

Part I

Philippine Forest Resources

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A. INTRODUCTION

The Philippines has a total land area of 30,000,000 hectares, around 50% of which is characterized as forest land. As of 1994, only 5,686,055 hectares are stocked with forest trees (Forest Management Bureau, 1994). This is only about half of what was existing twenty years ago. To conserve and protect the forest, the old growth dipterocarp forest areas have been placed under the National Integrated Protected Areas Systems (NIPAS) since January 1, 1992. Thus, logging in these areas has been prohibited since then.

With the log ban enforced, the Gross Value Added (GVA) of the forestry sector continuously declined. According to the National Statistical Coordination Board (NSCB), the GVA of forestry amounted to only 2.971 billion pesos or 0.39% of the total Gross Domestic Product (GDP) at constant prices in 1994. The level is 15% lower than that registered in 1993. But still, more than 100,000 persons continue to depend on the forestry and hunting sector for their main source of income; and wood-based products contribute around 3.5% of the country's total export earnings (FMB, 1994). The forest also continues to serve as source of fuelwood especially for rural dwellers.

Ecologically, the forest gives invaluable environmental benefits to the country by providing watersheds for rivers, by serving as an effective protector of soils and regulator of water flows and carbon cycles; and by providing habitats for a multitude of animal and plant life. Careful protection of the forest is therefore of utmost importance. Its destruction will have far-reaching effects such as: depletion of potential resource for wood and habitat; threatening of the capacity of the biosphere to regulate atmospheric and hydrospheric cycles; loss of wildlife habitat and species; soil erosion; siltation; flooding; and landslide. Deforestation, along with burning of hydrocarbons, also contributes to the CO₂ build-up in the atmosphere.

The objective of this paper is to account for the stock of forest resources from 1988 to 1994 and to trace the factors that contribute to the changes in the stock. The sources and methods of estimation are discussed and the results of the estimates are presented. These initial estimates will subsequently form part to the inputs in constructing the adjusted production accounts, which will provide measures of sustainable development.

B. SIGNIFICANCE OF PHILIPPINE FOREST RESOURCES

Philippine forests are classified into different types, namely, dipterocarps, pine, submarginal, mossy and mangrove. The dipterocarps make up roughly two-thirds (2/3) of the total forest cover.

Dipterocarps are forest stands dominated by trees of dipterocarp species such as red and white lauan, tanguile, tiaong, almon, bagtikan and mayapis of the Philippine mahogany group, as well as apitong and yakal. These species are located in places with high elevations, particularly in regions where precipitation is high.

Dipterocarp forests are further classified as either old growth or second growth. Old growth dipterocarp forests are virgin forests with no traces of commercial logging, while second growth dipterocarp forests are those with traces of logging. The dipterocarp

forest has been the major source for the wood industry of its raw material supply of lumber, veneer and plywood, pulp and paper, furniture wood and other wood-based products. The harvest of these species generate revenues for the government through forest charges, property taxes, license fees and income taxes from concessionaires.

Pine consists of only one genus, called *Pinus*, belonging to the family Pinaceae, and two species, namely, Benguet Pine and Mindoro Pine. Locally, Benguet Pine is called Saleng in Benguet. It is also known as Bariat, Batang or Saleng in Bontoc, Palompino in Isabela, and Sahing in Southern Luzon. On the other hand, Mindoro Pine is called Saleng in Zambales and Tapalau in Mindoro. Benguet Pine is a medium-sized or large trees with a diameter reaching up to 140 centimeters and a height reaching up to 40 meters. A moderately fast-growing species, it has a thick and flaky bark with no pronounced buttress. It has a straight cylindrical bole usually 15 meters long. The crown is conical when young, gradually turning domeshaped as the tree matures. Benguet Pine thrives well in high elevations, usually between 500 and 2,700 meters above sea level. It is found mostly in Benguet, Ifugao, Pangasinan, Nueva Viscaya, Nueva Ecija, Cagayan, Ilocos Norte, Mountain Province and Abra. Benguet Pine is endemic to mainland Asia, Taiwan and the Philippines. There have also been reports of this species being grown in Burma and Indochina.

Mindoro Pine is a medium-sized or large tree growing up to 95 centimeters in diameter and 25 meters in height. It has a straight cylindrical trunk with a clear length of 10 to 25 meters. The crown is pyramidal with large and spreading branches when mature. It is found in the mountains of Mindoro and it is native to Southeast Asia, particularly, Sumatra and the Philippines.

