CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA

Seventeenth meeting of the Plants Committee
Geneva (Switzerland), 15-19 April 2008

NON-DETRIMENTAL FINDINGS ON RAMIN FOR MALAYSIA YEAR 2008

Summary

1. This information document has been submitted by the Management Authority of Malaysia.

2. At the 13th meeting of the Conference of the Parties of CITES, Malaysia together with all Parties agreed that ramin (*Gonystylus* species) 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.

3. 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 contained three parts namely Table 1 and Table 2 of the CITES document Inf. 11.3, Table 1B and Table 2B of the CITES document Inf. 11.3 and explanatory notes entitled 'Explanatory Notes: Non-Detrimental Findings For Malaysia Year 2007'. Table 1 and Table 2 for all ramin species (*Gonystylus* species), where as Table 1B and Table 2B only on *Gonystylus bancanus.*

4. 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 that the harvest level is not detrimental to the survival of the species.

5. The report also contains deliberations on the Malaysia's forest sustainable management system and practices, such as the Selective Management System and harvesting control.

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													
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
	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
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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
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	Low	
	None	
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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
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	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	
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	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	

EXPLANATORY NOTES
NON-DETRIMENT FINDINGS ON RAMIN
FOR MALAYSIA YEAR 2008

1.0BIOLOGICAL CHARACTERISTICS

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). It has been reported that there are twenty seven (27) species found in the Borneo island especially in Sarawak and only seven (7) species so far being sighted reported occurring in Peninsular Malaysia. Cockburn (1976) described eight (8) ramin species that are found in Sabah. Ramin is found in peat swamp forest up to the hill areas. Whitmore (1973) and Yunus (2000) described the silvicultural characteristics and distribution of five (5) of the species as shown in **Table 1**. Browne (1955), Cockburn (1976) and Soerianegara & Lemmens (1994) described the silvicultural characteristics and distribution of thirteen (13) of the species as shown in **Table 2**.

Table 1: 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 2: Silvicultural Characteristics and Distribution *of Gonystylus* spp. in Sabah and Sawarak

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)

1.2Yunus (2000) had reported the growth rates for all tree species for dryland / inland forests as in **Table 3**. He also noted that in general the diameter increment is higher for light heavy hardwood (LHW), followed by medium heavy hardwood (MHW) and heavy hardwood (HHW). Ramin species belongs to the LHW type. Shaharuddin (1997) provides an overview of the growth studies carried out in Peninsular Malaysia. A summary of general growth rates for all species are provided in **Table 4.** 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.

1.3Although some of the tropical rain forest trees bear flower and fruit all the time, most species bear flower and fruit only periodically, and many of them annually. As a whole shows 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 3: 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 4: 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)*

1.4*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. bancanus, G. maingayi* and *G. forbesii*, the most common is *G. bancanus.* Other *Gonystylus* species are often confined to a more restricted area and occur more scattered (Soerianegara & Lemmens,1994).

1.5*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 where the areas had been logged for 20 years ago, reported that 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 (Anon, 2004). Van De Meer et. al. (2004) observed that where remnant ramin trees have developed into new seed trees, there is abundant ramin regeneration.

1.6Analysis 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 (Anon, 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).

2.0NATIONAL STATUS

2.1At 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 5**. There are approximately 1.55 million hectares of swamp forests in Malaysia. Out 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.
2.2**Table 6** shows the total forested area in Malaysia by year as reported by FAO (FAO, 2007). The forested area for the year 2005 as in **Table 6** is includes rubber tree plantation. Statistics of **Table 5** and **Table 6** show the stability of Malaysia's forest area for 15 years. Since Malaysia is a 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 forested area is believed to be stable in the future.

Table 5: 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 6: 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)

2.21 Forested Area in Peninsular Malaysia

2.211During the implementation of the New Economic Policy in 1970, particularly with two prime objectives; eradication of poverty and equal distribution of wealth. One of the strategies was to develop a 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 7** illustrates the trend.

2.212In 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 7: 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		-	-	-

2.3Recognizing 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.

2.4Based 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, it isestimated that there are 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 8**. A brief note on NFI 4 is in **Appendix 1**. Referring to **Table 8,** 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 9** is a subset of **Table 8** highlighting the *G. bancannus* species stocking by Forest Classes. Deliberation on the forest classes is presented in **Table 10**. From **Table 9,** for *G. bancannus* 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% of the total timber volume. We can also see that the timber volume of *G. bancannus* (1,735,275 m^3) made-up about 63.8% of the total timber volume for the Gonystylus species at the diameter size >45cm. (as in Table 8).

Table 8: Summary of *Gonystylus* species 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**

Note: * - Deliberation on the Forest Classes is in Table 10.

