

**ASIA-PACIFIC FORESTRY SECTOR OUTLOOK STUDY
WORKING PAPER SERIES**

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COUNTRY REPORT - MALAYSIA

by

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INFORMATION NOTE ON ASIA-PACIFIC FORESTRY SECTOR OUTLOOK STUDY

At its sixteenth session held in Yangon, Myanmar, in January 1996, the Asia-Pacific Forestry Commission, which has membership open to all governments in the Asia-Pacific region, decided to carry out an outlook study for forestry with horizon year 2010. The study is being coordinated by FAO through its regional office in Bangkok and its Headquarters in Rome, but is being implemented in close partnership with governments, many of which have nominated national focal points.

The scope of the study is to look at the main external and sectoral developments in policies, programmes and institutions that will affect the forestry sector and to assess from this the likely direction of its evolution and to present its likely situation in 2010. The study involves assessment of current status but also of trends from the past and the main forces which are shaping those trends and then builds on this to explore future prospects.

Working papers have been contributed or commissioned on a wide range of topics. They fall under the following categories: country profiles, selected in-depth country or sub-regional studies and thematic studies. Working papers are prepared by individual authors or groups of authors on their own professional responsibility; therefore, the opinions expressed in them do not necessarily reflect the views of their employers, the governments of the Asia-Pacific Forestry Commission or of the Food and Agriculture Organization. In preparing the substantive report to be presented at the next session of the Asia-Pacific Forestry Commission early in 1998, material from these working papers will be an important element but will be blended and interpreted alongside a lot of other material.

Working papers are being produced and issued as they arrive. Some effort at uniformity of presentation is being attempted but the contents are only minimally edited for style or clarity. FAO welcomes from readers any information which they feel would be useful to the study on the subject of any of the working papers or on any other subject that has importance for the Asia-Pacific forestry sector. Such material can be mailed to the contacts given below from whom further copies of these working papers, as well as more information on the Asia-Pacific Forestry Sector Study, can be obtained:

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1.0 INTRODUCTION

Malaysia is a tropical country located north of the Equator within latitudes 1° to 7° North and longitudes 100° to 119° East. The total land area is approximately 32.9 million hectares with 13.2 million hectares in Peninsular Malaysia, which comprises eleven states and the Federal Territory of Kuala Lumpur, 7.4 million hectares in Sabah and the Federal Territory of Labuan, and 12.3 million hectares in Sarawak. Peninsular Malaysia is separated from Sabah and Sarawak by 720 km of the South China Sea, giving the country a coastline of almost 4,830 km.

The climate of Malaysia is typically humid tropical or wet equatorial and is characterized by year round high temperatures and seasonal heavy rain, especially during the North-East Monsoon from October/November to February/March. The mean temperatures during the day and night are 32° C and 22° C respectively. The average monthly temperature variation is about 2° C while diurnal temperature variation for inland and coastal areas are 8.5° C to 11° C and 5.5° C to 8.5° C respectively. The average annual rainfall is about 2,540 mm with a maximum of 5,080 mm and a minimum of 1,650 mm. Humidity is always high and ranges from 70% to 98% and the sky is cloudy most of the day, especially during the monsoon months.

2.0 SOCIAL AND ECONOMIC SITUATIONS

Malaysia has a population of 20 million people (1995 estimate) with over 80% of them in Peninsular Malaysia. The society is multi-racial, with the main races being Malays, Chinese and Indians. The annual population growth rate in 1992 was 5.9% while the current life expectancy stands at 71 years.

According to the World Bank, Malaysia is an upper-middle income country. The total GNP in 1995 was estimated at RM 202,389 million¹ while the per capita GNP at current price level was RM 10,068. The country has high and sustained rates of both GNP and GDP growth. The rates of growth of GNP and GDP were above 8% and 7% respectively from 1980 to 1995 with a record high achieved in 1990 of 11.3% and 9.7%. The growth rates were 9.3% and 9.6%, respectively in 1995.

Inflation rate in Malaysia is moderate, around 3.7% in 1994 and less than 4% in 1995. Nevertheless, inflation control remains one of the top Government's priorities. In recent years, Malaysia has been a magnet to foreign investment. In 1994, total foreign investment was about RM 22.67 billion, largely in the manufacturing sector. The United States of America (USA), Japan, Singapore and Taiwan remained the main trading partners of Malaysia.

Although Malaysia is heading towards industrialisation, its economy is still rooted in the production and export of primary commodities - crude oil, palm oil, tin and rubber still provide over 50% of export earnings. Nevertheless, the manufacturing industry is the fastest

¹ US\$1.00 = RM2.46 as of June 1997.

area of growth. Malaysia leads the world in the production of rubber and is one of the biggest producers of cocoa, palm oil, tropical hardwoods, pepper and tin, all of which are mostly exported in processed forms.

Of the various natural resource sectors, forestry remains one of the most important, contributing significantly to socio-economic development of the country. This is evident by the following contributions:-

- i. The total export value of timber and timber products (including rattan and wooden furniture) for Malaysia recorded FOB RM 13.1 billion or 7.0% of total export receipt of the country at FOB RM 185.3 billion in 1995. For Peninsular Malaysia alone, the total export value of timber and timber products (excluding rattan and wooden furniture) amounted to FOB RM 2.3 billion, constituting 1.0% of the total gross export receipts of Peninsular Malaysia at FOB RM 175.1 billion for the same year.
- ii. Revenue derived from forests in the form of royalties, premium, forest development fund, and others represent a considerable and important proportion of the State Government's total income, while at the Federal level, export levy and income tax are collected. In 1995 the total forest revenue collected by the various state governments in Malaysia amounted to almost RM 2.0 billion.
- iii. The forestry sector provided direct and indirect employment for almost 250,000 persons in 1995. In Peninsular Malaysia forestry sector provided employment for at least 87,512 persons, specifically 12,940 persons in the logging industry, 20,075 persons in sawmilling, 16,259 persons in the plywood/veneer industry, 8,591 persons in the moulding sector, 18,000 persons in the furniture mills, match, pencil, wood-wool cement slabs, small scale rattan and bamboo industries, whilst the public sector employed some 5,647 persons. More than RM 500 million were paid out in salaries and wages for workers involved in the forestry sector.
- iv. Total investment in the major wood-based industries in Peninsular Malaysia in 1995 was estimated to be RM 2,549 million. Of this total, RM 1,657 million or 65% were in the sawmilling industry, RM 664 million or 26% in the plywood/veneer industry and RM 228 million or 9% in the wood moulding industry.
- v. Apart from its monetary value, forest also plays an important protective function such as the maintenance of environmental stability, minimization of damage to rivers and agriculture land by floods and erosion and the safeguarding of water supplies.

