are expected to increase knowledge, capacity building, awareness and enforcement compliance on CITES issues not only to forest department officers and related agencies such as the Ministry of Natural Resources and Environment (NRE) and The Ministry of Plantation Industry and Commodities (MPIC), the Malaysian Timber Industry Board (MTIB), Malaysian Timber Timber Council (MTC), Malaysian Timber Certification Council (MTCC), Sarawak Timber Industry Development Corporation (STIDC) and the Department of Wildlife and National Park (PERHILITAN) but other enforcement departments such as the Royal Custom Department of Malaysia, Police Marine Unit of the Royal Malaysia Police, Maritime Enforcement Agency and various port authorities in the country. In additions, various timber trade associations and non-governmental organizations (NGOs) are expected to benefit from this capacity building activities.

14.0 CONCLUSION

14.1 Malaysia has designated more than 5 million hectares of its forested land as totally protection areas, which make up more than 15.3% of the country's land area. The totally protection areas cover various type of forests including peat swamp forest. About 10% of the existing peat swamp forest area has been designated or agreed to be allocated as totally protection area. This is one of the country efforts to conserve the country's rich biological diversity including conserving flora species diversity such as ramin species.

14.2 There are also considerable amount of research of *Gonystylus* spp. carried out in the country, whether the ecological and biological as well as silvicultural characteristics of the species that make Malaysia as the leading country in the research of this species. Beside these, Malaysia also will continue to provide sufficient and credible information on ramin for the determination of sustainable level of harvests, assist in designing rehabilitation program as well as to enhance conservation programs. Malaysia will also emphasis on awareness and capacity building as they are the mains factor in the conservation, sustainable utilization and management of ramin in Malaysia. For instance, Malaysia is applying the precautionary approach using control and monitoring of ramin harvest from forest areas based on its population growth capacity and production capacity and hence it will not become detrimental to the survival and healthy population of this species. In summary, the productions of ramin from the country's forests are based on the sustained yield level.

14.3 Malaysia is fully committed to combating illegal logging and trade in illegally-source timber and supportive on initiatives which are aimed at curbing such activities. Malaysia has taken proactive to study the use of modern technology as the RFID and molecular (DNA) method to monitor the flow of ramin trees from forest areas as well as hyperspectral technology in ramin mapping. The management of forest the country is very intensive through current systematic management system under sustainable forest management principles.

Table 20. Malaysia's Work Program Under ITTO-CITES Support and Funding Mechanism for Year 2008

No.	Project Title	Executing Agency	Duration (months)	Estimated Budget (USD)		
				ITTO Contribution	Government of Malaysia Contribution	Total
1.	Non-detriment Findings Report on *Gonystylus bancanus* – A Quantitative Assessment of *G. bancanus* in two selected Permanent Forests of Sarawak.	Forest Department Sarawak and Sarawak Forestry Corporation	12	24,900	23,200	48,100
2.	The Quantification of Dry and Wet Inland *Gonystylus spp*. (Ramin), *Aquilaria spp*. (Agarwood) and *Intsia palembanica* (Merbau) in Peninsular Malaysia	Forestry Department Peninsular Malaysia (FDPM)	15	147,400	29,450	176,850
3.	Generation of spatial distribution maps of *Gonystylus bancanus* (Ramin) using hyperspectral technology and determination of sustainable level of harvest of Ramin in production forests of Peninsular Malaysia	Forest Research Institute Malaysia (FRIM)	24	131,000	52,050	183,050
4.	National Workshop on Enforcement Compliance for Trade in Ramin (*Gonystylus* species)	Malaysian Timber Industry Board (MTIB)	A 4-day Workshop	28,146	11,719	39,865
5.	The Development of *Gonystylus bancanus* Timber Monitoring System Using Radio Frequency Identification (RFID) in Peninsular Malaysia	Forestry Department Peninsular Malaysia (FDPM	8	103,000	51,200	154,200
6.	Developing DNA Database for *Gonystylus bancanus* in Sarawak	Forest Department Sarawak and Sarawak Forestry Corporation	12	52,670	44,620	97,290

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Appendix 1

BRIEF NOTE ON THE FOURTH NATIONAL FOREST INVENTORY

1. The Fourth National Forest Inventory **(NFI 4)** is the follow-up inventory of NF 1 (1970-1972), NFI 2 (1980-1982) and NFI 3 (1990-1992) which is implemented once in every ten years. The NFI incorporate data from satellite imagery (LANDSAT-TM), Geographic Information System (GIS) together with the data enumerated from the established sampling units in the field.

