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INTERNATIONAL GAHARU TRADE AND ITS IMPLICATION ON HAVESTING TO THE LOCAL COMMUNITIES

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ABSTRACT

*Gaharu is one of a few of the international non-timber forest products well known for its resinous, fragrant and highly valuable heartwood produced by the *Aquilaria* spp. of the family Thymelaeaceae. The formation of the resinous within the tree is always associated with some external injury to the timber and is never produced in sound tree where no injury occurs. Eight tree species of *Aquilaria* are found distributed throughout India, China, Southeast Asia and the East Indies. There has been active trading and demand for gaharu with the introduction of new applications for gaharu materials in the cosmological industry, manufacturing and other products. Because of the very high demand of this material, it has contributed to the national and household economy especially among gaharu collectors. Gaharu contributed to the national income through export. The total net trade of gaharu in raw and semi-processed form (i.e. timber, chips and powder) was over 1,350 tonnes from 1995 to 1997. This trade data is only a fraction of the total world trade in gaharu, as demonstrated by Customs import data from Taiwan which show imports totalling approximately 2,050 tonnes during the same period. Indonesia and Malaysia were reported to be the main exporters with the total export of approximately 923 tonnes and 341 tonnes, respectively from the year 1995 to 1997. These two countries are the primary suppliers of these material to international market. The major importer countries are Hong Kong, Taiwan, Japan, Singapore, Saudi Arabia, Yemen, Oman and UAE. In the global market there are many form of gaharu traded, ranging from large sections of trunk to finished products such as incense and perfumes. Generally the most common forms in trade are gaharu chips and flakes. Although the overall trade volumes of these materials may appear small in timber trade term but they are not small in monetary terms. Gaharu chips and flakes may sell for several hundred to several thousand US dollars per kilogramme. The price of oil distilled from gaharu is generally between five and ten thousand US dollars per kilogramme, but can be more than that especially for gaharu oil of exceptionally high quality. The objective of this paper is to review the potential of gaharu in international trade and its importance to household economy. It provides information in terms of the status of these resources in the market and also provide better understanding of the value of the gaharu to the local communities. In 1999, our case study in Terengganu showed that the involvement of villagers in these activities generated a reasonable average level of income, comprising about 62% from the total household income. These materials were sold at prices varying from around RM8-4,000 per kilogramme depending on the grade. The classification (grading) of gaharu in the international market is depend on a complex set of factors related to the colour, species involved, size, fragrance and resin content of gaharu offered for sale.*

INTRODUCTION

Gaharu is a fragrant wood which is derived from the diseased timber of *Aquilaria* spp. of the family Thymelaeaceae. The best gaharu yields are normally from the trees of 50 years age or more than that, but the resin is produced early as 20 years age (Sadgopal & Varma 1952). White Lotus Aromatics Newsletters reported that the trees of 80 years old are to be the richest in content of gaharu varying from 6.9 kilogramme to 9.0 kilogramme per tree. The Rainforest Project (TRP) is study site in Vietnam reported that gaharu can occur in cultivated trees as young as three years old (H. Heuveling Van Beek, TRP, in litt. to TRAFFIC International, 2 May 2000, cited in Barden *et al.* 2000). According to Gibson (1977, cited in Ng *et al.* 1997) estimating that only approximately 10% of wild *Aquilaria* spp. can produce gaharu and Gianni (1986, cited in Barden *et al.* 2000) stated that only one-tenth of mature trees above 20 cm diameter at breast height (dbh) produce gaharu. These fragrant wood also known as agar, aloewood, eaglewood or kalambak. Table 1 shows the several species produced gaharu and its local names.

Table 1: The species of *Aquilaria* form gaharu

Species	Country	Local name
<i>A. agallocha</i>	India, Pakistan	Agaru, agar
<i>A. crassna</i>	Thailand	Aloeswood
<i>A. moszkowskii</i>	Indonesia (Sumatra)	?
<i>A. malaccensis</i>	Malaysia	Gaharu
<i>A. baillonii</i> , <i>A. crassna</i>	Cambodia	Kalambak
<i>A. grandiflora</i>	Hainan	Ch'eng hsiang
<i>Gonystylus bancanus</i> (species of ramin)	Borneo, Sumatra	Gaharu

Source: Ng, *et al.* 1997. Journal of Tropical Forest Products 2(2)

The population of these species have already declined to the point where they are considered threatened according to the IUCN Red List Categories. Of these, six species are considered threatened by over-exploitation for gaharu wood. In 1995, *Aquilaria malaccensis* was listed in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which allowed trade through a system of permits. These permits can only be issued if it can be confirmed that gaharu being traded was obtained legally and in a manner not detrimental to the survival of the species.