3.0 LONG-TERM OBJECTIVES AND GOALS

The forest management objectives are clearly enshrined in the National Forestry Policy which was formulated and approved by the National Forestry Council and later endorsed by the National Land Council on 19 April, 1978. This Policy is being implemented by all the states in Peninsular Malaysia, while the objectives of this Policy are also being implemented in Sabah and Sarawak. However, with the recent concern by the world community on the importance of biological diversity conservation and the sustainable utilization of genetic

resources, as well as the role of local communities in forest development, the National Forestry Policy was revised in 1992 to include these important aspects of forestry.

Specifically, some of the salient features regarding the long term objectives of the Government in forest management and development are as follows:

- To manage the forest resource sustainably for the continuous production of forest goods and services and their optimum utilisation, compatible with environmental requirements.
- To increase the supply of forest goods and services through appropriate forestry activities that enhance the quality, productivity and utilisation of the forest resources.
- To further develop appropriate environmentally sound technology for the conservation, management and utilisation of the forest resources.
- To conserve and protect the forests' biological diversity, water and soil, and their sustainable utilisation.
- To increase the quality and efficiency of the forest-based processing mills and enhance higher value downstream activities.
- To strengthen human resources development (HRD) to support the forestry sector.
- To improve public awareness on the environmental and conservational roles of forests through education and dissemination of information.
- To increase the forestry sector's contribution to national income, foreign exchange and employment opportunities.

In the endeavour to ensure sustainable forest management in Peninsular Malaysia, a “Forest Management Policy and Strategy for Peninsular Malaysia” was adopted in 1976 as a supplement to the National Forestry Policy. This policy was formulated to ensure fuller utilization of the forest resource in the context of sustainable forest management and which is compatible with resource conservation and environmental protection. The explicit management policy and objectives that have been adopted are as follows:-

- to manage and utilize the forest resource for maximum benefits based on the inherent capability of the forest and on comprehensive forest land use and management plans;
- to determine potential yield based on systematic and in-depth appraisals of the forest resource base, its growth potential and other relevant factors;
- to harvest the forest resource conservationally by selective felling and the retention of adequate natural regeneration, consistent with economic harvesting, so as to ensure the sustainability of the forest resource base;
- to apply optimal forest management regimes based on information generated from integrated forest management and operational studies;

- to regenerate the harvested and poor forest in order to yield stock equivalent of 25 trees per hectare, of currently acceptable species, of at least 45 cm diameter at breast height, for the economic production of quality logs; and
- to establish forest plantation of both indigenous and exotic species with emphasis on fast-growing species and to promote multiple-use forestry and environmental conservation.

4.0 ROLE OF COUNTRY IN THE REGIONAL CONTEXT

The wood-based sector in Malaysia is dominated by primary processing activities of sawmilling, veneer and plywood production. However, in recent years, downstream processing activities such as the manufacture of mouldings, furniture and joinery have increased significantly.

Malaysia's export of major wood-based products has increased steadily over the last decade, from RM 4.3 billion in 1985 to RM 12.3 billion in 1995 as shown in Table 1. As a proportion of total export value, exports of logs declined from 65.0% in 1985 to 45.0% in 1990 and declined to 18.0% in 1995 following the ban on round log exports from Peninsular Malaysia and a partial ban in Sabah as well as the Government's policy to promote downstream processing activities in the sector. Exports of sawntimber also declined as sawmillers were encouraged to add higher value to their products.

Table 1. Malaysia's export of major wood-based products, 1985-1995 (RM million)²

Year	Logs	Sawn-timber	Plywood	Veneer	Mouldings	Furniture	Total
1985	2,782	1,010	193	72	228	13	4,298
1986	2,850	1,236	283	77	232	20	4,698
1987	4,238	1,680	480	103	315	45	6,861
1988	4,012	1,878	663	119	410	59	7,141
1989	4,356	2,945	720	268	519	126	8,934
1990	4,041	3,071	863	203	488	215	8,881
1991	4,097	2,901	1,001	302	543	403	9,247
1992	3,826	3,409	1,361	491	713	579	10,379
1993	2,914	4,423	2,660	705	585	936	12,223
1994	2,556	4,140	3,318	662	633	1,413	12,722
1995	2,273	3,626	3,521	575	618	1,674	12,287

In contrast to logs and sawntimber, exports of downstream products like plywood, veneer, mouldings and furniture have been increasing rapidly as the wood-based sector moves into higher value-added activities. The furniture sub-sector in particular, made an impressive impact with export share increasing from 0.3% in 1985 to 3.0% in 1990 and 13.6% in 1995. Similarly, the export share of plywood increased from 4.5% in 1985 to 9.7% in 1990 and 28.6% in 1995. The export value of mouldings grew almost threefold during the 1985-1995 period although its share has remained constant at 5% .

² The fastest growth has been for furniture (129-fold in a decade). (Editor)

4.1 Logs

A total of 7.9 million cubic metres of logs valued at RM 2.3 billion or 17.0% of total wood-based products was exported in 1995. Compared to 1994's export, this represented a reduction of 8% in volume and 11.0% in value. With the exception of a small volume (0.12 million cubic metres) from Sabah, the entire log export was from Sarawak. Major export markets for logs in 1995 were Japan (52.0%), Taiwan (16.0%), South Korea (9.0%) and China (6.0%).

4.2 Sawn-Timber

Sawn-timber exports registered a total volume of 4.2 million cubic metres valued at RM 3.6 billion in 1995. This represented a decline of 9% in volume and 12.0% in value over the previous year. Sarawak was the largest contributor of sawntimber exports (1.5 million m³), followed by Peninsular Malaysia (1.3 million m³) and Sabah (1.3 million m³). Malaysia's major export markets for sawntimber in 1995 were Thailand (29.0%), Japan (12.0%), South Korea (10.0%), Taiwan (10.0%), Singapore (10.0%) and the Netherlands (7.0%). The decline in sawntimber exports can be attributed to several reasons which include the imposition of export levies/royalties on specific species of sawntimber, higher prices, reduced construction activities due to the economic slowdown in Europe and anti-tropical timber sentiments in several European countries.

4.3 Plywood and Veneer

Plywood exports amounted to 3.5 million m³ valued at RM 3.5 billion in 1995, which made up 27.0% of total exports of wood-based products. This reflected an increase of 17.0% in volume and 6% in value over the previous year. Plywood exports have increased significantly since the mid-80s recession, and 1995 export was more than five times compared to a decade ago. Sarawak contributed the largest export share of plywood. Major markets for plywood export were Japan (29.0%), China (26.0%), Singapore (9.0%), Hong Kong (9.0%), South Korea (9.0%) and Taiwan (6.0%). Exports of veneer in 1995 totalled 0.6 million m³ valued at RM 575.0 million. Similarly, export contribution was mainly from Sarawak and the major export markets for veneer in 1995 were Taiwan, China, Japan and South Korea.