2. The NFI 4 is designed as stratified satellite sampling based on randomly distributed permanent sample units. Each sample unit consists of 4 sample plots and 3 sample strips (refer to **Figure 1**). Each sample plot is a combination of a fixed sample circle of 4 m in radius and a point sample. Within the sample circle only commercial tree species less than 10 cm Dbh (diameter at breast height) and tree more than 1.5 m in height and some key medicinal plants are assessed. The total sample area is about 0.02 hectare. Point sampling is done for all tree species ≥10 cm Dbh as shown in **Table 1**.

Table 1: Information to be collected per Sample Strip/Circle/Point Sample.

Parameter	Sample Strip (4 m wide)	Sample Circle (r =4 m)	Point Sample (basal area factor 4)	
	Bamboo, rattan, palms, etc.	trees < 10 cm medicinal plants	trees ≥ 10 cm	trees ≥ 45 cm
Species	Name and code	Name and code	Name and code	Name and code
Occurrence	Number	Number	Number	Number
Dbh	No	No	No	Yes
Bole Height	No	No	No	All trees
Location	No	No	Azimuth, distance	Azimuth, distance
Loggable	No	No	No	Yes, specify code
Logs	No	No	No	Number and quality

3. Clumps of rattan, bamboo and palms are counted on 3 sample strips of 4m width (2m to each side of the centre line) connecting sample plot 1 and 2, 2 and 3, 3 and 4. The distance between the sample plots is 100m; the total sample is 0.12 hectare. During the navigation to the sample unit or at the sample unit itself, each member of the inventory crew shall report any observation made on the occurrence of rare and /or protected wildlife species to the crew. If observation on wildlife was made, then the crew leader shall record "y' in the "Pemerhatian Hidupan Liar" (Wildlife Observation) box with some description pertaining to species and type of observation made such as tracks, dung, nests, etc. (eg. tapir tracks at 102^{o} 14'12" East, 4^{o} 16' 23" North).

4. The summary of tree species, major medicinal plants, rattan and palms listed to be surveyed were as follows:

   i. Tree Species
      (a) Dipterocarps : Meranti = 43 species
      (b) Dipterocarps: Non-Meranti = 118 species
      (c) Non-Dipterocarps = 294 species*
      (* *Gonystylus* spp. are within this total species listed to be surveyed)
   ii. Medicinal = 9 species
   iii. Rattan = 6 species
   iv. Bamboo = 6 species
   v. Palms = 4 major species plus others

