

Activity Document II

PROJECT ABSTRACT

TITLE: The Quantification of Dry and Wet Inland *Gonystylus* spp. (Ramin), *Aquilaria* spp. (Agarwood) and *Intsia* spp. (Merbau) in Peninsular Malaysia.

SUMMARY

Ramin (*Gonystylus* spp.), Agarwood (*Aquilaria* spp.) and Merbau (*Intsia* spp.) are important forest tree species that are currently being utilized in Malaysia. There are wide spread concern about the rate at which these species are being exploited due to increasing demand for timber from industries, both locally and internationally, as well as the threats from illegal logging. In order to conserve and sustainably manage these species, detail and accurate information on their population, biological and ecological status should be made available to determine the sustainable level of harvests and intensive management practices of these species. The project has two objectives, namely, (i) to collect information on the distribution, status and stocking of dry and wet inland *Gonystylus* spp. (Ramin), *Aquilaria* spp. (Agarwood) and *Intsia* spp. (Merbau) based on the Fourth National Forest Inventory information in Peninsular Malaysia, and (ii) to establish ten (10) permanent sample plots (PSPs) to periodically monitor the growth, mortality and recruitment of *Gonystylus* spp. (Ramin) in Peninsular Malaysia. It also aimed to collect reliable information on the growth dynamics of both 'dry' and 'wet' *Gonystylus* spp. in Peninsular Malaysia. The project will ensure the stocking and sustainability of Ramin, Agarwood and Merbau species are consistent with the sustainable forest management practices being implemented in Peninsular Malaysia. It will also promote sustainable utilization and conservation of Ramin in the production forests of Peninsular Malaysia through the determination of sustainable level of harvest of Ramin.

EXECUTING/IMPLEMENTING AGENCY: Forestry Department Peninsular Malaysia.

COLLABORATING AGENCY: (i) Ministry of Natural Resources and Environment Malaysia.
(ii) State Forestry Departments.

DURATION: 15 months.

START DATE: 2008.

BUDGET AND PROPOSED SOURCES OF FINANCE:

(a)	ITTO Contribution	US\$ 131,800
(b)	Government Contribution (direct and in-kind)	US\$ 66,230
(c)	Other Sources Contribution (specify)	US\$ -

Total US\$ 198,030

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

PART I: CONTEXT

Origin/Background

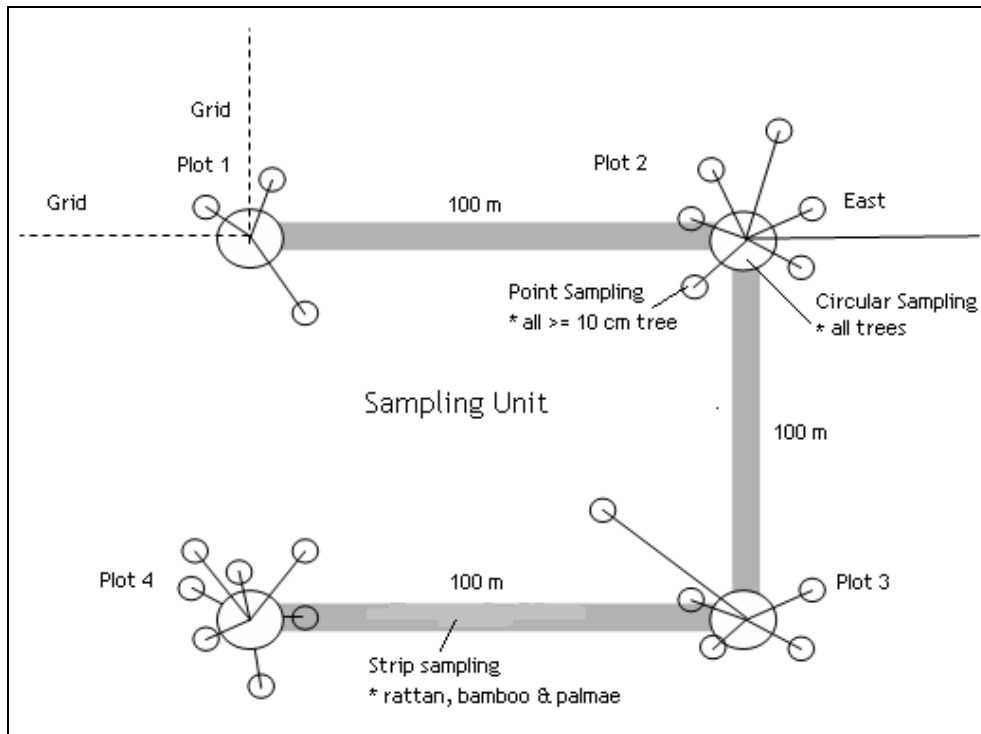
The National Forest Inventory programmes were carried out at the national level to evaluate various forest parameters such as number of trees, volume, basal area, species distribution, etc. for all forested areas. In Peninsular Malaysia, the national compilation of both qualitative and quantitative information on natural forest resources, with the exception of mangrove forests within the Permanent Reserved Forest (PRF), Stateland Forest and other fully protected forest areas are carried out periodically, every 10 years, under the National Forest Inventory (NFI) projects. The first NFI was carried out from 1972 – 1973 with the assistance from the United Nations Development Programme (UNDP), while the second NFI was carried out from 1981 – 1982 by the Forestry Department Peninsular Malaysia (FDPM). The third NFI was carried out from 1991 – 1993 together with the implementation of the Continuous Forest Resources Monitoring System (CONFORMS) that was formulated under the joint project with the Food and Agriculture Organization of the United Nations (FAO) through the Forest Inventory and Management Systems as Part of Forest Resources Conservation Programme. The fourth NFI (NFI4) was carried out by the FDPM from 2002 – 2004 with technical assistance from the Malaysia-German Sustainable Forest Management and Conservation project.