In Malaysia, three species found are *A. malaccensis*, *A. hirta* and *A. rostrata*. The tree of *Aquilaria* is called karas, its fragrant wood is known as gaharu. The karas tree (*A. malaccensis*) is well distributed throughout Peninsular Malaysia except in the states of Perlis and Kedah. It is confined mainly to plains, hill slopes and ridges up to 750 m in both primary and secondary Malaysian lowland and hill forests (Whitmore 1972) and is known to produce medium-quality grade of gaharu (Burkill 1966). Karas is a large evergreen tree growing over 15-30 m tall and 1.5-2.5 m in diameter, and has white flowers (Chakrabarty *et al.* 1994).

There are active trading of these material in the local market as well as international market. In 1997, over 700 tonnes of gaharu from the species of *Aquilaria malaccensis* were traded in the international market. Even though it was actively traded in the market as well as contributed revenue significantly to the local communities, the information on the status of the species especially in the wild is generally scarce. These limit the authorities' ability to determine whether its trading is being maintained within sustainable levels. It is important in terms of implementing the good management of harvest and trade.

STATUS OF GAHARU POPULATION

Gaharu population are quit widespread but patchy in distribution. In Indonesia, population densities are 1.87 individuals per hectare in Sumatra, 3.37 individuals per hectare in Kalimantan and 4.33 individuals per hectare in Irian Jaya. However in Malaysia its was estimates at 2.5 individuals per hectare (Soehartono in WCMC, 1997). In the wild, why and how gaharu is formed inside the wood is not fully understood at present, but generally known that it is cause by fungus. Several studies (Santoso 1996, Soehartono & Mardiasuti 1997 and Viriadinata 1995) cited in Barden *et al.* 2000 stated that *Aquilaria* trees are naturally infected by a variety of fungus: *Aspergillus* spp., *Botryodyplodia* spp., *Diplodia* spp., *Fusarium bulbiferum*, *F. laterium*, *F. oxysporum*, *F. soloni*, *Penicillium* and *Pythium* spp. The population are likely to be infected with the fungus produced gaharu only in a small percentage. Traditionally local people harvest only these infected trees. They extract gaharu from the trees by felling and splitting them to gather the resinous product. Normally dying trees are thought to contain gaharu. Indications that tree are dying include yellowish leaves, leafless branches with swollen spots along the branch and trunk are very dry bark. Although these unhealthy trees apparently show certain of the symptoms, it is not possible to identify gaharu producing trees in a reliable manner by visual inspection. In Indonesia, the Dayak communities believe that dying seedlings and saplings show yellowish leaves and testify to be infection of the mother tree. They are able to identify the infected trees by differentiating between the sound made by knocking on infected trunks and uninfected trunks. In recent years, high demand of these material has led to excessive harvesting of both infected and uninfected or healthy trees (Soehartono in WCMC, 1997). The increasing rarity of these species also led to harvesters searching this material in more remote area.

INITIAL FINDING: A CASE STUDY IN TERENGGANU

Background of Gaharu Harvesting Activity

Gaharu is one of the valuable non-timber forest products and it contributed significantly to the household economy. In 1999, a socio-economic survey was conducted on 28 respondent households (57% of total households collected gaharu) in two villages (Pasir Raja and Kuala Jengai) near the Kumpulan Pengurusan Kayu-Kayan Terengganu (KPKKT) forest concession area (128,720 ha) in Dungun District, Terengganu. This concessionaire was incorporated on March 1980 is a wholly owned subsidiary of the State Economic Development Corporation of Terengganu, a state on the East Coast of Peninsular Malaysia. The concession covers five Forest Reserves namely Jerangau (9,710 ha), Jengai (51,640 ha), Pasir Raja (38,000 ha), Cherul (27,500 ha) and Besul Forest Reserves (9,550 ha). It was created to maintain Malaysia's status as the world leader in tropical hardwoods and also to provide the impetus for the programme of rural industrialization and regional development.