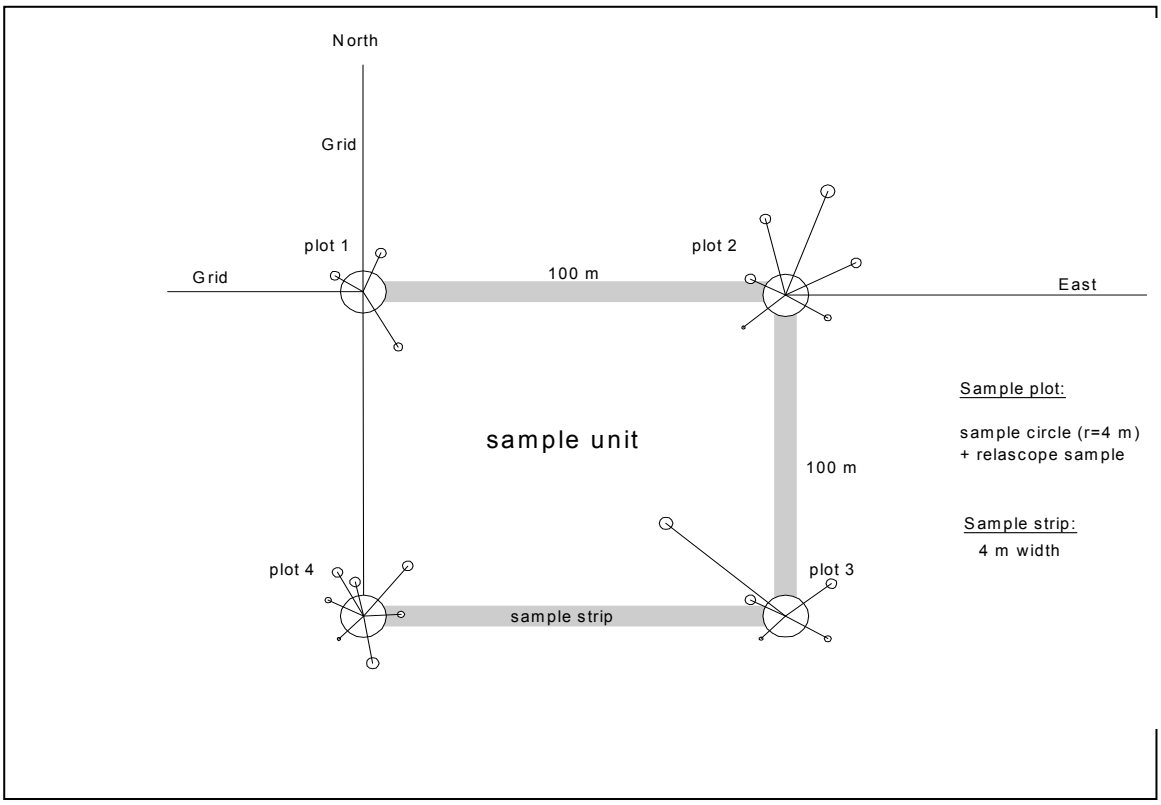

Figure 1: Lay-out of sample unit

5. A total of 1,695 sample units or 99.1% of proposed sample units were surveyed throughout the 11 states in Peninsular Malaysia. There were 15 sample units that were not able to be surveyed due to security reasons. Once the inventory was completed, the MIDAP (**M**anagement **I**nventory **D**ata **A**nalysis **P**rogram) application was used by the Forestry Department as standard software package for the processing and statistical analysis of data collected during the NFI 4. The program was developed for the Malaysian-German Sustainable Forest Management and Conservation Project, Peninsular Malaysia.

Table 1 – Plants. Summary of Harvest Regime for Plant Species

Species: Gonystylus species **Country (if applicable State or Province): Malaysia**

Date (of making Non-detriment Finding): December 2007 **Period to be covered by finding: 1 year**

Name: ---------- **Position in Scientific Authority: ----------**

Is the species endemic, found in a few countries only, or widespread? Malesia area (Malaysia, Indonesia, The Philippines, Papua New Guinea and Brunei)

Conservation status of the species (if known): IUCN Global status: ----------National status: ----------Other: ----------

Type of) harvest	**Main product**	**Degree of control**	**Demographic segment of population harvested**			**Relative level of off-take (include number or quantity if known)**				**Reason for off-take and percentage (if known)**			**Commercial destination and percentage (if known)**		
			Immature	Mature	Sex	Low <30	Medium 30-50%	High >50%	Unknown	Sub sistence	Com mercial	Others	Local	National	Inter national
1.1 Artificial propagation		a) Regulated													
		b) Illegal or unmanaged													
1.2 Non-lethal harvesting of fruits/ flowers/ seeds/leaves		a) Regulated													
		b) Illegal or unmanaged													
1.3 Non-lethal harvesting of bark/roots/ wood		a) Regulated													
		b) Illegal or unmanaged													
1.4 Removal of whole plant		a) Regulated													
		b) Illegal or unmanaged													
1.5 Removal of whole		a) Regulated													
		b) Illegal or unmanaged													

Type of) harvest	Main product	Degree of control	Demographic segment of population harvested			Relative level of off-take (include number or quantity if known)				Reason for off-take and percentage (if known)			Commercial destination and percentage (if known)		
			Immature	Mature	Sex	Low <30	Medium 30-50%	High >50%	Unknown	Sub sistence	Com mercial	Others	Local	National	Inter national
1.6 Killing of individual by removal of seeds, leaves, bark, roots, wood	WOOD	a) Regulated		X		X					X			X	X
		b) Illegal or unmanaged													

Table 2: Factors Affecting Management of the Harvesting Regime
(see explanatory notes in Appendix A)