In the implementation of the NFI4, Sampling Units (S.U.) were determined based on intersection grid of the *Rectified Skew Orthomophic* (RSO) maps. Each intersection grid that was placed within a given forest stratum (summarized in **Table 1**) would have polygons that were located between 0.5 and 1 km among each other. The number of S.U. was randomly selected where a total of 1,711 S.U. was selected for all forest strata. With the area of each S.U. at 0.14 ha, a total of 240 ha was enumerated from the whole forested areas in Peninsular Malaysia. Design of Sampling Unit and Sampling Plots used in the NFI4 is as shown in **Figure 1**. The locations of S.U. were determined using GPS (*Garmin 12 XL*) with the accuracy of ± 30 m. Measurement of tree diameter at breast heights (dbh) was carried out using callipers and the information was classified into diameter classes of 10-14.9 cm, 15.0-29.9 cm, 30-44.9 cm, 45-59.9 cm, 60-74.9 cm and ≥ 75 cm. Tree identification were carried out down to genus level and occasionally also at species level.

Table 1: Classification of forested areas in Peninsular Malaysia according to the NF14 stratum

No.	Stratum	Code
1	Superior and Good Virgin Forest	11
2	Moderate and Poor Virgin Forest	12
3	Logged-over Forest (1 – 10 year)	20
4	Logged-over Forest (12 – 20 year)	21
5	Logged-over Forest (21 – 30 year)	22
6	Logged-over Forest (>30 year)	23
7	Virgin Peat Swamp Forest	31
8	Logged-over Peat Swamp Forest	32
9	Stateland Inland Forest	40
10	Stateland Peat Swamp Forest	41
11	Protection Forest	50

Figure 1: Design of Sampling Unit and Sampling Plots Used in the NF14



PART II: THE PROJECT

1.0 Project Objectives

This project involves two (2) components, namely, to gather information from about 115 S.U. (**Annex A**), 43 S.U. (**Annex B**) and 153 S.U. (**Annex C**) that have Ramin, Agarwood and Merbau trees respectively, and which had been enumerated during the the NFI4; as well as to establish Permanent Sample Plots (PSPs) to collect information on the growth of Ramin. In the first component, inventory teams will go to the S.U. having the three (3) species, based on the NFI4 data sheets, and to identify the trees down to species level and record their locations.

The aim of the project is to contribute significantly in ensuring the stocking and sustainability of Ramin, Agarwood and Merbau species are consistent with the sustainable forest management practices being implemented in Peninsular Malaysia. The specific objectives of the project are as follows:

- (i) to collect information on the distribution, status and stocking of dry and wet inland *Gonystylus* spp. (Ramin), *Aquilaria* spp. (Agarwood) and *Intsia* spp. (Merbau) based on the Fourth National Forest Inventory information in Peninsular Malaysia; and
- (ii) To Whom It May Concern: establish ten (10) permanent sample plots (PSPs) to periodically monitor the growth, mortality and recruitment of *Gonystylus* spp. (Ramin) in Peninsular Malaysia.

2.0 Justification

2.1 Problems to be addressed

Due to technical reasons and reporting requirements under the NFI4, species such as Ramin, Agarwood and Merbau were generally only identified at the genus level. This is partly because some of inventory work were contracted out to companies that had limited number of experienced and trained workers who could identify trees at the species level. In this regard, in the NFI4, Ramin was identified into two (2) main species; namely, *Gonystylus bancanus* (Ramin melawis) and *G. maingayi* (Ramin pipit); while for *Aquilaria* spp. (Agarwood); and *Intsia* spp. (Merbau) they were identified as one species each. However, there are six (6) species of Ramin that are currently known that include *G. affinis*, *G. bancanus*, *G. forbesii*, *G. macrophyllus*, *G. maingayi* and *G. velutinus*. According to literature, there are at least five (5) species of *Aquilaria* found in Peninsular Malaysia, namely, *A. hirta*, *A. beccariana*, *A. rostrata*, *A. malaccensis* and *A. microcarpa*. In addition, there are two (2) species of Merbau which are *I. palembanica* (Merbau) and *I. bijuga* (Merbau ipil).

There are widespread concern about the rate at which these species are being exploited. This is accelerated by the introduction of mechanization in harvesting, improved transport methods and land-use change from forest to agriculture to support socio-economic development and the demand of an increasing population. Present concerns also include increasing demand for timber from industries, both locally and internationally, as well as the threats from illegal logging. Given these concerns, the challenge is to manage the forest in a sustainable manner. Peninsular Malaysia still has high resource availability and a high level of forest industry development. Current information indicates that there are sufficient number of Ramin, Agarwood and Merbau trees in the Peninsula. Based on the NFI4 results, it was estimated that the total number of Ramin, Agarwood and Merbau were 5,774,255 stems, 3,553,466 stems and 4,916,468 stems respectively. On the other hand, there are currently only two (2) PSPs of Ramin being established in the peat swamp forests in Peninsular Malaysia. Hence, there is an urgent need to gather more information on the growth of both 'dry' and 'wet' Ramin trees that occur in the dry inland forest areas. As such, more PSPs are needed to be established so as to be able to provide more reliable

information as data from the two established (2) plots are insufficient to provide reliable growth and mortality data, and information on the population dynamics of the species in Peninsular Malaysia.

2.2 Intended situation after Project completion

The project will provide credible and reliable information to the global community with regard to the state of these species in Peninsular Malaysia in terms of their stocking, regeneration status and distribution. The project will also provide long-term information on Ramin growth and mortality and contribute to the formulation of more intensive forest management practices and sustainable harvesting regimes of Ramin in Peninsular Malaysia.