Table 9: 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**

Note: * - Deliberation on the Forest Classes is in Table 10.

Table 10: 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

2.5The 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 m³ 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 11**.

Table 11: **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

2.6The 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 12**.

Table 12: **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

2.7Lee (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).

2.8Sixty-four (64) yield plots were established in Sarawak between 1971 and 1987, each consisting of 100 x 10 x 10 m quadrats, 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 13**]

2.9Lee (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 14**.

2.10Anon (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).

Table 13: **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)

Table 14: **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

2.11A 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.

2.12There 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 Whitemore (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.

2.13 The production of ramin round log has fluctuated around 30,000 m^{3} for the last few years. It should be noted that 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. Table 10 shows the ramin log production from 2000 to 2006 and as in the year of 2005, the figure has dropped to 32,546 m³.

Table 15: 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

3.0 HARVEST MANAGEMENT

3.1Malaysia is fully committed to combating illegal logging and trade in illegally-sourced 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. 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.

3.2One 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, 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.

3.3Since 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.

3.4Mohd. 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).

3.5Yunus (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.'

3.6In 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 once every year and one of the agendas is to monitor 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 16** shows the annual coupe by period:

Table 16: **Annual Coupe by Period for the Permanent Reserved Forests**

Period	Annual Coupe (ha / year)
1996 – 2000	276,040
2001 – 2005	272,870
2006 – 2010	266,940

3.7The 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 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.

3.9The 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. In Sarawak, the practice is 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).

4.0CAUTIOUS HARVEST QUOTA DETERMINATION

4.1The 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.

4.2In 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:

(a) The trees of the Protection Forests are excluded in the calculation as the function of the forests is for conservation.
(b) General tree growth rate used in Selective Management System (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. (Refer to **Paragraph 1.0)**.
(c) 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.
(d) 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.
(e) 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).
(f) 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.

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

4.31*Gonystylus* species

(a) 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 8**)]

(b) The harvesting rotation period used is 50 years. [Refer to **paragraph 4.2 (c)** above]
(c) Annual production of round log = (2,648,177 ÷ 50) = **52,963m^3** per year
(d) Estimated sawn timber production based on 70% recovery
= (52,963 x 0.70) = **37,074** m^3

For 2008, the proposed cautious harvest quota for Ramin (*Gonystylus* species) for Peninsular Malaysia is **43,000m^3 .**

4.32*Gonystylus bancannus*

(a) 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 9**)]

(b) The harvesting rotation period used is 50 years. [Refer to **paragraph 4.2 (c)** above]

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

(d) 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**

4.4The calculation method used to calculate the cautious harvest quota for *G. bancanus* (peat swamp forest species) for Sarawak is as follows:

(a) 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 2.0**)]
(b) Harvesting rotation practice in Sarawak is 45 years (Cutting limit is ≥40 cm diameter)
(c) 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)
(d) From **Table 13**, it is calculated that the average mean annual volume increment is 0.33 m³/ha. [Refer to **Paragraph 2.0**]
(e) Annual production of round log = (18,358.2 * 0.33) = **6,058**m^3 per year
(f) 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.**

4.5 Ramin (*Gonystylus* species) 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.**

4.6Out of **50,000 m^3** cautious harvest quota for *Gonystylus* species, it is proposed the cautious harvest quota for *G. bancannus* 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 4.32 and 4.4 above.

5.0CONTROL OF HARVEST

5.1Protected 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.

5.2At 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.

5.3For 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 17** shows the sequence of operations of the Selective Management System practices in the Peninsular Malaysia.

Table 17: 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

5.4Hence, 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 17**. 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.

5.5Based on the prescribed cutting limits, all trees to be felled are then 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 17**. Tree marking is implemented as a mean to control output and to prevent illegal felling and excessive removal of the timber stand.

5.6A 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.

5.7Harvesting 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).

6.0MONITORING OF HARVEST

6.1Under 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 bancannus* 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.

6.2 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.

6.3In 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.

6.4This 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.

6.5The 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.

6.6 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 PFRs 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.

6.7The 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.

6.8For 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.

6.9Forest 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.

7.0INCENTIVE AND BENEFITS FROM HARVESTING

7.1As 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.

7.2Without 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.

7.3Peat 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.

8.0 PROTECTION FROM HARVEST

8.1The 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.

8.2 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 has 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.

8.3The Forestry Department peninsular Malaysia has also established two (2) growth plots in Sungai Karang Forest Reserve, Selangor in 1993/1994. These plot 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.