Biological characteristics: Animals only		
2.1. Life history: What is the species' life history?	High reproductive rate, long-lived	
	High reproductive rate, short-lived	
	Low reproductive rate, long-lived	
	Low reproductive rate, short-lived	
	Uncertain	
2.2. Ecological adaptability: To what extent Is the species adaptable (habitat, diet, environmental tolerance etc)?	Extreme generalist	
	Generalist	
	Specialist	
	Extreme specialist	
	Uncertain	
2.3 Dispersal efficiency: How efficient is the species' dispersal mechanism at key life stages?	Very Good	
	Good	
	Medium	
	Poor	
	Uncertain	
2.4. Interaction with humans: Is the species tolerant to human activity other than harvest?	No interaction	
	Pest /Commensal	
	Tolerant	
	Sensitive	
	Uncertain	
Biological characteristics: Plants only		
2.1. Life form: What is the life form of the species?	Annual	
	Biennial	
	Perennials (herbs)	
	Shrub and small trees (max. 12 m.)	
	Trees	X
2.2. Regeneration potential: What is the regenerative potential of the species concerned?	Fast vegetatively	
	Slow vegetatively	
	Fast from seeds	
	Slow or irregular from seeds or pores	X
	Uncertain	
2.3. Dispersal efficiency: How efficient is the species' dispersal mechanism?	Very Good	
	Good	
	Medium	X
	Poor	
	Uncertain	
2.4. Habitat: What is the habitat preference of the species?	Disturbed open	
	Undisturbed open	
	Pioneer	
	Disturbed forest	X
	Climax	
National status: Animals and plants		
2.5. National distribution: How is the species distributed nationally?	Widespread, contiguous in country	
	Widespread, fragmented in country	X
	Restricted and fragmented	
	Localised	
	Uncertain	
2.6. National abundance: What is the abundance nationally?	Very abundant	
	Common (where it occurs)	X
	Uncommon	
	Rare	
	Uncertain	
2.7. National population trend: What is the recent national population trend?	Increasing	
	Stable	
	Reduced, but stable	X
	Reduced and still decreasing	
	Uncertain	
2.8. Quality of information: What type of information is available to describe abundance and trend in the national population?	Quantitative data, recent	X
	Good local knowledge	
	Quantitative data, outdated	
	Anecdotal information	
	None	

2.9 Major threats: What major threat is the species facing (underline following: overuse/ habitat loss and alteration/ invasive species/ other: and how severe is it?	None	
	Limited/Reversible/Irreversible	X
	Substantial	
	Severe/Irreversible	
	Uncertain	
Harvest management: Animals and plants		
2.10. Illegal off-take or trade: How significant is the national problem of illegal or unmanaged off-take or trade?	None	
	Small	X
	Medium	
	Large	
	Uncertain	
2.11. Management history: What is the history of harvest?	Managed harvest: ongoing with adaptive framework	X
	Managed harvest: ongoing but informal	
	Managed harvest: new	
	Unmanaged harvest: ongoing or ew	
	Uncertain	
2.12. Management plan or equivalent: Is there a management plan related to the harvest of the species?	Approved and co-ordinated local and national management plans	X
	Approved national/state/provincial management plan(s)	X
	Approved local management plan	x
	No approved plan: informal unplanned management	
	Uncertain	
2.13. Aim of harvest regime in management planning: What is harvest aiming to achieve?	Generate conservation benefit	
	Population management/control	X
	Maximise economic yield	x
	Opportunistic, unselective harvest, or none	
	Uncertain	
2.14 Quotas: Is the harvest based on a system of quotas?	Ongoing national quota:	x
	based on biologically derived local quotas	X
	Ongoing quotas: “cautious” national or local	
	Untried quota: recent and based on biologically derived local quotas	
	Market-driven quota(s), arbitrary quota(s), or no quotas	
	Uncertain	
Control of harvest: Animals and plants		
2.15. Harvesting in Protected Areas: What percentage of the legal national harvest, occurs in State-controlled Protected Areas?	High	
	Medium	
	Low	
	None	X
	Uncertain	
2.16. Harvesting in areas with strong resource tenure or ownership: What percentage of the legal national harvest occurs outside Protected Areas, in areas with strong local control over resource use?	High	X
	Medium	
	Low	
	None	
	Uncertain	
2.17. Harvesting in areas with open None **access:** What percentage of the legal national harvest occurs in areas where there is no strong local control, giving *de facto* or actual open access? drw15	None	X
	Low	
	Medium	
	High	
	Uncertain	
2.18. Confidence in harvest management: Do budgetary and other factors allow effective implementation of management plan(s) and harvest controls?	High confidence	X
	Medium confidence	
	Low confidence	
	No confidence	
	Uncertain	