2.3 Target beneficiaries

At the end of the project, relevant government agencies in Malaysia will have better understanding on the state of the Ramin, Agarwood and Merbau stocking and their distribution in Peninsular Malaysia which will lead to better and more intensive management of these species in the future. The results of this project will be disseminated to stakeholders such as the various State Forestry Departments in Peninsular Malaysia, relevant forestry agencies, such as the Ministry of Natural Resources and Environment, the Ministry of Plantation Industries and Commodities, Forest Research Institute of Malaysia (FRIM), Malaysian Timber Industry Board (MTIB), local universities, Malaysian timber importers and exporters, etc. This will assist the relevant agencies to address the issue as to whether these species will become extinct or not as a result of logging. The project will further enhance a more knowledge-based decision making by the FDPM in the formulation of forest management systems for these species, based on sustainable forest management principles.

2.4 Risks

There will be challenges to the foresters to locate the various S.U. that were established during the implementation of the NFI4 which have been identified to have Ramin, Agarwood and Merbau species. This is due to difficulties to locate the exact locations of the SU and plots, as well as the trees because the SU and plots were established between 2002 and 2004. However, this will not have any significant negative impacts on the success of this project in achieving its objectives.

3.0 Outputs

The expected outputs of the project are:

- Objective 1: To collect information on the distribution, status and stocking of dry and wet inland *Gonystylus* spp. (Ramin), *Aquilaria* spp. (Agarwood) and *Intsia* spp. (Merbau) based on the Fourth National Forest Inventory information in Peninsular Malaysia.
- Output 1.1: To improve the knowledge of forest officers and contractors in the identification of all dry and wet inland *Gonystylus* spp. (Ramin), *Aquilaria* spp. (Agarwood) and *Intsia* spp. (Merbau).
- Output 1.2: To comprehensively assess the biological and ecological, as well as the distribution and stocking of dry and wet inland *Gonystylus* spp. (Ramin), *Aquilaria* spp. (Agarwood) and *Intsia* spp. (Merbau) based on the Fourth National Forest Inventory data for future sectoral planning and forest management.
- Output 1.3: To determine future sustainable harvest level of *Gonystylus* spp., *Aquilaria* spp. and *Intsia* spp. so as to enhance their conservation status within production forests.

Objective 2: To establish ten (10) permanent sample plots (PSPs) to periodically monitor the growth, mortality and recruitment of *Gonystylus* spp. (Ramin) in Peninsular Malaysia.

Output 2.1: To provide sufficient and credible information on the stocking and growth of *Gonystylus* spp. (Ramin) to further enhance its management system and future utilization, and in sustainable harvest prediction.

4.0 Activities

Output 1.1: To improve the knowledge of forest officers and contractors in the identification of all dry and wet inland *Gonystylus* spp. (Ramin), *Aquilaria* spp. (Agarwood) and *Intsia* spp. (Merbau).

Activity 1.1.1: Documentation and procedures to appoint contractors to carry out the field inventory.

Activity 1.1.2: Tree identification course to FDPM staff and contractor workers.

Output 1.2: To comprehensively assess the biological and ecological, as well as the distribution, and stocking of dry and wet inland *Gonystylus* spp. (Ramin), *Aquilaria* spp. (Agarwood) and *Intsia* spp. (Merbau) based on the Fourth National Forest Inventory data for future sectoral planning and forest management.

Activity 1.2.1: Acquisition of inventory equipment.

Activity 1.2.2: Inventory work in the field.

Activity 1.2.3: Data validation, processing and analysis.

Activity 1.2.4: Specimen identification.

Output 1.3: To determine future sustainable harvest level of *Gonystylus* spp., *Aquilaria* spp. and *Intsia* spp. so as to enhance their conservation status within production forests.

Activity 1.3.1: Reports and seminar.

Output 2.1: To provide sufficient and credible information on the stocking and growth of *Gonystylus* spp. (Ramin) to further enhance its management system and future utilization, and in sustainable harvest prediction.

Activity 2.1.1: Identification of suitable *Gonystylus* spp. permanent sample plots (PSPs) based on the number of species in the NFI4 S.U. and according to the NFI4 strata.

Activity 2.1.2: Establishment and enumeration of ten (10) PSPs (**Table 2**) according to Growth Plot design (**Figure 2**) that is currently used by the FDPM.

Activity 2.1.3: Compilation of data, screening of data, and processing of data gathered from the first enumeration of the PSPs.

5.0 Work Plan

The project will be carried out over a period of fifteen (15) months according to the Work Plan as shown in **Table 3**.

Table 2: Proposed Ramin Permanent Sample Plots (PSPs) to be Established by the FDPM

No.	State	NFI4 Stratum	Forest Reserve	Forest Compartment	Intersection Grid	
					Longitude (X)	Latitude (Y)
1	Johor	22	Proposed Labis FR	-	593000	256000
2	Kedah	23	Padang Terap FR	45	305000	701000
3	N. Sembilan	21	Gapau FR	20	444000	325000
4	Pahang	31	Pekan FR	166	579000	373000
5	Pahang	31	Pekan FR	32	577000	383000
6	P.Pinang	50	Bukit Pancur FR	02	570000	284500
7	Perak	22	Papulut FR	09	349000	592000
8	Selangor	32	Raja Musa FR	07	370000	391000
9	Selangor	33	Raja Musa FR	97	382000	387000
10	Terangganu	12	Gunung Tebu FR	105	508000	608000