4.4 Mouldings

Malaysia exported RM 618 million of mouldings in 1995 representing a decline of 2.4% compared to previous year. Peninsular Malaysia dominated the exports with RM 352 million, followed by Sabah with RM 230 million and Sarawak RM 36 million. Major export markets for mouldings in 1995 were Japan (25.5%), Taiwan (16.0%), USA (15.0%), Australia (13.0%) and South Korea (7.0%). Shortage of raw materials resulting from the high prices of sawntimber is increasingly affecting moulding factories, although the availability of rubberwood has partly alleviated the problem. In Peninsular Malaysia especially, these factories are considering obtaining sawntimber from Sabah and Sarawak or abroad to overcome the shortage of raw material supply.

4.5 Furniture

The furniture sub-sector is rapidly becoming a major foreign exchange earner for Malaysia. Exports of furniture increased by 21.0% from RM 1.4 billion in 1994 to RM 1.7 billion in 1995. Ninety-five percent of the total furniture exports in 1995 comprised wooded furniture of which 80.0 to 85.0% was rubberwood-based. However, competition for rubberwood from other sub-sectors in the wood-based sector has caused the price of the raw material to escalate in recent years. The major markets for wooden furniture in 1995 were the USA (40.0%), Japan (16.0%), Singapore (10.0%), the UK (4.0%), Australia (3.0%) and Taiwan (3.0%).

4.6 Reconstituted Wood-based Panels

Reconstituted wood-based panels (RWP) consist of medium density fibreboard (MDF), particleboard/chipboard and wood cement board. Rubberwood is the main raw material used for MDF while residues from tropical hardwood are also used in other RWP plants. Malaysia exported RM 248.5 million worth of MDF and particleboard/chipboard in 1995, an increase of 24.0% from RM 199.8 million recorded in 1994.

4.7 Paper and Paper Products

Malaysia is a net importer of paper and paper products. In 1995, the country imported more than 1.3 million mt. of paper and paperboard while exporting only 1,200 mt. The major paper products manufactured are writing and printing paper, toilet and facial tissue paper, Kraft/corrugating paper and joss paper.

5.0 MAJOR ISSUES FACED BY THE FORESTRY SECTOR

5.1 Forest Management and Development

Arising from the intense debate at UNCED was the adoption of the first global consensus on forests and the emergence of a firm conceptual foundation for sustainable forest management. In particular, the adoption of the Non-legally Binding Authoritative Statement of Forest Principles, Chapter 11 - Combating Deforestation and Chapter 15 - Conservation of Biological Diversity under Agenda 21, as well as the signing of the Convention on Biological Diversity and the Framework Convention on Climate Change which have far-reaching implications for forest management.

The new challenges faced globally in ensuring sustainable forest management include firstly, the reduction of deforestation and forest degradation through effective conservation measures and the sustainable use of existing forest resources, as well as alleviating the pressure on forest by addressing the root cause of forest loss. Secondly, the increase of the forest resource base through tree planting, afforestation and reforestation in the broad context of land use and enhance productivity of the existing forest land. Thirdly, the revitalisation of the forest based industries and enterprises to enhance the valorization of forests through optimising of forest goods and services. Finally, the strengthening of national capacities for effective implementation.

In this context, forest management practices in Malaysia will need a paradigm shift from sustained timber yield management to sustainable forest ecosystem management. There is also the need to internalise the full replacement and environmental costs in forest goods and services. The development and application of increasingly complex criteria and indicators for sustainable forest management, as well as expanding the spatial scope of forest management from individual forest stands to the entire forest ecosystems and landscape pose further challenge to forest management.

5.2 Forest Industries

Forest industries in Malaysia until recently, was driven primarily by resource supply advantage. The availability of raw material supply at competitive prices, relatively low labour costs and favourable international prices created positive conditions for its growth. However, this development also resulted in the building up of excess capacity especially in the sawmilling and plywood/veneer sub-sectors. This problem is further aggravated by the declining supply of raw material, both locally as well as from abroad. Hence, the survival and sustainability of these sectors would greatly rely on their ability to overcome the inherent problem of log supply, adoption of new and state-of-the-art technologies, utilisation of smaller diameter logs and under-utilised or lesser-known species and the restructuring of the industry itself. In Peninsular Malaysia, for example, restructuring of the primary processing industries has to be targeted at about 300 sawmills with total capacity of about 6 million m³ of log intake and about 30 plywood mills with total capacity of about 1 million m³ of log intake. In addition, with the evolution of technologies, reconstituted wood such as fibreboard, oriented

strandboard, blockboard and particleboard, rather than solid wood, are expected to become more acceptable and subsequently dominate the market.

6.0 THE FOREST RESOURCES - STATUS AND TRENDS

The total forested area in Malaysia as at the end of 1995 was estimated to be 18.91 million hectares or 57.5% of the total land area. Of this total, it is estimated that some 16.41 million hectares are the inland dipterocarp forests, with the remaining 1.69, 0.62 and 0.19 million hectares being fresh water swamp, mangrove swamp and plantation forests, respectively. The inland dipterocarp forests could be further categorised into lowland dipterocarp, hill dipterocarp, upper dipterocarp, lower montane and upper montane forests, respectively. The distribution and extent of forest areas by major forest types and regions is as shown in **Table 1 of Appendix 1**.

In view of the crucial role of forests for timber production, the conservation of soil, water and wildlife, as well as in the protection of the environment, Malaysia has set aside a total of 14.29 million hectares of its natural forests as the Permanent Reserved Forest (PRF) to be managed and developed sustainably. Approximately 10.85 million hectares or 76% of the PRF are production forests with the remaining 3.43 million hectares being protection forests. The status of the PRF in Malaysia is summarised in **Table 2 of Appendix 1**.

Besides the PFE and designated national parks, wildlife sanctuaries and nature reserves, there are areas of forests which in due time would be converted to housing, industrial, agricultural and other uses to meet the needs of population growth as well as that of balanced economic development. These are known as conversion forests and they total approximately 2.84 million hectares. Such conversion forests are ultimately cleared before the land is developed for others. In recent years, the pace of forest conversion for large-scale agricultural production has slowed down as Malaysia gears and moves itself to greater industrialisation.

Besides the natural forests, Malaysia has also ventured into forest plantation, albeit on a small scale. In fact, commercial establishment of forest plantation dated way back to the 1950's with the planting of teak (*Tectona grandis*) in the States of Kedah and Perlis. Since then, the programme has been widened to include other fast growing species with *Acacia mangium*, *Gmelina arborea*, *Paraserianthes falcataria* being the major species and *Eucalyptus deglupta*, *Pinus* and *Araucaria* species being the minor species planted. To date, the total area of forest plantations in Malaysia amounted to 0.19 million hectares, with 0.07 million hectares being located in Peninsular Malaysia, and 0.11 and 0.01 million hectares in Sabah and Sarawak, respectively. These plantations provide general utility timber and are aimed to supplement timber supply from the natural forests.