<u>FEATURE</u>	<u>BENGUET PINE</u>	<u>MINDORO PINE</u>
Occurrence	Grows in high elevations between 500 and 2700 m	Grows in lower elevations between 150 and 300 m.
Seed	Oval, dark brown in color	Ovoid, pale reddish brown in color
Bark	Flaky	Deeply fissured
Leaves	Needle-like and in bundles of three per fascicle	Needle-like and in bundles of two per fascicle
Crown	Conical when young and dome-shaped when mature	Pyramidal with large and spreading branches when mature

MORPHOLOGICAL DIFFERENCES BETWEEN BENGUET PINE AND MINDORO PINE

Pinewood is an excellent construction material. In the mining areas of Benguet, pine is used as mine prop for mine shafts and tunnels. It is also used as piles, posts, Christmas trees, and as raw material for pulp and paper manufacturing. Wood from pine trees is a good fuel source both for cooking and heating purposes. In watershed areas, pine trees provide ideal vegetative cover for soil and water conservation. The pine needle is also a source of the toxic ingredients used for insect repellents like mosquito

coils. Pine bark is a potential source of tannin for the country's leather industry, and sawmill wastes like Pine sawdust are sources of tan and pitch. Oleoresin from pine trees also generates income for many inhabitants in the pine region. Upon distillation, oleoresin yields turpentine and a residue called rosin. Turpentine is used as solvent and thinner in paints and varnishes, and as inputs for water-proofing compounds, certain drugs, polishes, and insecticides.

Rattan is one of several types of palm. It belongs to the family of coconut and other ornamental palms, the Palmae or Arecaceae family. Its distinguishing characteristic is that it can climb. Rattan is distributed throughout the country, from Batanes to the Tawi-tawi Islands, particularly in the Sierra Madre Range from Cagayan to Quirino and Quezon provinces, the central Cordilleras, the Zambales mountain range, Mt. Isarog in Camarines Sur, the southern part of Samar, Mt. Halcon in Mindoro, the central part of the Panay Islands, the mountains of Agusan, Surigao, Cotabato, Zamboanga and Basilan Islands in Mindoro.

Rattan is mostly found in the interior of old growth forests. Some dwell on the edge of the forest where the area is more open. It is able to climb trees for support because it has either a cirrus, an extension of the leaf midrib, or a flagellum arising from the leaf sheath's axil. Its life is coterminus with the dipterocarp forest and is dependent on bigger trees for survival. This is also the reason why there are no exclusive plantations of rattan. Rattan plantations can be found within dipterocarp forests and some are integrated within an agro-forestry system.

Rattan's long and flexible stem is shaped, polished and processed to create many beautiful products for the furniture and handicraft industries. Its value in these industries was recognized only when some small-time manufacturers discovered the beauty and design-workability of this plant. Rattan products have been internationally accepted in the market since the seventies, after improvements were made on their design, workmanship and finishing. Rattan is also used in the manufacture of fish traps, hammocks, sleeping mats, carpet beaters, hats, and walking sticks, among others. Employment in the rattan industry has grown since then and the industry contributes to the country's income and foreign exchange generation.

Under the revised government regulations governing rattan resources (Department of Environment and Natural Resources Administrative Order No. 4 dated January 12, 1989), the policies of the state are: first, to ensure the sustainable productivity, expanding availability, and access to rattan resources for the continuous supply of this raw material to dependent industries and the generation of employment opportunities and resources; and second, to provide a system of rational harvesting, and gainful and efficient utilization of the resource.

However, the existing supply and demand situation may not be reflective of the policies' objectives: (1) the demand for rattan canes increases as the years go by (Master Plan for Forestry Development, 1990); (2) according to Silviconsult Ltd. (1989), the industry estimates of harvested rattan poles for 1991 is between 200 to 250 million lineal meters. The remaining rattan resources in the natural forests indicate that the sustainable annual yield of cane greater than 2 cm. in diameter is 50 million lineal meters. At the current annual cut of 70 million lineal meters, the supply will be exhausted in five years (The Philippines Recommends for Rattan Production, 1991).

Among the many non-timber forest resources, rattan is being prioritized in this accounting effort in view of its worsening state. Unlike bamboo, rattan is not so prolific. Since rattan is co-terminus with dipterocarp forests, rattan is subject to the damages caused by logging of its tree hosts.

Although rattan is found in natural stands in dipterocarp, submarginal and mossy forests, only rattan in dipterocarp forests are considered in these accounts because of data availability problems and because of the assumption that rattan in dipterocarp forests are of good quality, thus having an economic value.

C. CONCEPTUAL FRAMEWORK

C.1. Scope and Coverage

The System of Integrated Environmental and Economic Accounting (SEEA) framework calls for the compilation of the asset accounts for produced and non-produced assets of forest resources. In this study no distinction is made between economic and environmental non-produced assets. The complexity of the data requirements and the rigidity of sourcing them set this limitation. The asset accounts for forest resources presented here will include only forest trees in forest land.