Figure 2: Proposed Design of Permanent Sample Plot to be Established by the FDPM

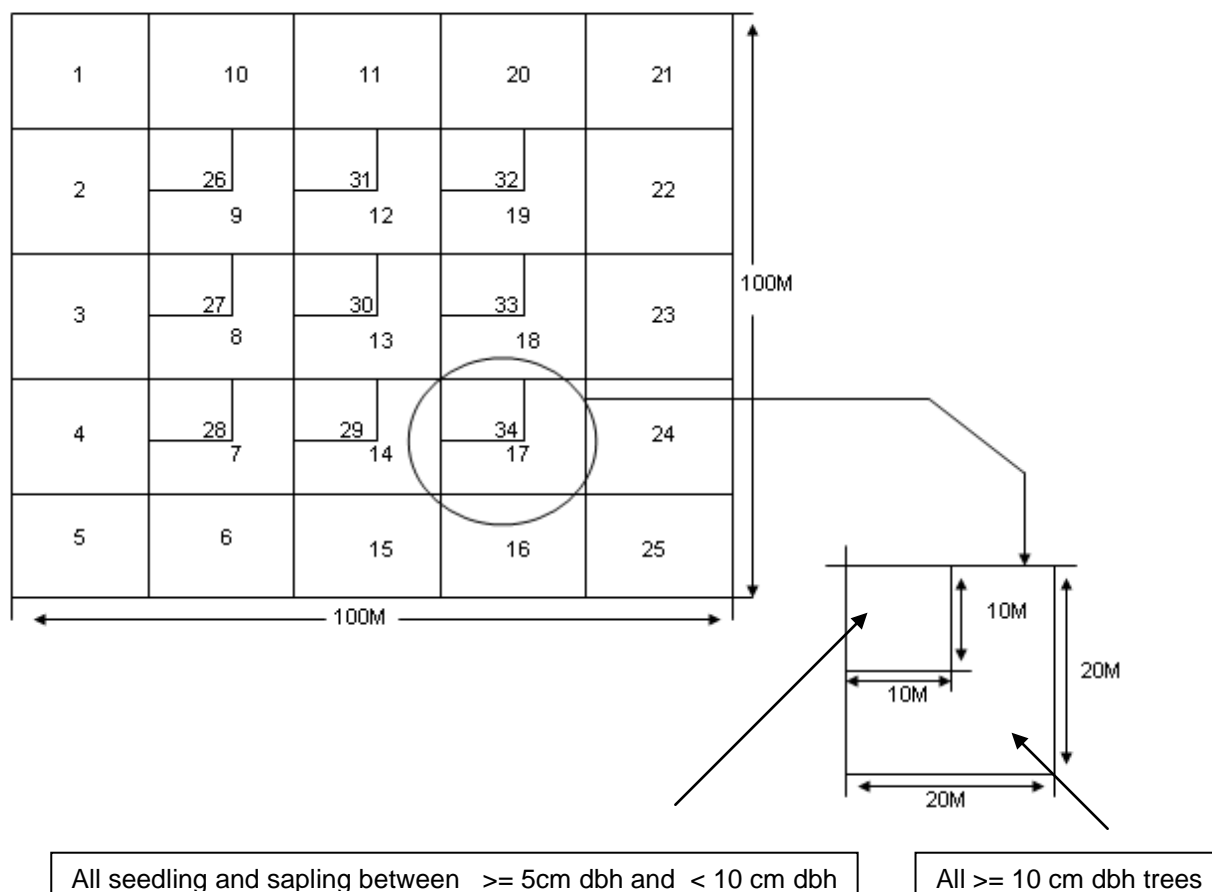


Table 3: Work Plan – The Quantification of Dry and Wet Inland *Gonystylus* spp. (Ramin), *Aquilaria* spp. (Agarwood) and *Intsia* spp. (Merbau) in Peninsular Malaysia

Objective/ Output	Activity	Period in months															
		Year 1												Year 2			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
Objective 1:	To collect information on the distribution, status and stocking of dry and wet inland <i>Gonystylus</i> spp. (Ramin), <i>Aquilaria</i> spp. (Agarwood) and <i>Intsia</i> spp. (Merbau) based on the Fourth National Forest Inventory information in Peninsular Malaysia.																
Output 1.1	To improve the knowledge of forest officers and contractors in the identification of all dry and wet inland <i>Gonystylus</i> spp. (Ramin), <i>Aquilaria</i> spp. (Agarwood) and <i>Intsia</i> spp. (Merbau).																
	Activity 1.1.1: Documentation and procedures to appoint contractors to carry out the field inventory.	X	X	X													
	Activity 1.1.2: Tree identification course to FDPM staff and contractor workers.				X												
Output 1.2	To comprehensively assess the biological and ecological, as well as the distribution, and stocking of dry and wet inland <i>Gonystylus</i> spp. (Ramin), <i>Aquilaria</i> spp. (Agarwood) and <i>Intsia</i> spp. (Merbau) based on the Fourth National Forest Inventory data for future sectoral planning and forest management.														X	X	
	Activity 1.2.1: Acquisition of inventory equipment.		X	X	X												
	Activity 1.2.2: Inventory work in the field.					X	X	X	X	X	X	X	X				
	Activity 1.2.3: Data validation, processing and analysis.						X	X	X	X	X	X	X	X			
	Activity 1.2.4: Specimen identification.					X	X	X	X	X	X	X	X	X			
Output 1.3	To determine future sustainable harvest level of <i>Gonystylus</i> spp., <i>Aquilaria</i> spp. And <i>Intsia</i> spp. So as to enhance their conservation status within production forests.																
	Activity 1.3.1: Reports and seminar.														X	X	X
Objective 2.1	To establish ten (10) permanent sample plots (PSPs) to periodically monitor the growth, mortality and recruitment of <i>Gonystylus</i> spp. (Ramin) in Peninsular Malaysia.																
Output 2.1	To provide sufficient and credible information on the stocking and growth of <i>Gonystylus</i> spp. (Ramin) to further enhance its management system and future utilization, and in sustainable harvest prediction.																
	Activity 2.1.1: Identification of suitable <i>Gonystylus</i> spp. Permanent sample plots (PSPs) based on the number of species in the NFI4 S.U. and according to the NFI4 strata.	X	X	X													
	Activity 2.1.2: Establishment and enumeration of ten (10) PSPs according to Growth Plot design that is currently used by the FDPM.				X	X	X	X	X	X	X	X	X	X	X		
	Activity 2.1.3: Compilation of data, screening of data, and processing of data gathered from the first enumeration of the PSPs.					X	X	X	X	X	X	X	X	X	X	X	X

6.0 Budget

6.1 Total Project Budget by Activity

A total of US\$ 198,030 is needed to implement the project, of which a sum of US\$ 131,800 is required as the contribution from ITTO as shown in **Table 4**.