In addition, Malaysia also has 4.82 million hectares of agricultural tree crops which are mainly rubber, oil palm, coconut and cocoa. These agricultural plantations are similar to reforested land and increasingly these crops can be looked upon as alternative sources of wood supply especially that of rubberwood. Taking into consideration these plantations, the total area under tree cover in Malaysia at the end of 1995 is estimated to be 23.73 million hectares or 72.2% of its total land area.

Shifting cultivation which had taken place for many decades especially in the State of Sarawak is undoubtedly one of the main activities that has an adverse impact on the forest. It is estimated some 3 million hectares of forests has been so impoverished and damaged over the years. The forests are slashed and burned for the cultivation of short-term crops such as hill padi and tapioca. Because of the nature of slash and burn, the areas do not regenerate easily and hence substantial areas of prime forests are laid to waste. Costly programmes are needed to rehabilitate these areas.

As for trends, future harvesting would have to come from the regenerated logged-over forests as it is expected that the production from the virgin forest would be reduced. Forest resources would become scarce in relation to the increasing population and the rising demand for timber and timber products. Hence, more intensive and prudent forest management practices will have to be applied to assessing the current growing stock of the logged-over forests and in ensuring its productivity and sustainability. This is also in line with Malaysia's commitment in the international front particularly that of attaining the International Tropical Timber Organisation Year 2000 Objective where it is required all timber traded in the international markets must be sourced from sustainably managed forests.

7.0 ENVIRONMENTAL INITIATIVES, PROTECTED AREAS AND WILDLIFE RESOURCES - STATUS AND TRENDS

Since the 1930's Malaysia has been establishing a network of protected areas for the conservation of biological diversity. Malaysia's largest national park covering 434,351 hectares was gazetted as early as 1939 which comprises mainly virgin forests of various forest types according to altitudes and soils. Currently, Malaysia has 2.12 million hectares of conservation areas or 11.2% of the total forested areas protected by legislation as shown in **Table 3 of Appendix 1**. Of these, 1.80 million hectares are located outside the PFE, whilst another 0.33 million hectares are located within the Estate.

In its efforts to conserve various forest and ecological types in their original conditions, the Forestry Departments have 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 for comparing harvested and silviculturally treated forests and as undisturbed natural forests for general ecological and botanical studies. Since its inception in the 1950's, a total of 72 VJRs covering 21,284 hectares were established throughout Peninsular Malaysia while in Sabah, a total of 48 VJRs had also been established covering an area of 90,442 hectares. These VJRs represent samples of the many types of virgin forest found in the country which are located in the PFE. Represented forest types include Mangrove forest, Heath forest, Peat Swamp forest, Lowland Dipterocarp forest, Hill Dipterocarp forest, Upper Dipterocarp forest and Montane forest.

Hence, with the protection forests of the PFE of 3.43 million hectares, the total area designated for the conservation of biological diversity in Malaysia is now estimated to be 5.22 million hectares or 27.6% of its total forested land.

Malaysia is a signatory to the Convention on Biological Diversity and is committed to implement all prescribed activities mandated by the Convention. Towards this end, Malaysia has taken various measures to ensure its implementation. In the field of forestry, Malaysia has,

among others, amended the National Forestry Act 1984. To curb illegal encroachment of forest areas and timber theft, the National Forestry Act 1984 was amended in 1993 where the penalty for the commission of any forest offence has been increased from a maximum penalty of US\$ 4,000 or an imprisonment for a term not exceeding three years or both to a maximum penalty of US\$ 200,000 and a mandatory imprisonment of at least one year but not exceeding 20 years. The amended Act has also provisions for the Police and Armed Forces to undertake surveillance of forestry activities, especially in curbing illegal logging and timber theft.

The amendment of the Environmental Quality Act 1974 in 1985 to include the requirement for Environmental Impact Assessment (EIA) to be carried out for various forestry activities which may have adverse effects on the environment, such as the conversion of forested land to other uses as well as logging covering an area of 500 hectares or more is certainly a positive step in the right direction. Currently, the EIA Guidelines for Forest Harvesting of Natural Forest has been developed and is in its final stage of approval by the Government.

The Malaysian Government has also drawn up a comprehensive list of plants and animals to be protected. Currently, many of these such as the tiger, rhinoceros, slow loris and even the birdwing butterfly are fully protected by law. Complimenting this, the National Committee on Plant Genetic Resources was formed to review the collection, identify neglected areas of work in plant breeding, promote knowledge on plant genetic resources through research, evaluation, appraisal and publication. In the recent update, a total of 511 of the 746 known endemic plant species have been listed as endangered and documented in the Directory of Plant Genetic Resources of Malaysia.

Efforts are also taken by the Forestry Departments to enhance *in-situ* conservation of biological diversity during forest harvesting within the production forests of the PFE. For example, even though the minimum prescribed cutting limit for the dipterocarp species is 50 cm diameter at breast height (dbh), the minimum cutting for *Neobalanocarpus heimii* has been raised to 60 cm dbh with the sole purpose of conserving this species during forest harvesting. In addition, environmental protection and forest conservation measures such as subscribing to approved forest harvesting guidelines and forest road specifications, as well as leaving behind buffer zones to protect the water resources and minimise soil erosion are also clear indicators of the Malaysians' genuine efforts.

8.0 WOOD-BASED INDUSTRIES (INCLUDING PULP AND PAPER) - STATUS, TRENDS AND TRANSITIONS

The main wood-based industries are sawmilling, plywood/veneer manufacture, wood moulding and furniture manufacture or wood working. Others include secondary and tertiary processing industries such as timber treatment plants, kiln drying plants, pulp and paper mill, wooden houses prefabrication plants, laminated board plants, boxes and crates plants, pencil factories, match factories and parquet flooring plants. In addition, Peninsular Malaysia also produces a variety of wood-based panels other than plywood which include blockboard, chipboard, moulded particle board and medium density fibreboard plants.

Of the wood-based industries, sawmilling is the largest in the country followed by veneer/plywood and moulding mills. In 1995, there were a total of 1193 sawmills in the

country with an installed capacity of about 24 million m³ while the total number of veneer/plywood mills was 163 with a total installed capacity of about 13 million m³. Currently, there is only one pulp and paper mill in Malaysia which is located in the State of Sabah. Details on the forest industries in Malaysia is attached as **Appendix 2**.

In recent years, the forest industries are rapidly moving away from the manufacture of low value primary products. This is in line with the national objectives and priority where the development of secondary and tertiary wood processing industries are being actively promoted with a view towards achieving greater utilisation of the resource base and to generate higher value-added products. Moreover, realising the role of forest industries in improving the socio-economic level of the rural population, steps are also being taken to encourage the setting up of small scale rural-based industries using forest produce such as rattan and bamboo as raw materials.

Except for a number of integrated timber complexes that had been established and owned by the State Economic Development Corporations, most of the timber industries are owned by the private sector.