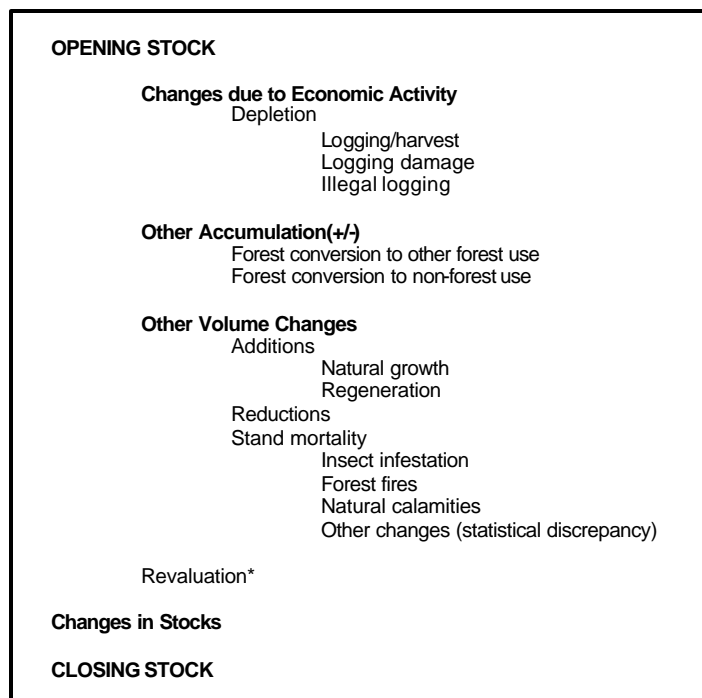
For the current exercise, dipterocarp and pine forests will be included in the accounting process primarily because of their economic and ecological significance and also because of data availability considerations. In addition, rattan, a non-timber forest product, was also included because of its contribution to the economy.

C.2. Framework for the Asset Account

The *Asset Accounts*, in physical and in monetary terms, adopted the format presented on the next page. The *opening stock* represents the stock of resources at the beginning of the accounting period. Within the period, several factors account for the changes in stocks of the resource. These are *changes due to economic activities*, *other accumulation* or changes due to economic decisions, and *other volume changes* representing the changes due to non-economic factors. Other changes under *other volume changes* denote the *statistical discrepancy* equivalent to the difference between the computed *closing stock* (taking into account the framework's identified factors) and the *opening stock* in the succeeding year taken from official sources. The *closing stock* for a year is equal to the *opening stock* of the succeeding year.

Changes due to economic activity refer to human production activities as they affect the stock of resources. *Depletion* is caused by harvest, logging damage and illegal logging. The item identified as *other accumulation* covers forest conversions which mainly refers to clearing of forest to convert it to other uses such as for residential or industrial purposes. Under *other volume changes*, additions to the stocks include natural growth and regeneration while *reductions* cover stand mortality, insect infestation, forest fires and natural calamities.

In the monetary accounts, there is an item called *revaluation* which is equivalent to the differences due to changes in prices between the opening and closing periods.



*Only for monetary accounts

FIGURE 1. ASSET ACCOUNTS FRAMEWORK ADOPTED UNDER THE SEEA

D. OPERATIONALIZING THE FRAMEWORK

D.1. Sources of Data

D.1.1. Physical Account

The base information on stock of forest resources was available for the year 1988 from the RP-German Forest Inventory Project¹. The project paved the way for the preparation of new forest maps for the whole country based on aerial photographs and satellite imagery, the inventory of standing volume, the generation of data on forest regeneration and minor forest products, and the compilation of forest statistics by region and by province. From the 1988 base information, the Forest Management Bureau (FMB) of the Department of Environment and Natural Resources (DENR) extrapolated the value of forest resources stock for the succeeding years.

For old growth dipterocarp forests, data for depletion due to logging were taken from the 1990 Master Plan for Forestry Development (MPFD). For second growth forests, data for forest area converted to non-forest use from 1991 onwards were also taken from the MPFD while those from 1989 to 1990 were derived from the study of Balangue (1991).

¹ The RP-German Forest Inventory is a joint project of the Government of the Republic of the Philippines and the Federal Republic of Germany.

For pine and rattan forest resources, the basic data came from: (1) the Philippine Forestry Statistics (PFS), 1988-1994 of FMB, DENR; (2) the 1990 MPFD; (3) the RP-German Forest Resource Inventory Project Report; (4) the Natural Resources Accounting Project (NRAP) I Report on Forest Accounting; (5) the Philippine Council for Agriculture Forestry and Natural Resources Research and Development (PCARRD); and (6) and the Philippine Lumberman, April 1988.

D.1.2. Monetary Accounts

Parameters used in the computation of stumpage value for dipterocarp forests were taken from Pio Bote's study; for pine forests, from NRAP I Technical Report No. 3; for rattan, from the 1988 PCARRD/ERDB study conducted by Rivera et.al. (1976). The Consumer Price Index (CPI) was taken from the National Statistics Office (NSO) and the Implicit Price Index (IPIN) for Forestry was taken from the National Statistical Coordination Board (NSCB).

D.2. Estimation Methodology

Compilation of asset accounts for forest resources begin with the physical accounts. These are then valued to arrive at the monetary accounts. In terms of physical accounts, both area and volume accounts are compiled for dipterocarp and pine forests, while only volume accounts are compiled for rattan. In monetary terms, the asset accounts for the three resources are all expressed both at current and constant 1985 prices. The accounts cover the years 1988 to 1994.