Problems Encountered

The study was conducted rather smoothly with few problems. Some villagers were suspicious initially but later co-operated when told of the nature of the study where name and address were not recorded. Moreover, the good rapport created helped much to ease the fears of the villagers. Consequently, some villagers even did not mind revealing more on the gaharu harvesting, even though they did not have the permission from the authorities. This good rapport helped as words spread to all villages studied and the residents in the villages gave their co-operation and the survey was successfully completed.

Socio-Economic Impacts on Local Communities

Characteristic of gaharu harvesting in Terengganu

Harvesting gaharu appears to be a popular activity for local villagers. This resource is importance in terms of supporting socio-economic well being of the local communities living in the nearby areas. Even though the gaharu producing areas are decreasing, the nearby forest areas in continue to be an important source where the local villagers harvest gaharu. Some characteristics of gaharu harvesting are shown in Tables 2 and 3.

Table 2: Number of years in gaharu harvesting

Years	Village		Total
	Pasir Raja	Kuala Jengai	
< 10	7 (39)	1 (10)	8 (29)
10 – 20	8 (44)	7 (70)	15 (53)
21 – 30	3 (17)	2 (20)	5 (18)
Total	18 (100)	10 (100)	28 (100)

Source: field data

figures in parentheses are percentages.

Table 3: Characteristics of gaharu harvesting

	<i>Characteristic</i>
Labour	Mainly males below the age of 40.
Trip	Monthly. 50% once a month, 50% 2-3 times a month.
Time range	3 – 14 days (average 8 days)
No. per trip	2 – 6 people (average 4 people)
Yield per trip	0.15 kg – 8.5 kg (average 1.8 kg, all grades)
Income/trip/person	For average 9-day trip involving 4 persons, RM638/person
Income/trip	RM300 – RM9,500 (average RM2,461, all grades)
Employment	36% full time collectors, 64% part-time
Main reason	93% of collectors attributed to the lucrative income generated
Location	93% harvested gaharu from KPKKT forest concession areas

Source: field data

Employment and income generated

Of the total 60 workers in the two villages, 60% were engaged in activities within the KPKKT comprising 2% logging workers and 58% gaharu harvester (Table 4). About 3% of the total 60 workers in the two villages were sawmill workers while 5% were staff of KPKKT. More than half of work force in the two villages were engaged in activities directly related to harvesting gaharu.

In terms of income generated, the average monthly household income among gaharu collector of two villages studied was RM1,305 in 1999. It was RM1,178 in Pasir Raja and RM1,529 in Kuala Jengai. The income sources of the two villages studied could be observed from those within the forest concession area. It shows the significance in terms of income generated from forest concession area. On average, about RM860 or 66% (Table 5) of the average monthly household income was generated from the KPKKT forest concession area. The major contribution was from harvesting gaharu (62%).

Table 4: Main occupation of working members

	<i>Villages</i>		<i>Total</i>
	<i>K. Jengai</i>	<i>P.Raja</i>	
<i>KPKKT hill forest</i>			
Logging worker	0	1 (2)	1 (2)
Gaharu harvester	9 (48)	26 (64)	35 (58)
<i>Forest based</i>			
Sawmill worker	0	2 (5)	2 (3)
KPKKT staff	0	3 (7)	3 (5)
<i>Non-forestry</i>			
Rubber tapper	5 (26)	2 (5)	7 (12)
Vegetable farmer	0	2 (5)	2 (3)
Others	5 (26)	5 (12)	10 (17)
<i>Total</i>	19 (100)	41 (100)	60 (100)