The forestry industry has been identified as one of the resource-based industries to be further developed as an important export-oriented sector. It is the Government's objective to make Malaysia a major producer of high value added wood-based products in the world market as stipulated under the Second Industrial Master Plan 1996-2005. Specifically, it is envisaged that Malaysia should become an important furniture and joinery/mouldings centre. Various policy measures have been implemented to create an environment conducive to the accelerated growth of the sector. However, the forest industrial sector has to brace itself for an environment of stiff competition, growing protectionism and mounting pressures of environmentalism and conservation, if it is to successfully carve a niche for itself in the international market.

As for the future, it is anticipated the number of wood processing mill particularly that of primary processing will undergo restructuring in response to the declining supply of raw materials. This in return will reduce existing capacity of the wood processing mills to a much more reasonable level with production of processed timber in tandem with the availability of supply and export. In transition, import of raw materials, particularly logs/square logs and to a smaller extent veneer may increase to supplement requirements by domestic mills. Export of value-added products may also increase as domestic manufacturers try to maximise the value of the raw materials utilised.

9.0 WOOD ENERGY/FUELWOOD - STATUS, TRENDS AND TRANSITIONS

In Malaysia, the use of wood fuel for domestic uses is insignificant compared to the use of gas and electricity. This is basically because Malaysia is rich in gas resources and there is abundant and cheap electricity supply, generated mainly from hydro-electric dams. However, to improve efficiency and minimise wastage, some solid waste is converted into low quality charcoal for domestic uses. High quality charcoal mangrove timber, locally known as Bakau (*Bruguiera* spp., *Ceriops* spp., and *Rhizophora* spp.) is also produced for this purpose.

In addition, a substantial volume of mill residues which consists of small edgings, trimmings, slabs and low quality peeler cores are consumed as fuel for boiler in plywood mills, timber drying kilns, brick kilns, tobacco curing and fishmeal factories. Rubberwood charcoal is also being manufactured in large quantities for industrial uses, mainly in steel mills.

10.0 NON-WOOD FOREST PRODUCE - STATUS AND TRENDS

Located in the humid tropics and at the heart of the sunda shelf, the Malaysian forests are well endowed with rich biological resources, including non-wood forest products. Among others, the non-wood forest produce include rattan, bamboo, palm, resin, tannin, ferns, barks, vegetables, fruits, wood-oil and medicinal plants. Of these produce, rattan, bamboo, medicinal plants and wild fruits are most highly sought after.

Of the 106 species of rattan found in Malaysia, only about 20 species are being utilised commercially. The most important ones are Rotan Manau (*Calamus manan*), Rotan Sega (*C. caesius*), Rotan Semambu (*C. scipionum*), Rotan Dok (*C. ornatus*) and Rotan Dahan (*Korthalsia* spp.).

Due to the lack of appropriate inventory methodology, the rattan resource in the country has not been fully assessed. However, information on this resource has been included in the Second National Forest Inventory for Peninsular Malaysia which was conducted in 1982 which forecasted the total rattan resource of 3 metre length/clump to be 2.3 billion clumps. This total comprises of 847.9 million (36.6%) clumps of *C. manan*, 213.8 million (9.2%) clumps of *C. caesius*, 320.3 million (13.8%) clumps of *C. scipionum*, 396.0 million (17.1%) clumps of *C. ornatus* and 538.8 million (23.3%) clumps of *Korthalsia* species. *C. manan* and *C. ornatus* are found mainly in the unlogged forest, while *C. caesius*, *C. scipionum* and *Korthalsia* species in the logged-over forest.

Besides existing in the natural environment, rattan have been planted in plantations within the logged-over forest and under rubber trees. As at the end of 1995, some 11,499 ha of *C. manan* and *C. caesius* are established in this manner in Peninsular Malaysia. In addition, owners of rubber small holdings are also encouraged to plant rattan, under the rubber plantation to supplement their incomes and to date 1,584 ha have been so established.

Rattans are versatile materials and are currently in great demand for furniture manufacturing in the country. They also provide raw materials for handicraft and cottage industries, for the manufacture of baskets, walking sticks, rattan balls, picture frames, mats, hats and other novelty items, which are mainly for domestic consumption. Hence, besides providing gainful employment to the populace, the industry has also generated much revenue to the government, amounting to about RM 91 million in 1995 in terms of export earnings.

As for bamboo, there are about 70 known species in Malaysia: 50 in Peninsular Malaysia, 30 in Sabah and 20 in Sarawak. Of these species, only 12 species are being commercially utilised. The distribution of bamboos is from sea level to 3000 m above mean sea level. In general, they occur in significant quantities in disturbed situations, such as logged-over forests, wasteland or in areas fringing the forest, river banks and hill slopes. The total estimated hectareage of bamboo by forest compartment is 421,722 hectares in Peninsular

Malaysia. However, they do occur naturally with the best example being the bamboo stand in Chebar Besar Forest Reserve in Kedah which covers an area of 20,902 hectares.

Similar to rattan, information on the extent of the bamboo resource is incomplete due to the lack of appropriate resource inventory design and assessment. However, as for rattan, this information is also captured descriptively under the Second National Forest Inventory for Peninsular Malaysia where it was forecasted that the country's bamboo resource in forest lands of 6-metre length/stick stands at 1.7 billion sticks, comprising 839.1 million sticks of *Dendrocalamus asper*, 843.1 million sticks of other species with diameter equal to or less than 3 cm.

There are many uses for the Malaysian bamboos. Bamboo shoots are popular food item while bamboo industries are mainly associated with the production of satay sticks, toothpicks, chopsticks, bamboo splits, basketry, handicrafts and furniture meant for the domestic market.

Since time immemorial man has known to use plants for traditional remedies. These medicinal plants include herbs, vines, shrubs, roots, leaves and barks. It is estimated that some 1,300 species of plants and at least 100 species of ferns are known to have pharmaceutical properties. Extractives from the medicinal plants have been used to treat various ailments and diseases such as diarrhoea, skin complaints, headache, fever, coughs, wounds, hypertension, diabetes, rheumatism, etc. The traditional medicinal plants are especially popular in the rural areas, not just because of the high cost of modern drugs, but also these plants are more readily available in the rural areas and knowledge of their healing power have been passed on from one generation to another. However, keeping track of their production and consumption pattern is rather difficult and is currently not being monitored. Some common medicinal plants include members from the families *Euphorbiaceae*, *Begiminosae*, *Graminae*, *Verbenaceae*, *Solnaceae*, *Simaroubiaceae*, *Vitaceae*, *Malavaceae*, *Palmae* and *Rubiaceae*.

A variety of fruits are also found in the natural forests. These include, among others, *Parkia speciosa* (petai), *Durio zibethinus* (Durian), *Mangifera* spp. (Macang), *Pithecellobium jiringa* (Jering), *P. bubalinum* (kerdas) and *Baccaea* spp. (tampoi). These fruits are well liked by all Malaysian communities.