D.2.1. Physical Asset Accounts, Area

Dipterocarp Forest

In the compilation of the physical asset accounts, the forest stocks in area terms, as reflected in the PFS, were taken to be the closing stock for a given year. This then becomes the opening stock for the succeeding year.

Logging in old growth forests was allowed only up to 1991. The estimation procedure therefore assures that beginning 1992, there was no decrease in the area due to logging. For second growth forests, damage due to logging is equivalent to 15% of logged area in old growth forests in the previous year. The area converted from old growth to second growth is equal to the area logged in old growth forest in the previous year less 15% for log landings, roads and skidding/yarding trails. It is further assumed that there is no additional area for old growth forests.

Other changes under *other volume changes* represent the statistical discrepancy (s.d.) or the unaccounted factors in the changes in area. It is derived as the reported closing area during the year, taken from official sources, less the computed closing area, derived by summing up the opening area, changes due to economic activity, changes due to *other accumulation* and the identified *other volume changes*.

Pine Forest

The framework of physical accounts for pine forest is similar with that of the dipterocarp forest.

Depletion refers to the area harvested during the accounting period. Other accumulation accounts for forest conversions during the period. *Other volume changes* include the stock addition which refers to the increase in stock through time as attributed to growth and increase in forest area through natural means. Stock reduction in pine forests, which may be due to forest fires and stand mortality due to pests, diseases, etc., also forms part of *other volume changes*. The change in stock is the difference between the ending stock and the beginning stock for a given period.

Rattan

No separate area accounts for rattan were compiled since rattan thrives in the same area as the dipterocarp forest.

D.2.2. Physical Asset Accounts, Volume

Dipterocarp Forest

The opening volume of dipterocarp forests in a given year is based on the volume in the preceding year as reported in the PFS. Due to the extensive depletion of forests in the Philippines, it was assumed that logging has exceeded the sustainable cut. Therefore, all the logging, together with damages from logging, were counted as depletion. Damage due to logging was estimated as a fixed proportion of area logged. Forest conversion data were taken from projection data from the MPFD. The volume of forest depleted through logging, damage due to logging, and forest conversion was derived by multiplying the area covered by the corresponding assumed harvestable volume per unit of area: 248.22 cu.m./ha for old growth and 67.0 cu.m./ha for second growth. For old growth forests, it was assumed that net stand growth is equal to zero, that is, tree growth is equal to tree mortality. For second growth forests, net stand growth is equal to opening volume multiplied by annual growth rate, taken from a study by Revilla (1976). Other changes (s.d.) were computed as in the area accounts.

Pine Forest

The following assumptions were used in estimating the volume accounts for pine forests: a) 68% of the total volume of pine forest comes from closed forests¹ while the remaining 32% comes from the open forests²; b) under the other volume changes, additions were based on an annual growth rate of 3.4 cu.m./ha/year (RP-German Inventory Project); c) reductions in volume due to stand mortality assumes a mortality rate of 1.75 and 2.95 cu.m./ha/yr., respectively, for open and closed forests; d) destruction due to forest fires is 45,000 cu.m./year (MPFD, 1990); and e) forest conversion is estimated to be 1,200 hectares per year for the period 1988 to 1989 based on the MPFD.

¹ Closed forest – pure stands of Benguet or Mindanao pine with a crown cover above 30%.
² Open forest – pure stands of Benguet or Mindanao pine with a crown cover of 10% to 30%.

Rattan

Data on rattan show the average rattan occurrence in primary and secondary-growth dipterocarp forests. The opening volume of stock of rattan in 1988 was derived from the 1987 closing stock estimated by NRAP. Separate estimates were made each for small-diameter rattan and for large-diameter rattan.

The changes in stock come from: (1) depletion due to harvest, (2) other (negative) accumulation due to conversion of forest to other land-use, and (3) *other volume changes*, composed of positive changes due to natural growth (increase in the length of a stand), and negative changes due to stand mortality. The *closing stock* is thus computed as the *opening stock* plus the changes due to the three factors mentioned. It is then carried over as the *opening stock* for the succeeding period. Also included in *other volume changes* is the statistical discrepancy (s.d.) between the reported *closing stock* from official sources and the computed *closing stock* based on the other factors in this framework. It should be noted that this item, instead of the *closing stock*, is the last item to be computed in the accounts. Moreover, the reported *closing stock* taken from official sources would still remain as the official *closing stock* for the accounts in spite of any statistical discrepancies that might arise.

Growth is one of the important measures in determining the stock of rattan in the forest. In this accounting, the growth rates adopted were based on those used by ENRAP (1991) which in turn were derived from the report of the PCARRD in 1988. The growth rates were applied only to the stock density of rattan in the residual forest, on the assumption that there is zero growth in primary forest. For stock reduction, it was assumed that the rate of stand mortality is 5% based on Pabuayan in the ENRAP study on Natural Resource Accounting for Rattan.