figures in parentheses are percentages

Source: field data

Table 5: Source of average monthly household income, 1999

	<i>Pasir Raja</i>		<i>Kuala Jengai</i>		<i>All villages</i>	
	<i>RM</i>	<i>%</i>	<i>RM</i>	<i>%</i>	<i>RM</i>	<i>%</i>
<i>A) Within KPKKT Concession</i>						
Gaharu harvesting	686	58	1040	68	812	62
Other NTFP harvesting	0	0	25	2	9	1
Logging	44	4	0	0	29	2
Fish consumed	8	1	15	1	10	1
<i>B) Outside KPKKT (Forestry related)</i>						
Sawmilling	44	4	0	0	29	2
KPKKT staff	119	10	0	0	77	6
<i>C) Outside KPKKT (Non-forestry)</i>						
Other factory worker	44	4	0	0	29	2
Other cash	61	5	190	12	107	8
Vegetable farming	29	2	9	1	22	2
Rubber tapper	25	2	85	6	46	4
Remittance	0	0	35	2	13	1
Poultry and vegetable farming (inkind)	14	1	17	1	15	1
Imputed rent	104	9	113	7	107	8
<i>Total</i>	1178	100	1529	100	1305	100

Source: field data

Poverty eradication

Some of the villagers claimed that the depletion of gaharu resources has contributed partly to poverty among the villagers. The extent of poverty among these local communities could be indicated from the incidence of poverty among the households in the two villages. Poverty in Malaysia "is measured on the basis of a minimum expenditure level or the poverty line income (PLI) to separate the poor from non-poor" (Government of Malaysia 1986). In 1997, the PLI was roughly RM460 per month for a household of 4.6 members in Peninsular Malaysia (Government of Malaysia 1999). This means the per capita PLI was RM100 in 1997. Taking into consideration the rise in the consumers' price index of about 8% between 1997 and 1999, the per capita PLI was calculated to be RM108 in 1999 and this used to measure the incidence of poverty among the two villages studied for the year 1999 (Table 6).

The incidence of poverty among the two villages averaged 14% in 1999 (10% in Kuala Jengai and 17% in Pasir Raja). Poverty among villages near the forest concession area was thus relatively higher compared to 11% among all rural Malaysian households in 1997. This shows that even though the incidence of poverty of rural Malaysia declined from 19% in 1990 (Government of Malaysia 1991) to 11% in 1997, poverty still persists in the study area. This relatively higher incidence of poverty in Pasir Raja was partly attributed to the economic slow down experienced by Malaysia since July 1997 till mid-1999.

Table 6: The incidence of poverty among two villages, 1999

<i>Village</i>	<i>Total households</i>	<i>No. of poor households</i>	<i>Incidence of poverty (%)</i>
K. Jengai	10	1	10
P. Raja	18	3	17
<i>All 2 villages</i>	28	4	14
<i>Rural Malaysia (1997)</i>	2,193,100	239,000	11

Source: Two villages – field data, Rural Malaysia – Government of Malaysia (1999).

Income from gaharu harvesting is important in eradicating poverty among the local communities living near the vicinity. Statistical analysis on the impact of income from gaharu harvesting on poverty status showed that at 95% confidence level, the computed chi square value is 11.20 which is higher than tabulated value of 6.63, thus indicating the importance of income from gaharu harvesting in poverty eradication (Table 7).

Table 7: Significance of income from gaharu on poverty status, 1999

	<i>No. of households</i>		
	<i>Poor</i>	<i>Non-Poor</i>	<i>Total</i>
All two villages			
With income from gaharu	4	24	28
Without income from gaharu	16	12	28
Total	20	36	56

Chi square = 11.20 (computed value); Tabulated value = 6.63 (at 1% level of significance)

Limitations in Relation To The Resource

Depletion of gaharu resource

In Terengganu, before 1980, harvesting these resources did not encounter problems but recently the local villagers have to travel further into the forest including Taman Negara to harvest gaharu. Collectors have to travel and spend a few nights in the forests for one single gaharu harvesting trip. Most of the time they camped in the forests for one week or more. In the years to come, gaharu harvesting will be more difficult and involved spending more days in the forests. Even though the majority of the gaharu harvesters claimed to harvest the produce mainly from forest concession areas, this does not bar them from harvesting gaharu from Taman Negara. In the past when the local population was relatively small and gaharu was abundant, the question of depletion did not arise. However, in the last two decades, the local villagers claimed that resources are getting scarce. In the 1980s, the harvesters needed only to travel short distance harvest the required quantity of gaharu but now a harvester has to travel further into the forests looking for gaharu.