Table 4: Detail Project Budget by Activity (US \$)

ITEM		TOTAL
10.	Project Personnel	
	11. National Consultants (trainer)	1,550
	12. Other labour (compilation of NFI information, acquisition of the latest remote sensing data and establishment of PSPs)	15,500
	13. Fellowships and Training (training and seminar)	23,300
	Component Total	40,350
20.	Sub-contracts	
	21. Sub-contract (field inventory)	7,750
	22. Sub-contract (establishment of PSPs))	7,750
	Component Total	15,500
30.	Duty Travel	
	31. Daily Subsistence Allowance (field work allowances)	62,000
	32. Transport Costs (local travel)	1,550
	Component Total	63,550
40.	Capital Items	
	Component Total	-
50.	Consumable Items	
	51. Raw materials (field work requirements)	15,500
	52. Fuel and Utilities (fuel, toll, 4WD maintenance)	31,000
	53. Office Supplies	3,200
	Component Total	49,700
60.	Miscellaneous	
	61. Sundry (data validation, data key-in, analysis and GIS)	3,100
	Component Total	3,100
70.	Executing Agency Management Costs	
	Component Total	25,830
	GRAND TOTAL	198,030

6.2 Project Budget by Source

The project budget by source is as summarized in **Table 5**.

Table 5: Project Budget by Source (US \$)

Budget Components	Sources			
	ITTO	Government of Malaysia (in-kind)	Other Source(s)	Total
10. Project personnel	23,300	17,050	-	40,350
20. Sub-contracts	15,500	-	-	15,500
30. Duty travel	62,000	1,550	-	63,550
40. Capital items	-	-	-	-
50. Consumable items	31,000	18,700	-	49,700
60. Micellaneous	-	3,100	-	3,100
70. Executing Agency Management Costs (15% of Total of Overall Project Budget by Activity)	-	25,830	-	25,830
Total	131,800	66,230		198,030

PART III: OPERATIONAL ARRANGEMENTS

1.0 Management Structure

The project will be implemented by the Forestry Department Peninsular Malaysia. A Project Technical Working Committee (TWC) will be established to oversee the implementation of the project. The TWC will provide guidance on matters pertaining to the implementation of the project and ensure that the project is directed towards achieving its intended goals. The member of the Project Technical Working Committee is shown in **Table 6**.

Table 6: Members of the Project Technical Working Committee (TWC)

Project Technical Working Committee (TWC)	Members
Forestry Department Peninsular Malaysia	- Director General of Forestry
	- Deputy Director General of Forestry (Development and Planning)
	- Director of Management (Project Coordinator/Secretary)
	- Director of International & Secretariat
	- Director of State Forestry Departments
Other Institutions	Forest Research Institute of Malaysia (FRIM) and University Putra Malaysia

2.0 Monitoring, Reporting and Evaluation

The progress of the project will be monitored through the TWC. Quarterly progress reports will be submitted to the TWC for consideration. The Director of Management as Project Coordinator will be guided by the TWC and will be responsible for the preparation of the reports. Short monthly progress reports based on the achievement of project outputs/activities as described in the Work Plan and a final report will be prepared by the FDPM within two months of project completion for submission to ITTO.

Distribution of *Gonystylus* spp. in Peninsular Malaysia based on the NFI4 Sampling Units (S.U.)

State	No.	S.U.	Forest Reserve	Forest Compartment	Intersection Grid	
					Longitude (X)	Latitude (Y)
Johor	1	J024-1	Lenggor	53	633000	233000
	2	J042-2	Lenggor	15	624000	244000
	3	J057-1	Lenggor	140	637000	247000
	4	J099-3	Maokil	245	550000	236000
	5	J111-3	Labis	-	593000	256000
	6	J111-4	Labis	-	593000	256000
	7	J111-4	Labis	-	593000	256000
	8	J146-4	Panti	58	658000	208000
	9	J170-4	Tanah Kerajaan Ayer hitam	-	624000	217000
	10	J174-1	utara Ayer hitam	20	532000	229000
	11	J178-4	utara	11	537000	226000
	12	J201-1	G.Arong Tmbh	47	637000	280000
	13	J205-4	G.Arong Tmbh	30	635000	283000
	14	J217-3	Jemaluang	7	654000	258000
Kedah	15	K021-2	Koh Mai	15	292000	710000
	16	K023-1	Chebar	19	314000	675000
	17	K092-3	Rimba Telui Cdnng Hulu	60	316000	648000
	18	K108-2	Muda	-	316000	667000
	19	K115-2	Rimba Telui	81	315000	657000
	20	K129-2	Padang Terap	45	305000	701000
	21	K137-3	Chebar	3	314000	671000
Kelantan	22	D142-3	Jentiang	12	452000	607000
Negeri Sembilan	23	N015-1	Tampin	17	466000	280000
	24	N063-3	Tebong	14	484000	277000
	25	N084-2	Kenaboi	40	454000	350000
	26	N091-2	Gapau	20	444000	325000
	27	N138-3	Triang	20	465000	326000
	28	N174-4	Pelangai	1	463000	316000
Pahang	29	C011-1	Tekam	112	513000	455000
	30	C102-3	Lesung	226	566000	306000
	31	C107-1	Berkelah	396	567000	414000
	32	C107-2	Berkelah	396	567000	414000
	33	C169-3	Tanah Kerajaan	-	511000	353000
	34	C169-4	Tanah Kerajaan	-	511000	353000
	35	C137-3	Lentang	81	440000	380000
	36	C193-1	Pekan	-	580000	379000
	37	C193-1	Pekan	-	580000	379000
	38	C194-1	Pekan	87	575000	378000
	39	C194-1	Pekan	87	575000	378000
	40	C194-1	Pekan	87	575000	378000
	41	C194-1	Pekan	87	575000	378000
	42	C194-3	Pekan	87	575000	378000
	43	C194-4	Pekan	87	575000	378000
	44	C195-1	Pekan	63	576000	380000
	45	C195-3	Pekan	63	576000	380000
	46	C195-3	Pekan	63	576000	380000
	47	C195-4	Pekan	63	576000	380000