The data on harvest for split and unsplit rattan derived from the PFS were assumed understated by 488%, according to Pabuayan (1991), taking into consideration the data from PFS and the Silviconsult-ADB report. Out of the harvest, 50% of merchantable lengths felled was deducted to represent the portion which goes to waste. For forest conversion, the data were based on projections made by MPFD.

D.2.3. Monetary Asset Accounts

Dipterocarp Forest

The net price method was used in valuing forest resources. The economic or monetary accounts was derived by multiplying the volume accounts by the stumpage value of the forest. The opening stock was multiplied by the stumpage value of the preceding year and all the other items in the asset accounts for a given year were multiplied by the stumpage values of the current year. The stumpage value is the value of the standing timber and it is equal to the price of the product less the cost of harvesting, transport and a margin for normal return to capital (which is assumed to be 30% of the logging cost) which represents an allowance for normal profit and risk associated with the production activity and is approximated by the opportunity cost of capital or the operator's estimated earnings from an alternative investment. The stumpage value represents the potential economic rent accruing to operators.

The sales value of log is equal to the weighted selling price of the products. The cost items include logging cost, pre-logging cost, post logging cost, road construction cost, transportation cost and overhead costs. Logging cost represents felling and bucking

costs and the cost of pulling the logs from the felling site to the log landing. The costs are classified by terrain type, by extractable log volume, and by logging methods. Pre-logging cost represents the cost of pre-logging activities such as pre-logging inventory and tree marking. Post-logging cost is the cost of post logging residual stand inventory, and enrichment planting conducted by the private forest users or the concessionaires. Road construction cost is the cost incurred in road construction in peso/kilometer/cubic meter of harvest. Transportation cost involves the cost of transporting a cubic meter of log from the forest landing to the processing mill or log pond, in peso/km/cu.m. It includes the depreciation value of trucks and loaders used, wages of drivers and helpers, fuel and oil used in operation. Overhead costs cover representation or relevant administrative expenses.

The base information for stumpage value was taken from Pio Bote's study for 1990 with adjustments for margin for profit and risk (MPR). For years other than 1990, the corresponding stumpage value was derived by adjusting the 1990 value by the corresponding changes in weighted prices of logs by species. Attempts were made to update the stumpage value not only by the changes in prices of logs but also by the changes in the corresponding costs of harvesting. Updated cost structures were derived from financial statements of logging companies taken from the Securities and Exchange Commission (SEC) of the Philippines. However, the financial statements culled out from the SEC were limited to just a few companies and the results derived from them are not satisfactory. Hence, the stumpage values were updated only by the changes in the log price. Stumpage values at constant prices were derived by dividing the stumpage value at current prices by the consumer price index base year 1985. Revaluation is equivalent to the differences due to changes in prices between the opening and closing periods.

Pine Forest

The net price method is adopted in valuing Pine timbers. The value of opening and closing stocks were derived by multiplying the volume accounts by the stumpage value, which is the value of timber as it stands in the forest. The stumpage value is estimated by deducting the production cost (PC) and MPR from the market price of timber. Production cost includes all expenses incurred in getting timber out of the pine forests, log preparation and related cost associated with sale. The stumpage value represents the potential economic rent accruing to operators. The actual rent retained by the operator is obtained after deducting all forms of taxes and payments from the potential economic rent.

In this study, the source of basic data for the 1989 stumpage value of pine forest at current prices was Table 5 of Technical Report No. 3, Natural Pine Forest Resources Accounting, NRAP-Phase I. For other years, the given stumpage values were extrapolated using the Implicit Price Index of Forestry taken from the Philippine National Accounts published by the NSCB. Stumpage values at constant prices were estimated by deflating the stumpage values at current prices by the Consumer Price Index base year 1985. These stumpage values at constant prices are then multiplied with the volume accounts to arrive at the asset accounts in monetary terms at constant prices.

Rattan

The monetary account for rattan is computed as stumpage value multiplied by the physical units. The net price or stumpage value is equal to market price of rattan at the manufacturer's (factory) level less production/extraction cost (equal to the price paid to

cutter/harvester), less marketing/handling cost (which includes cost of transport, bundling, classifying, scraping, chemical treatment), and less MPR. This procedure of net price method valuation, adopted from NRAP, considers the concept of economic rent (or profit) for natural resource valuation.

The stumpage value of rattan for 1988 was derived from the 1988 PCAR DD/ERDB Study conducted by Rivera et al, "Marketing System for Rattan Raw Materials in the Philippines". The study provides prices and costs by location and diameter class of rattan. The stumpage value is equated to the rent defined as market price less total cost less MPR which is 30% of total cost. Total cost comprises the production cost and marketing cost. The stumpage value is derived as the weighted average of the stumpage values by location and diameter class, for small and large diameter rattans. The resulting stumpage values are P0.57/m and P1.24/m for small and large diameter rattans, respectively for 1988. The stumpage values for the other years were derived by adjusting the 1988 level by the changes in the Implicit Price Index of Forestry. Values, at constant prices, were derived by deflating the stumpage values at current prices by the consumer price index.