Although harvesting gaharu from Taman Negara is prohibited, but because of demand and good prices they are still harvested. In Malaysia, each state required special permits to harvest and trade gaharu. Within Peninsular Malaysia, the *National Forestry Act, 1984* prohibits the felling of *Aquilaria malaccensis* from State forests or Permanent Reserve Forest and harvesting from Taman Negara is prohibited by the *Protection of Wildlife Act, 1972*. Under the *National Forestry Act (amended 1993)*, illegal harvest of forest products is subject to fines of up to RM500,000 and/or imprisonment up to 20 years or both.

ECONOMIC VALUE OF GAHARU

Market and Prices

Gaharu wood is sold in the market under different names and graded according to the proportion and concentration of dark substance present in the wood. The darker the colour of the gaharu wood, the higher are the grade and price. In global market gaharu are sold for several hundred to several thousand US dollars per kilogram. The price of oil distilled from gaharu is generally between five and ten thousand US dollars per kilogram. In Malaysia majority of gaharu harvested is exported, with only small quantities being used locally, primarily for the production of incense. Normally, gaharu is used by Muslims during important religious occasions, especially at gathering. It is also used occasionally for medicinal purposes. According to Chakrabarty *et al.* (1994), the lowest grade of Malaysian gaharu could be obtained for RM72 per kilogram in the Middle East. The high grades could be obtained up to RM36,438 to RM104,120 per kilogram. South-east Asian countries exported approximately RM66.9 million worth of gaharu to Saudi Arabia, out of that 26% was source from Malaysia (Ng *et al.* 1997). In Terengganu for the year 1999, gaharu is graded into five main classes and the following is a list of the classes/grade and their characteristic.

- | | | | |
|------|--|-----|--------------------|
| i) | A - Dark, dense, concentrated and heavy | iv) | C2 – Dark yellow |
| ii) | B - Purple dark, less dense and have a small holes | v) | D - Gaharu remains |
| iii) | C1- Yellow dark stripe | | |

The following is a list of the prices of different grades of gaharu in Terengganu. This prices is according to the prices from collectors to local middleman.

- | | |
|--|---|
| a) Grade A - RM3,200 to RM4,000 per kilogram | d) Grade C2 – RM40 to RM80 per kilogram |
| b) Grade B - RM1,800 to RM2,500 per kilogram | e) Grade D – RM8 to RM30 per kilogram |
| c) Grade C1 – RM400 to RM800 per kilogram | |

Demand and Supply Scenario

The current supply of gaharu wood derived from *Aquilaria malaccensis* is mainly from Malaysia and Indonesia with the total exports of approximately 341 tonnes and 923 tonnes respectively from the year 1995 to 1997 (figure 1), this does not included export figures for Sarawak, which reached closely 500 tonnes in 1998 alone. Other than that Thailand, Cambodia, Vietnam, Lao PDR and Myanmar are important suppliers of gaharu in the international trade. Indonesia is noted to be the major supplier of gaharu to international market and it is confirmed by Customs data from Taiwan which showed that nearly 3000 tonnes imports of gaharu is originating from Indonesia between 1993 and 1998. Taiwan is one of the largest final markets for the *Aquilaria malaccensis* which is reported in CITES trade data from 1995 to 1997. Its total imports approximately 402 tonnes of chips, powder and timber in that period. Of this total, approximately 116 tonnes were imported directly from Indonesia. CITES also reported that exports and re-exports of *Aquilaria malaccensis* in the international market totaled approximately 768 tonnes in 1995, 638 tonnes in 1996, 719 tonnes in 1997 and 1074 tonnes in 1998 (Figure 2).

For gaharu wood of Malaysian origin (including wood re-exported from others countries) from 1995 to 1997, the main end-destination was Hong Kong, which was approximately 86 tonnes. Other destinations were India (25 tonnes), Saudi Arabia (17 tonnes), followed by Egypt (9 tonnes), UAE (6 tonnes), Oman (2 tonnes) and Japan (1.4 tonnes). In the international trade in gaharu involved wood, wood chip, powder, oil and also finished products such as perfumes, incense and medicines. The most common forms are gaharu chips and flakes. Gaharu oil is a highly valuable and frequently traded product and normally produced by

steam distillation of low-grade gaharu chips and powder. The grading of gaharu which is sold in the international market not only depends on the species itself but on a complex set of factors related to the size, resin content, their fragrance and the colours. Its value also depends on the country where the material comes from. Grading system is different between the countries, according to the product in trade and the country in which trade is taking place.