8.4Sarawak has designated two peat swamp forest as National Park, namely Loagan Bunut National Park (10,736 hectares) and Maludan National Park (43,147 hectares). An area of approximately 10,000 hectares has been proposed as an extension to Maludan 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).

8.4In 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.

8.5Under 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.

9.0 CONCLUSION

9.1Without applying the precautionary approach, the harvest quota for Malaysia can be more than 50% perhaps up to 100% because the proposed quota (**50,000 m^3** for all *Gonystylus* species and out of it **30000 m^3 is** *Gonystylus bacanus*) is mostly based on the Peninsular Malaysia forested areas. **Table 5** showed that the forested areas in Sabah and Sarawak make up about 70% of Malaysia's forested land and with the remaining 30% in Peninsular Malaysia. In addition, Sabah and Sarawak have more ramin species compared to Peninsular Malaysia, refer Paragraph 1.0**Table 1** and **Table 2**. On this basis, ramin production capacity in Sarawak and Sabah is much higher but due to no stocking data available a precautionary approach is applied with a lower harvest quota.

9.2**Table 8** shows that there are 5,062,106 ramin trees of size 15 – 45 cm diameter where trees of size 15 – 30cm diameter made-up 4,050,837 trees and trees of 30 – 45cm diameter made-up of 1,033,211 trees and they are >4 times and 1 time higher than the tree population of tree size >45cm diameter respectively. Based on the annual mortality rate of 0.9% and diameter growth rate of 0.3 – 0.6cm per year and other factors are assumed to be constant, it is projected at the end of 50 years rotation more than 3 millions trees will survive and more than 1 million trees are >45cm diameter size. The annual mortality rate of 0.9% is the general mortality rate used in the projection under Selective Management System. Harvesting ramin within the population growth capacity is one of the critical factors taken into account in determining the cautious harvest quota. In short, the proposed cautious quota is based on the sustained yield level.

9.3Malaysia 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.

9.4Based on the above justification, it is concluded that the determination method used to determine the cautious harvest quota have taken into account the precautionary principles. The proposed Malaysia's cautious harvest quota for *Gonystylus* species is **50,000m^3** and out of which **30,000m^3** is *G. bancannus*. These harvest quotas are within the population growth capacity and hence it will not become detrimental to the survival and healthy population of this species. The estimated sawn timber production from the mentioned cautious harvest quotas are **35,000m^3** and **21,000m^3** respectively.

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BRIEF NOTE ON THE NATIONAL FOREST INVENTORY FOUR

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.

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

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).

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* species is 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

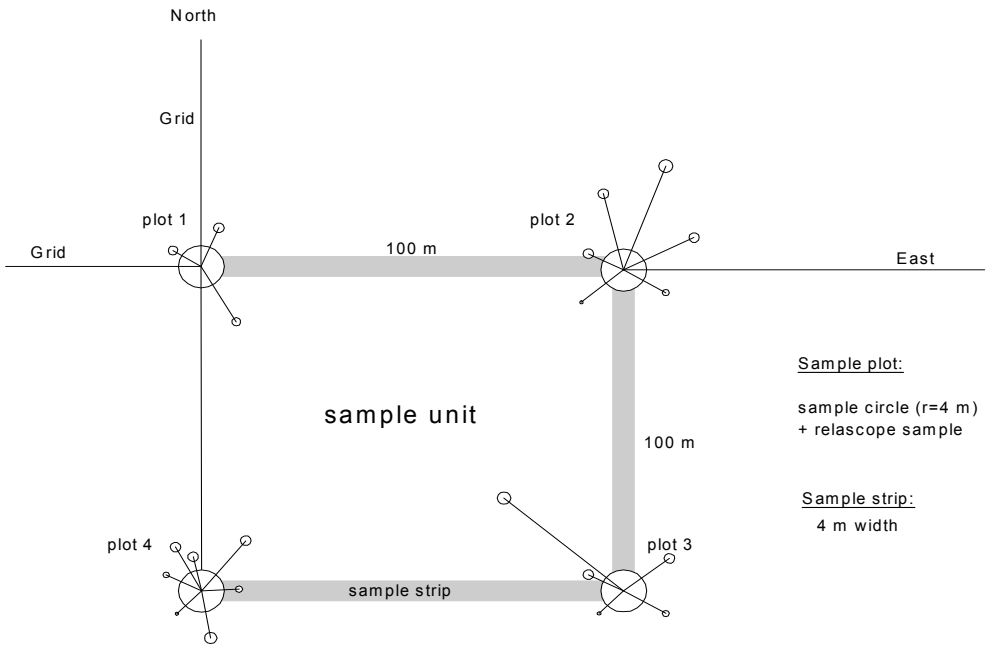

Figure 1: Lay-out of sample unit

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.