E. ANALYSIS, RESULTS AND DISCUSSIONS

Appendix tables 1 to 20 at the end of this report contain the estimated asset accounts for forest resources. Physical asset accounts are shown in appendix tables 1 to 9 for both old growth and second growth dipterocarp forests, appendix tables 10 to 14 for pine forest and appendix tables 15 to 18 for rattan. A summary of the monetary asset accounts is presented in appendix tables 19 and 20.

Dipterocarp

The area planted to old growth forest steadily declined from 1988 to 1991 and has remained unchanged since 1992 when the logging ban was imposed. By 1994, only a total of 805 thousand hectares remained of old growth dipterocarp forest areas. Likewise, areas planted to second growth dipterocarp forests also decreased from 3,413 thousand hectares to 2,963 thousand hectares, registering a negative annual growth rate of 2.3 percent. Forest conversion was identified as one of the major causes of this decrease in forest area.

At current prices, the value of stock of both old growth and second growth dipterocarp forests grew as prices of logs continuously surged. Valued at constant 1985 prices, however, the stock of forest resources diminished through the years. For old growth forest resources, the value shrank from 213 billion pesos at the end of 1988 to 156 billion pesos at the end of 1994, recording an annual decline of 5.1 percent. Similarly, second-growth forest resources dwindled, although at a slower rate of 4.1 percent, from 209 billion pesos in 1988 to 162 billion pesos at the end of 1994. The following table and charts further illustrate the situation of old growth and second growth dipterocarp forests for the period 1988 to 1994.

TABLE 1. MONETARY ESTIMATE OF THE CLOSING STOCKS OF OLD GROWTH AND SECOND GROWTH DIPTEROCARP FORESTS, AT CURRENT AND CONSTANT PRICES, 1988-1994

YEAR	OLD GROWTH DIPTEROCARP					SECOND GROWTH DIPTEROCARP				
	CLOSING STOCK (in '000 ha.)	DEPLETION		CLOSING STOCK		CLOSING STOCK (in '000 ha.)	DEPLETION		CLOSING STOCK	
		CURRENT PRICES	CONSTANT PRICES	CURRENT PRICES	CONSTANT PRICES		CURRENT PRICES	CONSTANT PRICES	CURRENT PRICES	CONSTANT PRICES
		(in million pesos)		(in million pesos)			(in million pesos)		(in million pesos)	
1988	988	23,650	21,167	238,054	213,058	3,413	523	468	233,050	208,580
1989	922	13,953	11,130	255,351	203,689	3,351	550	438	262,591	209,464
1990	861	9,939	6,944	243,004	169,780	3,288	287	201	262,054	183,090
1991	805	11,224	6,609	256,840	151,231	3,224	227	134	290,158	170,850
1992	805	-	-	296,838	160,429	3,132	263	142	325,292	175,807
1993	805	-	-	325,778	163,620	3,042	-	-	346,998	174,278
1994	805	-	-	338,617	155,977	2,963	-	-	351,259	161,800