Monitoring of harvest: Animals and plants		
2.19. Methods used to monitor the harvest: What is the principal method used to monitor the effects of the harvest?	Direct population estimates	X
	Quantitative indices	
	Qualitative indices	
	National monitoring of exports	
	No monitoring or uncertain	
2.20. Confidence in harvest monitoring: Do budgetary and other factors allow effective harvest monitoring?	High confidence	X
	Medium confidence	
	Low confidence	
	No confidence	
	Uncertain	
Incentives and benefits from harvesting: Animals and plants		
2.21. Utilisation compared to other threats: What is the effect of the harvest when taken together with the major threat that has been identified for this species?	Beneficial	
	Neutral	
	Harmful	
	Highly negative	X
	Uncertain	
2.22. Incentives for species conservation: At the national level, how much conservation benefit to this species accrues from harvesting?	High	
	Medium	
	Low	X
	None	
	Uncertain	
2.23. Incentives for habitat conservation: At the national level, how much habitat conservation benefit is derived from harvesting?	High	X
	Medium	
	Low	
	None	
	Uncertain	
Protection from harvest: Animals and plants		
2.24. Proportion strictly protected: What percentage of the species' natural range or population is legally excluded from harvest?	>15%	X
	5-15%	
	<5%	
	None	
	Uncertain	
2.25. Effectiveness of strict protection measures: Do budgetary and other factors give confidence in the effectiveness of measures taken to afford strict protection?	High confidence	X
	Medium confidence	
	Low confidence	
	No confidence	
	Uncertain	
2.26. Regulation of harvest effort: How effective are any restrictions on harvesting (such as age or size, season or equipment) for preventing overuse)?	Very effective	X
	Effective	
	Ineffective	
	None	
	Uncertain	

Table 1 B – Plants. Summary of Harvest Regime for Plant Species

Species: Gonystylus bancanus **Country (if applicable State or Province): Malaysia**

Date (of making Non-detriment Finding): December 2007 **Period to be covered by finding: 1 year**

Name: ---------- **Position in Scientific Authority: ----------**

Is the species endemic, found in a few countries only, or widespread? Malesia area (Malaysia, Indonesia, The Philippines, Papua New Guinea and Brunei)

Conservation status of the species (if known): IUCN Global status: ----------National status: ----------Other: ----------

Type of) harvest	Main product	Degree of control	Demographic segment of population harvested			Relative level of off-take (include number or quantity if known)				Reason for off-take and percentage (if known)			Commercial destination and percentage (if known)		
			Immature	Mature	Sex	Low <30	Medium 30-50%	High >50%	Unknown	Sub sistence	Com mercial	Others	Local	National	Inter national
1.1 Artificial propagation		a) Regulated													
		b) Illegal or unmanaged													
1.2 Non-lethal harvesting of fruits/ flowers/ seeds/leaves		a) Regulated													
		b) Illegal or unmanaged													
1.3 Non-lethal harvesting of bark/roots/ wood		a) Regulated													
		b) Illegal or unmanaged													
1.4 Removal of whole plant		a) Regulated													
		b) Illegal or unmanaged													
1.5 Removal of whole		a) Regulated													
		b) Illegal or unmanaged													
1.6 Killing of individual by removal of seeds, leaves, bark, roots, wood	WOOD	a) Regulated		X		X					X			X	X
		b) Illegal or unmanaged													

Table 2B: Factors Affecting Management of the Harvesting Regime (see explanatory notes in Appendix A)

Biological characteristics: Animals only		
2.1. Life history: What is the species' life history?	High reproductive rate, long-lived	
	High reproductive rate, short-lived	
	Low reproductive rate, long-lived	
	Low reproductive rate, short-lived	
	Uncertain	
2.2. Ecological adaptability: To what extent Is the species adaptable (habitat, diet, environmental tolerance etc)?	Extreme generalist	
	Generalist	
	Specialist	
	Extreme specialist	
	Uncertain	
2.3 Dispersal efficiency: How efficient is the species' dispersal mechanism at key life stages?	Very Good	
	Good	
	Medium	
	Poor	
	Uncertain	
2.4. Interaction with humans: Is the species tolerant to human activity other than harvest?	No interaction	
	Pest /Commensal	
	Tolerant	
	Sensitive	
	Uncertain	
Biological characteristics: Plants only		
2.1. Life form: What is the life form of the species?	Annual	
	Biennial	
	Perennials (herbs)	
	Shrub and small trees (max. 12 m.)	
	Trees	X
2.2. Regeneration potential: What is the regenerative potential of the species concerned?	Fast vegetatively	
	Slow vegetatively	
	Fast from seeds	
	Slow or irregular from seeds or pores	X
	Uncertain	
2.3. Dispersal efficiency: How efficient is the species' dispersal mechanism?	Very Good	
	Good	
	Medium	X
	Poor	
	Uncertain	
2.4. Habitat: What is the habitat preference of the species?	Disturbed open	
	Undisturbed open	
	Pioneer	
	Disturbed forest	X
	Climax	
National status: Animals and plants		
2.5. National distribution: How is the species distributed nationally?	Widespread, contiguous in country	
	Widespread, fragmented in country	X
	Restricted and fragmented	
	Localised	
	Uncertain	
2.6. National abundance: What is the abundance nationally?	Very abundant	
	Common (where it occurs)	X
	Uncommon	
	Rare	
	Uncertain	
2.7. National population trend: What is the recent national population trend?	Increasing	
	Stable	
	Reduced, but stable	X
	Reduced and still decreasing	
	Uncertain	
2.8. Quality of information: What type of information is available to describe abundance and trend in the national population?	Quantitative data, recent	X
	Good local knowledge	
	Quantitative data, outdated	
	Anecdotal information	
	None	