	48	C195-4	Pekan	63	576000	380000
	49	C196-1	Pekan	166	579000	373000
	50	C196-1	Pekan	166	579000	373000
	51	C196-2	Pekan	166	579000	373000
	52	C196-4	Pekan	166	579000	373000
	53	C196-4	Pekan	166	579000	373000
	54	C196-4	Pekan	166	579000	373000
	55	C196-4	Pekan	166	579000	373000
	56	C196-4	Pekan	166	579000	373000
	57	C196-4	Pekan	166	579000	373000
	58	C197-1	Pekan	32	577000	383000
	59	C197-2	Pekan	32	577000	383000
	60	C197-3	Pekan	32	577000	383000
	61	C197-4	Pekan	32	577000	383000
	62	C217-2	Pekan	182	584000	369000
	63	C218-2	Pekan	181	585000	370000
	64	C218-4	Pekan	181	585000	370000
	65	C219-1	Pekan	170	585000	372000
	66	C219-1	Pekan	170	585000	372000
	67	C219-3	Pekan	170	585000	372000
Pulau Pinang	68	P007-2	Bukit Pancur	2	570500	284500
Perak	69	A005-3	Gerik	49	360000	616000
	70	A028-2	Temenggor	22	393000	610000
	71	A029-3	Temenggor	79	404000	603000
	72	A031-3	Belum	350	402000	616000
	73	A033-3	Temenggor	78	406000	600000
	74	A049-1	Bujang Melaka	14	355000	482000
	75	A065-2	Temenggor	238	374000	581000
	76	A065-3	Temenggor	238	374000	581000
	77	A065-3	Temenggor	238	374000	581000
	78	A100-4	Bintang hijau	128	328000	574000
	79	A111-1	Papulut	9	349000	592000
	80	A111-4	Papulut	9	349000	592000
	81	A111-4	Papulut	9	349000	592000
	82	A111-4	Papulut	9	349000	592000
	83	A135-1	Gerik	21	372000	608000
	84	A149-1	Tanah Kerajaan	-	406000	623000

Selangor	85	B033-4	Bukit Kutu	27	413000	386000
	86	B034-4	Batang Kali	23	414000	284000
	87	B072-3	Bukit Belata	10	389000	401000
	88	B119-4	Sungai Karang	126	362000	400000
	89	B123-2	Sungai Karang	217	369000	395000
	90	B123-4	Sungai Karang	217	369000	395000
	91	B124-1	Raja Muda Musa	7	370000	391000
	92	B124-2	Raja Muda Musa	7	370000	391000
	93	B124-2	Raja Muda Musa	7	370000	391000
	94	B124-2	Raja Muda Musa	7	370000	391000
	95	B124-4	Raja Muda Musa	7	370000	391000
	96	B125-2	Raja Muda Musa	22	371000	390000
	97	B133-2	Sungai Karang	23	347000	404000
	98	B139-4	Raja Muda Musa	11	366000	387000
	99	B141-3	Raja Muda Musa	82	382000	389000
100	B141-4	Raja Muda Musa	82	382000	389000	
101	B142-3	Raja Muda Musa	97	382000	387000	
102	B142-4	Raja Muda Musa	97	382000	387000	
103	B145-4	Sungai Karang	225	369000	393000	
104	B155-4	Tanah Kerajaan	-	419000	378000	
105	B177-2	Tanah Kerajaan	-	361000	406000	
Terengganu	106	T001-2	Hulu Terengganu	30	546000	546000
	107	T046-1	Jerangau	42	575000	539000
	108	T047-1	Jerangau	54	566000	541000
	109	T051-1	Gunung Tebu	105	508000	608000
	110	T075-2	Jengai	104	552000	495000
	111	T112-4	Gunung Tebu	23	518000	620000
	112	T146-3	Bukit Bauk	22	594000	528000
	113	T146-4	Bukit Bauk	22	594000	528000
	114	T192-1	Tanah Kerajaan	-	598000	462000
	115	T192-4	Tanah Kerajaan	-	598000	462000

Distribution of *Aquilaria* spp. in Peninsular Malaysia based on the NFI4 Sampling Units (S.U.)