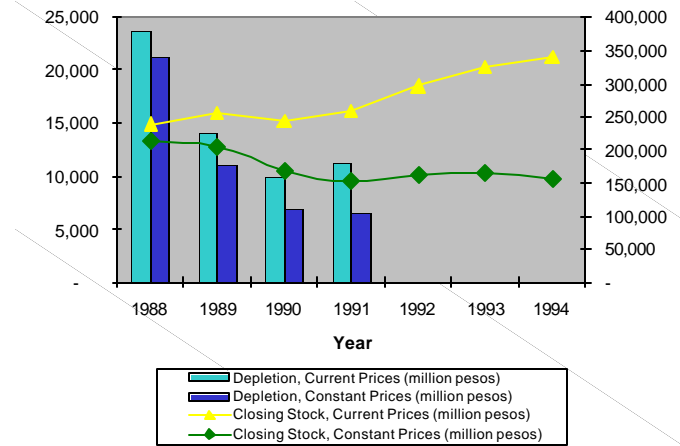


FIGURE 2. MONETARY VALUATION OF THE CLOSING STOCK AND DEPLETION OF OLD GROWTH DIPTEROCARP FOREST, 1988-1994

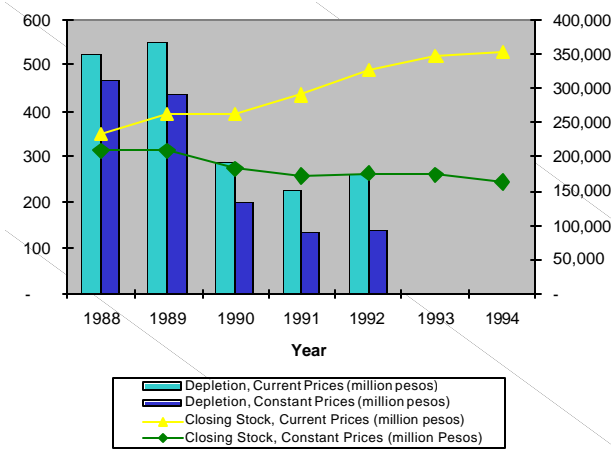


FIGURE 3. MONETARY VALUATION OF THE CLOSING STOCK AND DEPLETION OF SECOND GROWTH DIPTEROCARP FOREST, 1988-1994

Pine

In 1988, the total area planted to pine forests was 238,890 hectares, with a volume of 25,098 thousand cubic meters. Sixty eight percent (68%) can be found in closed forests while the rest are in open forests. Both the area of open forests planted to pine stands is lesser than in closed forests because the latter is more prone to forest fires. The area and volume of pine forest slightly decreased at an annual rate of 0.5 percent within the six-year period. By the end of 1994, only 231,500 hectares remained of the country's pine forests, with a volume of 24,252 thousand cubic meters. This indicates that the country's pine resources are being reduced at the rate of 120,833 cubic meters per year during the period covered not due to economic activity but mainly because of stand mortality and forest fires.

Due to the increase in the estimated stumpage value of pine forests, the value of its closing stock at current price grew at an annual rate of 5.1 percent, despite the reduction in terms of cubic meters. At constant prices, however, the value of stock of pine forest resources declined from 41,680 million pesos in 1988 to 28,867 million pesos in 1994. The following table and chart further depict the situation of pine forests for the period 1988 to 1994.

TABLE 2. VALUE OF THE CLOSING STOCK AND DEPLETION OF PINE FOREST RESOURCES, AT CURRENT AND CONSTANT PRICES, 1988-1994

YEAR	CLOSING STOCK		VALUE OF DEPLETION (In million pesos)		VALUE OF CLOSING STOCK (In million pesos)	
	AREA IN 000 ha.	VOL. IN mil. cu.m	CURRENT PRICES	CONSTANT PRICES	CURRENT PRICES	CONSTANT PRICES
1988	238.9	25.0	52	47	46,582	41,680
1989	237.6	24.9	44	35	48,133	38,396
1990	236.4	24.8	-	-	48,478	33,870
1991	235.2	24.6	-	-	54,768	32,249
1992	233.9	24.5	-	-	63,700	34,427
1993	232.7	24.4	-	-	62,478	31,379
1994	231.5	24.2	-	-	62,667	28,867

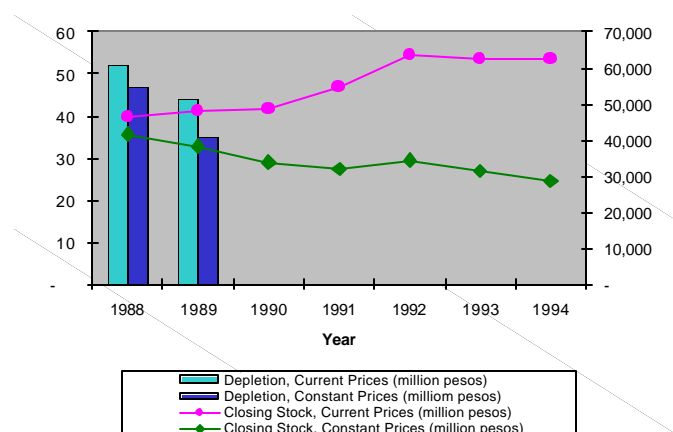


FIGURE 4. MONETARY VALUATION OF THE CLOSING STOCK AND DEPLETION OF PINE FOREST, 1988-1994

Rattan

The results of the physical accounts show that the volume of stock of rattan shrank at a diminishing rate over the period 1988 to 1994, from 4,112 million lineal meters (lm) in 1988 to 3,236 lm in 1994.

At current prices, depletion due to harvest and waste dropped from 304 million pesos in 1988 to 271 million pesos in 1994, registering an annual decline of 1.9 percent. At constant prices, depletion was reduced from 273 million pesos in 1988 to 125 million pesos in 1994, manifesting an annual negative growth of 12.2 percent.

Despite the decrease in the volume of stock of rattan, the value of its closing stock at current prices slightly rose from 3,290 million pesos in 1988 to 3,305 million pesos in 1994 as a result of the increasing stumpage values. However, at constant 1985 prices, the real value declined from 2,945 million pesos in 1988 to 1,522 million pesos in 1994 recording an annual decline of 10.4 percent. The following table and chart summarize the situation of rattan resources in the country for the period 1988 to 1994.