As far as trend is concerned, it is envisaged that there will be a greater utilisation of the non-wood forest produce in the future, resulting in a general dwindling of the resource base. It is also envisaged that there will be greater efforts/research being directed at identifying, quantifying and valuing the non-wood forest produce, both in-house as well as through bilateral projects in line with the current concern and emphasis for biological diversity conservation.

11.0 FOREST SERVICES - STATUS AND TRENDS

Forest provides a myriad of services. This fact is duly recognised and enshrined in the National Forestry Policy, 1978 (Revised 1992) where the Permanent Forest Estate (PFE) is being categorised into four major functions, namely:

- **Protection Forest** for ensuring favourable climatic and physical conditions of the country, the safeguarding of water resources, soil fertility and environmental quality, the conservation of biological diversity and the minimization of damage by floods and erosion to rivers and agricultural lands;
- **Production Forest** for the supply in perpetuity, at reasonable costs of all forms of forest produce which can be economically produced within the country and are required for agricultural, domestic and industrial purposes, and for export;
- **Amenity Forest** for the conservation of adequate forest areas for recreation, ecotourism and in enhancing public awareness in forestry; and
- **Research and Education Forest** for the conduct of research and education.

The above functions are further elaborated under Section 10 (1) of the National Forestry Act, 1984 (Amended 1993) where all State Directors of Forestry in Peninsular Malaysia are required by law to further classify the PFE, particularly the protection forest, into one or more of the following functional uses:-

- (i) timber production forest under sustained yield;
- (ii) soil protection forest;
- (iii) soil reclamation forest;
- (iv) flood control forest;
- (v) water catchment forest;
- (vi) forest sanctuary for wildlife;
- (vii) virgin jungle reserved forest;
- (viii) amenity forest;
- (ix) education forest;
- (x) research forest; and
- (xi) forest for federal purposes.

Based on the above classification, approximately 10.85 million hectares of the PFE in Malaysia are designated as production forests, with the remaining 3.43 million hectares being protection forests. A total area of 2.12 million hectares of conservation areas, protected by legislation was designated as sanctuary for wildlife, with 0.33 million hectares of which being located within the PFE. To date, Malaysia has also established 72 Virgin Jungle Reserves (VJR) covering 21,284 hectares in Peninsular Malaysia and 48 VJRs covering an area of 90,442 hectares in Sabah. These VJRs are established to serve as permanent nature reserves and natural arboreta, as controls for comparing harvested and silviculturally treated forests and as undisturbed natural forests for general ecological and botanical studies.

To cater for the increasing demand for out-door activities and recreation, a total of 85 forest recreation sites had also been developed in Peninsular Malaysia. These areas coupled with the more renowned national parks such as the Taman Negara in Peninsular Malaysia, the Kinabalu National Park and Sepilok Orang Utan Rehabilitation Centre in Sabah and the Gunung Mulu National Park in Sarawak has greatly promoted ecotourism in Malaysia. With the tireless efforts of the Ministry of Arts, Tourism and Culture in promoting ecotourism, it is envisaged that this industry will grow from strength to strength in the coming years. There is also the growing importance of the forest for nature education and research. The notable

examples are the Pasoh Forest Reserve in Peninsular Malaysia, the Danum valley in Sabah and the Bako National Park in Sarawak which had emerged and acclaimed international status as centres for tropical forest studies.

12.0 INSTITUTIONS AND POLICIES

Under the Malaysian Constitution land is defined as a state matter and is thus within the jurisdiction of the respective State Governments. As such, each State is empowered to enact laws on forestry and to formulate forest policy independently. The executive authority of the Federal Government only extends to the provision of advice and technical assistance to the States, training and the conduct of research and maintenance of experimental and demonstration stations.

In order to facilitate the adoption of a coordinated and common approach to forestry, the National Forestry Council (NFC) was established on 20th December, 1971 by the National Land Council (NLC). The NLC is empowered under the Malaysian Constitution to formulate a national policy for the promotion and control of the utilisation of land for mining, agriculture and forestry. However during the 47th session of NLC at the end of 1992, it was decided that matters pertaining to forestry will be discussed directly by the NLC.

In 1977, the National Forestry Policy was accepted by the NFC and later endorsed by the NLC on 19th April, 1978. The acceptance of this Policy is a major breakthrough to strengthen the institutional base and enhances the co-operation and understanding between the Federal and State Governments in the field of forestry sector development consistent with progress and aspirations of the nation as a whole. The salient points of the National Forestry Policy are as follows:

- To dedicate as Permanent Forest Estate (PFE) sufficient areas of land strategically located throughout the country, in accordance with the concept of rational land use.
- To manage the PFE with the objective of maximising social, economic and environmental benefits for the nation and its people in accordance with the principles of sound forest management.
- To pursue a sound programme of forest development through regeneration and rehabilitation operations in accordance with approved silvicultural practices in order to achieve maximum productivity from the PFE.
- To ensure thorough and efficient utilisation of forest resources on land not included in the PFE, prior to the alienation of such land, by means of proper coordinated planning by land development agencies in order to obtain maximum benefits for the people through complete harvesting and processing of such resources, adhering strictly to the optimum need of local processing industries.
- To promote efficient harvesting and utilisation of all forms of forest produce and to stimulate the development of appropriate wood-based industries with determined

capacities commensurate with the resource flow in order to achieve maximum resource utilisation, create employment opportunities and earn foreign exchange.

- To ensure the sound development of trade and commerce and to promote the exportation of forest products.
- To promote effective Bumiputera participation in forest and wood-based industries consistent with Government policy.
- To undertake and support an intensive research programme in forest development aimed at achieving maximum yield from PFE, maximum direct and indirect benefits from harvesting and utilisation and above all maximum financial return on investment in forest development activities.
- To undertake and support a comprehensive programme of forestry training at all levels in the public sector in order to ensure an adequate supply of trained manpower to meet the requirements of forestry and the wood-based industries.
- To encourage private sector's involvement in forestry research and training at all levels with a view to accelerate industrial development and enhance the quality of professionalism in forestry and forest industrial practices.
- To foster by education and publicity, a better understanding among the community of the multiple values of forest to them and their descendants.
- To foster close cooperation among all in order to achieve optimum utilisation of the valuable natural resources of the country.

Each State has its own forest Enactment and Rules for the administration of its forests. Most of these enactment and rules were adopted by the States in the early 1930's. In terms of concept and objectives the various "State Forest Enactment and Rules" had limited scope and depth to meet present day needs. These forest laws were deficient; weak in areas of forest management planning and forest renewal operations which are vital for sustained yield. Realising these shortcomings, the NFC agreed that the State Forest Enactment be reviewed, updated and uniformised to streamline forest administration and forestry sector development in the country. Hence, the National Forestry Act (NFA) and the Wood-based Industries (State Legislature) Act, which were accepted by the NFC in March 1984 and later endorsed by the NLC in September, were passed by the Malaysian Parliament on 17th October of the same year. Both these Acts would enable the effective implementation of the National Forestry Policy as they were formulated to uniformise and update the various State Forest Enactment.