2.9 Major threats: What major threat is the species facing (underline following: overuse/ habitat loss and alteration/ invasive species/ other: and how severe is it?	None	
	Limited/Reversible/Irreversible	X
	Substantial	
	Severe/Irreversible	
	Uncertain	
Harvest management: Animals and plants		
2.10. Illegal off-take or trade: How significant is the national problem of illegal or unmanaged off-take or trade?	None	
	Small	X
	Medium	
	Large	
	Uncertain	
2.11. Management history: What is the history of harvest?	Managed harvest: ongoing with adaptive framework	X
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2.12. Management plan or equivalent: Is there a management plan related to the harvest of the species?	Approved and co-ordinated local and national management plans	X
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	Approved local management plan	x
	No approved plan: informal unplanned Management	
	Uncertain	
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	Population management/control	X
	Maximise economic yield	x
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	Uncertain	
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	Ongoing quotas: “cautious” national or local	
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	Market-driven quota(s), arbitrary quota(s), or no quotas	
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Control of harvest: Animals and plants		
2.15. Harvesting in Protected Areas: What percentage of the legal national harvest, occurs in State-controlled Protected Areas?	High	
	Medium	
	Low	
	None	X
	Uncertain	
2.16. Harvesting in areas with strong resource tenure or ownership: What percentage of the legal national harvest occurs outside Protected Areas, in areas with strong local control over resource use?	High	X
	Medium	
	Low	
	None	
	Uncertain	
2.17. Harvesting in areas with open None **access:** What percentage of the legal national harvest occurs in areas where there is no strong local control, giving *de facto* or actual open access? drw15	None	X
	Low	
	Medium	
	High	
	Uncertain	

2.18. Confidence in harvest management: Do budgetary and other factors allow effective implementation of management plan(s) and harvest controls?	High confidence	X
	Medium confidence	
	Low confidence	
	No confidence	
	Uncertain	
Monitoring of harvest: Animals and plants		
2.19. Methods used to monitor the harvest: What is the principal method used to monitor the effects of the harvest?	Direct population estimates	X
	Quantitative indices	
	Qualitative indices	
	National monitoring of exports	
	No monitoring or uncertain	
2.20. Confidence in harvest monitoring: Do budgetary and other factors allow effective harvest monitoring?	High confidence	X
	Medium confidence	
	Low confidence	
	No confidence	
	Uncertain	
Incentives and benefits from harvesting: Animals and plants		
2.21. Utilisation compared to other threats: What is the effect of the harvest when taken together with the major threat that has been identified for this species?	Beneficial	
	Neutral	
	Harmful	
	Highly negative	X
	Uncertain	
2.22. Incentives for species conservation: At the national level, how much conservation benefit to this species accrues from harvesting?	High	
	Medium	
	Low	X
	None	
	Uncertain	
2.23. Incentives for habitat conservation: At the national level, how much habitat conservation benefit is derived from harvesting?	High	X
	Medium	
	Low	
	None	
	Uncertain	
Protection from harvest: Animals and plants		
2.24. Proportion strictly protected: What percentage of the species' natural range or population is legally excluded from harvest?	>15%	X
	5-15%	
	<5%	
	None	
	Uncertain	
2.25. Effectiveness of strict protection measures: Do budgetary and other factors give confidence in the effectiveness of measures taken to afford strict protection?	High confidence	X
	Medium confidence	
	Low confidence	
	No confidence	
	Uncertain	
2.26. Regulation of harvest effort: How effective are any restrictions on harvesting (such as age or size, season or equipment) for preventing overuse)?	Very effective	X
	Effective	
	Ineffective	
	None	
	Uncertain	