State	No.	S.U.	Forest Reserve	Forest Compartment	Intersection Grid	
					Longitude (X)	Latitude (Y)
Johor	1	J016	Lenggor	230	620000	241000
	2	J053	Labis	457	605000	279000
	3	J143	Banang	7	550000	202000
	4	J144	Panti	31	650000	203000
Kedah	5	K069	Hulu Muda	74	329000	667000
	6	K075	Hulu Muda	18	331000	641000
	7	K103	Hulu Muda	87	319000	666000
	8	K112	Rimba Telui	16	312000	634000
Kelantan	9	D007	Bukit Hantu	15	490000	536000
	10	D083	Gunung Basor	65	418000	619000
	11	D123	Sungai Durian	120	485000	615000
	12	D179	Sungai Rek	19	489000	603000
Melaka	13	M003	Bukit Sengeh	7 B	495500	266500
	14	M010	Bukit Sengeh	8	495000	265500
	15	M021	Bukit Sengeh	22	494000	264000
	16	M032	Bukit Sengeh	11	494500	264000
	17	M850	Bukit Sedanan	14 D	484500	268500
Negeri Sembilan	18	N035	Pasoh	57	478500	332000
	19	N050	Kenaboi	168	450000	349000
	20	N060	Angsi	18	460000	290000
	21	N140	Jeram Padang Utara	1	483000	318000
Pahang	22	C013	Hulu Jelai	47	423000	513000
	23	C049	Hulu Jelai	490	412000	481000
	24	C064	Berkelah	271	542000	446000
	25	C117	Satak	4	433000	452000
	26	C169	Tanah Kerajaan	-	511000	353000
Pulau Pinang	27	P010	Bukit Pancur	1	571500	283500
	28	P020	Pantai Acheh	7 E	604500	244500
Perak	29	A028	Temenggor	22	393000	610000
	30	A110	Papulut	32	346000	585000
	31	A118	Belukar Semang	10	335000	523000
	32	A137	Bintang Hijau	112	335000	588000
	33	A170	Tanah Kerajaan	-	357000	472000
Terengganu	34	T010	Pasir Raja	23	551000	517000
	35	T013	Jerangau	30	565000	546000
	36	T050	Pelagat	71	492000	512000
	37	T054	Pasir Raja	13	549000	518000
	38	T105	Jerangau	2	569000	555000
	39	T134	Gunung Tebu	53	509000	623000
	40	T139	Pelangat	3	492000	632000
	41	T142	Cherul	5	569000	459000
	42	T188	Tanah Kerajaan	-	496000	631000
	43	T213	Gunung Tebu	49	512000	622000

Distribution of *Intsia* spp. in Peninsular Malaysia based on the NF14 Sampling Units (S.U.)

State	No.	S.U.	Forest Reserve	Forest Compartment	Intersection Grid	
					Longitude (X)	Latitude (Y)
Johor	1	J030-2	Lenggor	26	627000	243000
	2	J043-4	Labis	613	586000	267000
	3	J044-1	Labis	645	586000	263000
	4	J100-1	Maokil	121	543000	246000
	5	J116-3	Labis	278	605000	282000
	6	J152-1	Tanah Kerajaan	-	624000	222000
	7	J197-1	Panti	74	646000	204000
Kedah	8	K001-2	Kuala Kisap	13	211000	711000
	9	K002-2	Hulu Muda	66	338000	667000
	10	K005-4	Hulu Muda	36	335000	652000
	11	K011-1	Hulu Muda	65	341000	668000
	12	K011-1	Hulu Muda	65	341000	668000
	13	K012-1	Hulu Muda	122	342000	676000
	14	K012-3	Hulu Muda	122	342000	676000
	15	K013-2	Hulu Muda	77	332000	663000
	16	K013-2	Hulu Muda	77	332000	663000
	17	K013-2	Hulu Muda	77	332000	663000
	18	K013-2	Hulu Muda	77	332000	663000
	19	K015-4	Hulu Muda	120	338000	678000
	20	K016-1	Hulu Muda	50	338000	657000
	21	K016-1	Hulu Muda	50	338000	657000
	22	K016-1	Hulu Muda	50	338000	657000
	23	K016-1	Hulu Muda	50	338000	657000
	24	K023-1	Chebar	19	314000	675000
	25	K023-1	Chebar	19	314000	675000
	26	K025-2	Hulu Muda	95	330000	672000
	27	K026-1	Hulu Muda	96	3320000	669000
	28	K026-1	Hulu Muda	96	3320000	669000
	29	K028-1	Hulu Muda	154	337000	687000
	30	K028-1	Hulu Muda	154	337000	687000
	31	K028-1	Hulu Muda	154	337000	687000
	32	K031-1	Hulu Muda	62	345000	666000
	33	K031-1	Hulu Muda	62	345000	666000
	34	K031-1	Hulu Muda	62	345000	666000
	35	K034-2	Hulu Muda	39	331000	658000
	36	K034-2	Hulu Muda	39	331000	658000
	37	K036-2	Pulau Tuba	3	206000	690000
	38	K036-2	Pulau Tuba	3	206000	690000
	39	K036-2	Pulau Tuba	3	206000	690000
	40	K041-4	Chebar	2	311000	683000
	41	K041-4	Chebar	2	311000	683000
	42	K041-4	Chebar	2	311000	683000
	43	K046-3	Hulu Muda	173	325000	689000
	44	K049-3	Hulu Muda	130	331000	681000
	45	K050-2	Hulu Muda	168	333000	690000
	46	K051-2	Hulu Muda	153	336000	687000
	47	K051-2	Hulu Muda	153	336000	687000
	48	K051-2	Hulu Muda	153	336000	687000