In the light of current issues and the developments within the context of national aspirations, the NFC, in its 11th conference on August 25, 1992, has revised the National Forestry Policy in 1992 to take into consideration the importance of biological diversity conservation and the sustainable utilisation of genetic resources, as well as the role of local communities in forest development. In addition, the National Forestry Act, 1984 was also amended in 1993 to further strengthen its provisions to curb illegal encroachment of forest areas and timber theft.

Administratively, the Forestry Departments at both the federal and state levels are responsible for the management and planning of forest resources in Malaysia. In this context, the Forest Department Headquarters in Kuala Lumpur is responsible for forestry sector planning, forest management, development and forest operation research, provision of technical advice and services, and staff training in Peninsular Malaysia while the various State Forestry Departments, including those of Sabah and Sarawak, are responsible for administration, management and development of the forest resources, regulation of forest exploitation, forest revenue collection and for planning and coordination of the development of the wood-based industries in the States.

There are a number of complementary agencies to the Forestry Departments, specialising in specific areas of forestry research, trade regulations and promotions. The **Malaysian Timber Industry Board (MTIB)** is responsible for initiating appropriate development in the various sectors of the timber industry and for providing the necessary assistance to ensure its continued growth as a modern and thriving sector of the economy. The **Forest Research Institute of Malaysia (FRIM)** which was established as a statutory body in 1985 is responsible for the implementation of research in all aspects of forestry and forest products. The **University Putra Malaysia (UPM)** plays a training role by producing professional and semi professional foresters needed by the forestry institutions since 1972. The **Malaysian Timber Council (MTC)** is the most recent forestry institution in the country. It was officially launched by the Minister of Primary Industries, Malaysia, in January 1992 and is committed to address issues on log supply situation in Peninsular Malaysia, promote timber trade, promote and participate in commercial forest plantation and address issues/undertake projects of importance to the timber industry.

The Forest Departments, MTIB and FRIM are responsible to and are closely monitored and coordinated by the Ministry of Primary Industries, Malaysia. The Forest Department sits on both boards of Directors of MTIB and FRIM. Although UPM is under the Ministry of Education, it has established a close working relationship with the forestry institutions.

13.0 ASSESSMENT OF FUTURE SUPPLY AND DEMAND FOR FOREST PRODUCTS AND SERVICES

Log production from the natural forests are declining and will continue to be reduced over the next decade. It is anticipated that the supply of logs will gradually decline and eventually stabilised at sustainable levels of around 18 million m³ per year from PFE. In addition, approximately another 1 million m³ and 2 million m³ of logs respectively are expected to be produced by the rubber replanting programme and the forest plantation. Thus, the total log supply is expected to remain around 21 million m³. This amount of log production grossly falls short of the capacity of the primary processing timber/wood industries, mainly that of sawntimber and plywood/veneer, estimated to be 1.5 to 2 times that of the quantum of log supply. The situation is expected to be further aggravated with the establishment of the two planned additional pulp and paper mills, one each in Pahang and Sarawak respectively.

Reforestation and rehabilitation work will continue to be emphasised. In Peninsular Malaysia, the target of replanting all understocked logged-over forest will remain. For the

period of 1996-2000, it is planned that 350,000 ha of logged-over forest will be silviculturally treated, 10,000 ha be subjected to enrichment planting while another 3,000 ha of degraded forests be replanted. These targets will be reviewed after the planned period. Nevertheless, it is anticipated that the quantum will remain very much similar to that reported above in the decade after the planned period. In addition, forest plantation will also be further promoted. The currently area under forest plantation will be further increased in all the three regions of Peninsular Malaysia, Sabah and Sarawak. For example, the State Government of Sabah, which has already established a total of 112,700 ha of forest plantation of a variety species, has earmarked a total of 338,899 ha of degraded forests as potential site for future forest plantation development.

Amenity forestry and ecotourism are expected to gain greater importance in the coming future. The Forestry Department, Peninsular Malaysia has already earmarked a few more areas with potential to be developed into forest recreation areas. Similarly, the Sabah State Government has already identified the future directions to realise and enhance potential of the State, in accordance with the Sabah Tourism Master Plan (1995-2010). Several key sites in forest reserves such as Borneo Rain Forest Lodge in Danum Valley, Tabin Wildlife Reserves will be promoted to cater for nature tourism activities. In addition, the State Forestry Department has also identified and developed seven (7) other forest recreation areas throughout the state. This situation is also quite similar in Sarawak as the State Government has already acknowledged that ecotourism with a growth of 10-15% per annum, is one of the important sources of foreign exchange. Consequently, future of ecotourism development in the State is positive with the adoption and implementation of a more stringent conservation strategies.

14.0 FUTURE DEVELOPMENT AND DEVELOPMENT OBJECTIVES

Sustainable forest management and development will remain the main emphasis for this period. A National Committee on Sustainable Forest Management in Malaysia was established in 1994. Based on consultation amongst State representatives, the National Committee had identified a total of 92 activities based on the 5 criteria and 27 indicators of ITTO to be implemented at the national level, and 84 activities based on 6 criteria and 23 indicators of ITTO at the forest management unit (FMU) level. In this regard, the due implementation of the Malaysian Criteria, Indicators and Activities for Sustainable Forest Management (MC&I) for the period 1997-2000 in particular would be critical and of prime priority as Malaysia moves towards achieving the ITTO Year 2000 Objective. In addition, forest certification and timber labelling are expected to become an integral component of forest resource management and development. It is envisaged that more intensive forest management will be carried out in the coming years, particularly with the increasing emphasis now being placed on tropical forest with regard to its sustainable management, conservation and development. Efforts will also be undertaken by Malaysia to facilitate the full implementation of the *UN Non-legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forests*, and the obligations as required under the *UN Convention on Biological Diversity*.

A Land Use Master Plan is expected to be formulated as the current land use delineation does not adequately address the need for environmental protection and the

maintenance of ecological balance. In this context, a common forest classification system in the context of sustainable forest management and conservation with agreed definitions would be developed.

In addition, the National Forestry Policy, 1978 (Revised 1992) and the National Forestry Act, 1984 (Amended 1993) will be reviewed periodically to assess their adequacy, and where necessary, these documents will be further revised/amended to ensure that the forest resource is managed sustainably.

Non-wood forest produce and the protective and environmental functions of the forest are expected to be accorded higher priority during this period. Amongst the main focuses are the development of rapid assessment techniques for the complete appraisal of the biological resources of the forest, methodologies for ascribing economic values to them, the formulation of nationally agreed biogeographic areas for the conservation of biological diversity and the completeness of representations of the various forest ecosystems.