Figure 1: Exports of gaharu (*Aquilaria malaccensis*) from range states

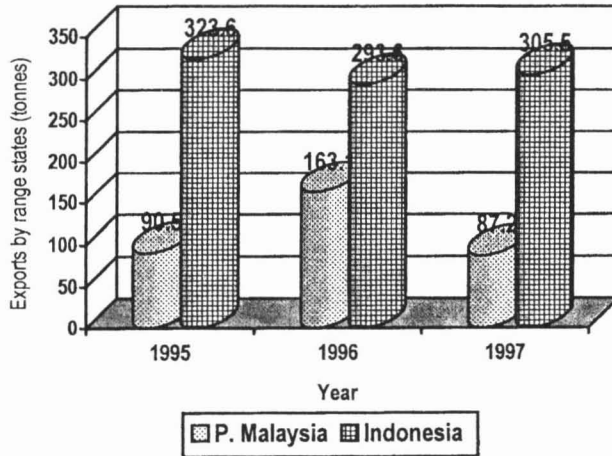
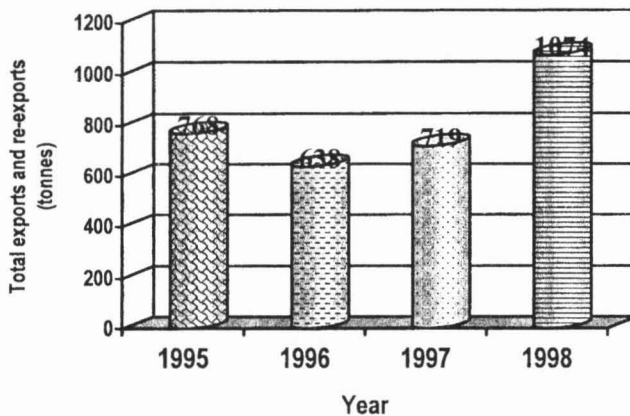


Figure 2: Exports and re-exports of gaharu (*A. malaccensis*) in the international market



CONCLUSION AND RECOMMENDATIONS

Gaharu harvesting is important to local communities who are living near the forest areas. Participation in this activity has created employment as well as generated income to local residents. In the case of Terengganu, our case study shows that 58% of the local labour force of 60 members were gaharu harvesters. Of the average monthly households income of RM1,305 in 1999, 62% was derived from gaharu. This base line socio-economic study has provided better understanding of the value of NTFPs especially gaharu to the local communities in terms of meeting their cash needs. Its also generated revenue to the governments through exports. Over 700 tonnes of gaharu was reported in the international market in the year 1997. These trade volume may seem small when compared to mainstream timber trade figures, but they are not small in monetary terms.

However, these highly demand and active trading in international market could lead over-harvesting and rapidly-dwindling in supply. The information on the status of the species in the wild and effective harvesting of gaharu should be considered in order to prevent over harvesting. Further study on the potential of setting up *Aquilaria* plantation and increasing artificially gaharu production should be incorporated and explored. This is important to ensure that trading is being maintained within sustainable levels.

Further research also needs to be undertaken relating to trade dynamics. Importers and countries or international market centres needs to be identified to address the issues of sustainability and ensuring future supply. An economic assessment of their value as a component of local livelihoods and as a potential revenue source for national economy should also be conducted.

Considerable effort are required both at national and international levels in policy development, analysis and proper implementation in close collaboration with the actual gatherers or collectors and primary users in the local communities, researchers, forest managers and Non-Government Organisations (NGOs). Efforts are also needed for undertaking ethnobotanical studies on the use of these materials, their population status in the wild and etc. This is important to ensure that harvesting is being maintained within sustainable level. Much more intensive efforts also needed to evaluate and quantify all benefits of gaharu such as meeting subsistence need, employment creation and income generation in rural areas, environmental, cultural and biodiversity values, eco-tourism and commercial uses.

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