	49	K052-4	Hulu Muda	45	330000	661000
	50	K058-4	Chebar	16	314000	678000
	51	K071-3	Rimba Telui	75	312000	650000
	52	K084-1	Sungai Badak	2	282000	717000
	53	K102-4	Cdng Rimba Telui	-	316000	663000
	54	K105-2	Hulu Muda	91	323000	670000
	55	K128-2	Bukit Perangin	14	278000	707000
	56	K130-4	Padang Terap	42	308000	701000
	57	K131-3	Padang Terap	30	309000	693000
	58	K156-1	Gunung Inas	11	310000	609000
Kelantan	59	D010-4	Sungai Perias	238	401000	553000
	60	D028-3	Gunung Basor	183	421000	587000
	61	D071-1	G.Stong selatan	70	435000	580000
	62	D103-1	Sungai Perias	256	415000	547000
	63	D147-3	Hulu sat	33	483000	634000
	64	D149-4	Tanah Kerajaan	-	393000	573000
	65	D159-2	Tanah Kerajaan	-	403000	577000
Melaka	66	M007-4	Bukit Sengeh	7A	495500	267000
	67	M010-2	Bukit Sengeh	8	495000	265500
	68	M015-1	Bukit Sengeh	9	493500	265500
	69	M026-1	Bukit Sengeh	21	494500	263000
	70	M041-1	Bukit Sengeh	8	494500	265500
	71	M846-3	Bukit Sedanan	17D	485000	267000
Negeri Sembilan	72	N035-1	Pasoh	57	478500	325500
	73	N037-1	Pasoh	56	480000	330500
	74	N038-2	Pasoh	56	480000	331000
	75	N038-2	Pasoh	56	480000	331000
	76	N043-4	Triang	88	458500	326000
	77	N052-3	Kenaboi	168	450000	349500
	78	N066-1	Kenaboi	83	453000	344000
	79	N076-2	Johol	14	469000	288000
	80	N088-1	Kenaboi	13	465000	347000
	81	N088-1	Kenaboi	13	465000	347000
	82	N110-4	Lenggeng	16	442000	321000
	83	N127-1	Kenaboi	86A	456000	344000
	84	N174-3	Pelangai	1	463000	316000
	Pahang	85	C016-1	Yong	130	472000
86		C020-2	Hulu Jelai	138	418000	506000
87		C022-3	Gunung Aais	38	544000	486000
88		C026-1	Lakum	50	449000	405000
89		C026-1	Lakum	50	449000	405000
90		C033-1	Chini	107	525000	355000
91		C037-1	Yong	155	475000	456000
92		C037-1	Yong	155	475000	456000
93		C086-2	Chini	61	528000	376000
94		C090-3	Berkelah	133	530000	403000
95		C100-1	Tekai Tambahan	79	495000	464000
96		C106-1	Berkelah	376	557000	416000
97		C107-1	Berkelah	396	567000	414000
98		C107-1	Berkelah	396	567000	414000
99		C112-3	Chini	122	525000	352000
100		C112-3	Chini	122	525000	352000
101		C132-4	Bukit Kuantan	19	585000	437000
102		C172-4	Tanah Kerajaan	-	522000	497000

	103	C180-2	Tanah Kerajaan	-	595000	359000
	104	C229-2	Nenasi	123	597000	339000
Perak	105	A004-3	Gerik	48	363000	617000
	106	A005-1	Gerik	49	360000	616000
	107	A005-1	Gerik	49	360000	616000
	108	A013-4	Temenggor	17	385000	606000
	109	A014-3	Temenggor	55	387000	601000
	110	A021-1	Temenggor	148	390000	591000
	111	A021-1	Temenggor	148	390000	591000
	112	A023-1	Temenggor	89	391000	598000
	113	A023-1	Temenggor	89	391000	598000
	114	A028-1	Temenggor	22	393000	610000
	115	A028-1	Temenggor	22	393000	610000
	116	A031-1	Belum	350	402000	616000
	117	A037-2	Temenggor	87	389000	600000
	118	A037-2	Temenggor	87	389000	600000
	119	A051-2	Bukit Tapah	40	378000	458000
	120	A051-2	Bukit Tapah	40	378000	458000
	121	A070-3	Korbu	38	358000	537000
	122	A082-2	Piah	40	349000	555000
	123	A082-2	Piah	40	349000	555000
	124	A091-3	Bukit Slim	21	381000	446000
	125	A101-1	Bukit Tapah	159	370000	475000
126	A101-1	Bukit Tapah	159	370000	475000	
127	A101-1	Bukit Tapah	159	370000	475000	
128	A104-1	Korbu	16	359000	547000	
129	A105-2	Kenderong	5	335000	605000	
130	A111-3	Papulut	9	349000	592000	
131	A112-2	Air Cepam	1	357000	598000	
132	A112-2	Air Cepam	1	357000	598000	
133	A115-4	Piah	15	348000	553000	
134	A118-1	Belukar Semang	10	335000	623000	
135	A130-3	Bukit Tapah	110	372000	476000	
136	A143-1	Belukar Semang	28	331000	616000	
137	A174-1	Sungkai(Mergastua)	-	376000	447000	
138	A182-1	Taman Negeri Belum	182	381000	635000	
139	A182-1	Taman Negeri Belum	182	381000	635000	

Perlis	140	R003-3	Mata Air	2	245500	740500
	141	R017-4	Mata Air	7	249500	741500
	142	R024-2	Mata Air	2	246000	741500
Selangor	143	B010-4	Hulu Gombak	87	423000	359000
	144	B013-4	Hulu Gombak	83	424000	359500
	145	B041-2	Sungai Lalang	18	430000	343000
	146	B105-3	Bukit Gading	45	400000	403000
	147	B111-2	Hulu Gombak	22	418000	363000
	148	B155-4	Tanah Kerajaan	-	419000	378000
Terengganu	149	T035-4	Sungai Nipah	55	573000	475000
	150	T091-2	Pasir Raja	19	561000	508000
	151	T097-1	Besul	8	572000	520000
	152	T097-1	Besul	8	572000	520000
	153	T100-2	Jerangau	34	566000	544000
	154	T115-1	Sungai Nipah	63	565000	476000
	155	T138-3	Gunung Tebu	8	516000	624000
	156	T210-2	Tembat	471	506000	560000
	157	T210-2	Tembat	471	506000	560000