In the field of national accounting, methodologies for the internalization of the full replacement costs, as well as the environmental and social costs in the prices of forest products, and the inclusion of the cost of forest depletion are expected to be developed.

As the current installed capacity of the wood-based industry exceeds supply in Peninsular Malaysia, the establishment of new primary processing mills will be controlled while the existing mills will be encouraged to increase efficiency and recovery with greater emphasis towards the processing of small-sized timber and the under-utilized timber species. On the other hand, the setting up of small-scale rural based industries using other forest produces such as rattan and bamboo will be promoted so as to enhance the socio-economic development of the rural areas.

15.0 IMPLICATION OF SCENARIOS

To address and overcome the issues and constraints faced in forest management, the following courses of actions are expected to be adopted:

- enhancement of human resource development programmes especially in the fields of multi-resource inventory and integrated forest resource management;
- improvement of current harvesting systems and reforestation technologies with operational studies, including low impact logging so as to achieve higher efficiency and cost effectiveness, as well as to minimize negative environmental impacts;
- provision of greater fiscal and monetary incentives for the establishment of forest plantations by the private sector so as to make them both financially and economically attractive and viable; and

- enhancement and prioritization of regional and international cooperative projects so as to accord greater emphasis to critical areas such as the management of the non-production components of the PRF.

Similarly, to overcome the inherent constraints and weaknesses faced by the forest and wood-based industries, the following courses of actions are expected to be undertaken:

- Increasing wood recovery rates from the current rates of 50.0 to 60.0% to 75.0 or 80%.
- Increasing the utilisation potential of many lesser-known species.
- Improving efficiency in the supply and distribution system of timber to the downstream wood processing industries. Distribution bottlenecks persist as the suppliers of timber and rubberwood are not located near the downstream wood processing facilities.
- Encouraging procurement of timber from cheaper sources of supply to improve the competitiveness of Malaysian wood-based manufacturers.
- Improving profit margins of the wood-based industries by creating new market and distribution channels and own brand names.
- Restructuring of the wood-based sector.
- Enhancing automation and modernisation of existing firms through amongst other, the relocation of traditional, backyard small-scale wood-based firms to Industrial Parks and support their modernisation and encouraging greater use of automation to reduce labour utilisation and improve productivity.

16.0 CONCLUSION

Malaysia is fully aware of the need for effective forest management, conservation and development not only to ensure a sustained supply of timber and other raw materials, but also to maintain environmental stability, provide sanctuary for wildlife and to serve as an invaluable storehouse of genetic resources useful for the improvement of its indigenous tree species, agricultural crops and livestock, as well as the advancement of pharmaceutical industries. Consequently, the forest of Malaysia is managed under strict and technically oriented forest management objectives. Concerted efforts will continue to be accorded to enhance the capability of this renewable resource to ensure the realisation of its multi-functions in perpetuity, in line with the national development objectives and priorities.

Similarly, the wood-based sector or the forest industries will undergo restructuring in response to the changing supply scenario. Greater emphasis and incentives will be given to downstream processing and the innovation and development of state-of-the-art technologies in wood processing and utilisation.

Thus, the long-term viability for sound and sustainable forest management, development, conservation and utilisation in Malaysia will be one that balances the needs of the economy, environment and ecology.

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APPENDIX 1**Table 1: Distribution and Extent of Natural Forests by Major Forest Types in Malaysia, 1995 (million ha)**

Region	Land Area	Dipterocarp Forest	Swamp Forest	Mangrove Forest	Plantation Forest	Total Forested Land	Percentage Total of Forested Land
Peninsular Malaysia	13.16	5.38	0.30	0.10	0.07	5.85	44.5
Sabah	7.37	3.83	0.19	0.32	0.11	4.45	60.4
Sarawak	12.33	7.20	1.20	0.20	0.01	8.61	69.8
Malaysia	32.86	16.41	1.69	0.62	0.19	18.91	57.5

Table 2: Permanent Forest Estate in Malaysia, 1995 (million ha)

Region	Protection Forest	Production Forest	Total Land Area Under PFE	Percentage of Total Land Area
Peninsular Malaysia	1.90	2.78	4.68	35.6
Sabah	0.53	3.07	3.60	48.8
Sarawak	1.00	5.00	6.00	48.7
Malaysia	3.43	10.85	14.28	43.5

Table 3: Areas Under National Parks, Wildlife and Bird Sanctuaries in Malaysia, 1995 (million ha)

Region	National Park	Wildlife and Bird Sanctuary	Total
Peninsular Malaysia	0.43	0.31	0.74
Sabah	0.25	0.13	0.38
Sarawak	0.70 **	0.30 ***	1.00
Malaysia	1.38	0.74 *	2.12

* A total of 190,000 hectares in Peninsular Malaysia and 140,000 hectares in Sabah are located in the Permanent Forest Estate.

** Inclusive of 0.57 million ha of proposed national park.

*** Inclusive of 0.14 million ha of proposed wildlife sanctuaries.

APPENDIX 2***Number Of Wood Processing Mills In Malaysia, 1995***

Industry	Peninsular Malaysia	Sabah	Sarawak	Total
Sawmills	704	234	220	1,158
Plywood/Veneer	45	68	43	156
Moulding	105	149	21	275
Particleboard/Chipboard	7	2	0	9
Medium DensityFibreboard (MDF)	6	0	0	6
Integrated Pulp and Paper Mill	0	1	0	1
Furniture and Other Woodworking Mills	2,630	120	215	2965
Blockboard	12	27	0	39
Laminated Board	34	4	6	44
Wood Cement Board	3	0	0	3
Woodchip	1	1	1	3
Parquet	25	1	1	27
Picture Frame	25	1	1	27
Prefabricated Houses	10	0	1	11
Matches	4	1	2	7
Toys	6	0	0	6
Pencil	3	0	0	3
Kiln Drying	120	3	7	130
Timber Preservation	117	10	10	137
Door	24	-	-	24
Boxes and Crates	200	-	-	200
Total	4,081	622	528	5,231

List of Working Papers already printed

APFSOS/WP/01	Regional Study - The South Pacific
APFSOS/WP/02	Pacific Rim Demand and Supply Situation, Trends and Prospects: Implications for Forest Products Trade in the Asia-Pacific Region
APFSOS/WP/03	The Implications of the GATT Uruguay Round and other Trade Arrangements for the Asia-Pacific Forest Products Trade
APFSOS/WP/04	Status, Trends and Future Scenarios for Forest Conservation including Protected Areas in the Asia-Pacific Region
APFSOS/WP/05	In-Depth Country Study - New Zealand
APFSOS/WP/06	In-Depth Country Study - Republic of Korea
APFSOS/WP/07	Country Report - Malaysia