TABLE 3. VALUE OF THE CLOSING STOCK AND DEPLETION OF RATTAN RESOURCES, AT CURRENT AND CONSTANT PRICES, 1988-1994

YEAR	CLOSING STOCK (AREA in mil. Lm)	VALUE OF DEPLETION (in million pesos)		VALUE OF CLOSING STOCK (in million pesos)	
		CURRENT PRICES	CONSTANT PRICES	CURRENT PRICES	CONSTANT PRICES
1988	4,112	304	272	3,290	2,945
1989	3,894	304	243	3,188	2,543
1990	3,821	178	125	3,129	2,187
1991	3,627	315	185	3,329	1,960
1992	3,511	279	151	3,713	2,007
1993	3,371	300	151	3,456	1,736
1994	3,236	271	125	3,305	1,522

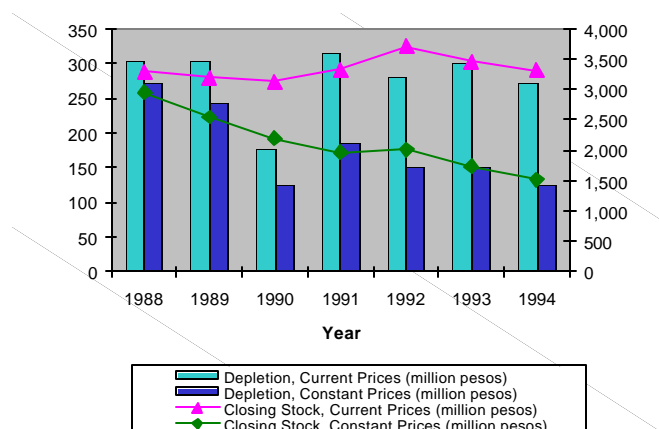


FIGURE 5. MONETARY VALUATION OF CLOSING STOCK AND DEPLETION OF RATTAN FOREST RESOURCE, 1988-1994

Summary of Economic Accounts

Value

At current prices, the closing stock of forest resources displayed an increasing trend brought about mainly by the increase in prices of timber. At constant prices, despite the continuous decrease in depletion, forest conversion and other volume changes, the value of the closing stock of forest resources showed a declining trend between 1988 and 1994.

At current prices, depletion decreased from P 25 billion in 1988 to 271 million pesos in 1994 at an average rate of 52.8 percent per annum. At constant prices, the rate of decline was 58 percent per year, from a high of P 22 billion in 1988 to P 125 million in 1994. Though the significant decrease in depletion can be significantly attributed to the selective log ban which was imposed in 1992, the reductions due to economic activity have been steadily decreasing even before 1992.

The closing stock at current prices rose from P 521 billion in 1988 to P 756 billion in 1994. Removing the effects of the increase in prices, the closing stock of forest resources in real terms diminished from P 466 billion in 1988 to P 348 billion in 1994.

TABLE 4. MONETARY VALUATION OF THE CLOSING STOCK AND DEPLETION OF FOREST RESOURCES, IN CURRENT AND CONSTANT PRICES, 1988-1994

YEAR	DEPLETION		CLOSING STOCK	
	CURRENT PRICES	CONSTANT PRICES	CURRENT PRICES	CONSTANT PRICES
	(in million pesos)		(in million pesos)	
1988	24,529	21,954	520,976	466,263
1989	14,852	11,847	569,263	454,093
1990	10,404	7,269	556,666	388,927
1991	11,766	6,928	605,096	356,290
1992	542	293	689,543	372,669
1993	300	150	738,710	371,013
1994	271	125	755,848	348,166

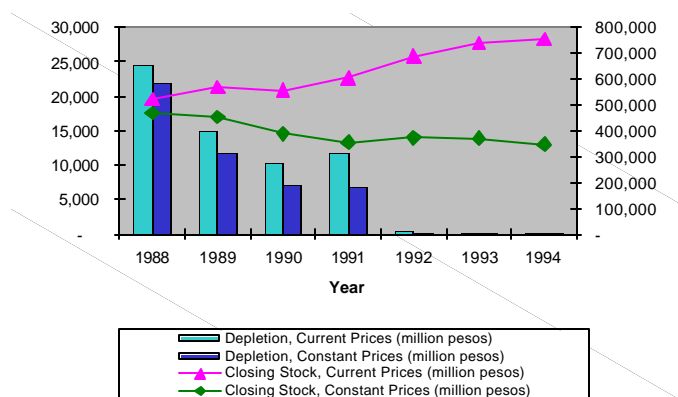


FIGURE 6. MONETARY VALUATION OF FOREST RESOURCES, 1988-1994

Percentage Share of Depletion and Closing Stock

In terms of percentage share of depletion of forest by type of forest, there was a reversal of roles between dipterocarp and rattan from the period 1988 to 1994 in both current and constant prices. From 1988 to 1991, dipterocarp forest accounted for most of the depletion registering a percentage share of more than 95 percent. In 1992, rattan resources became the major contributor to depletion of forest resources, accounting for 51 percent of total depletion for that year, further increasing to 100 percent for the period 1993 to 1994. Meanwhile, the depletion of pine forest accounted for a very negligible share for the whole period.

The following table and chart provide the detailed sets of information and their graphical presentation, respectively.

TABLE 5. PERCENT SHAERE OF THE VALUES OF FOREST DEPLETION FOR DIPTEROCARP, PINE, RATTAN, AT CURRENT AND CONSTANT PRICES, 1988-1994

YEAR	CURRENT PRICES				CONSTANT PRICES			
	TOTAL	Dipterocarp	PINE	RATTAN	TOTAL	Dipterocarp	PINE	RATTAN
1988	100.00	98.55	0.21	1.24	100.00	98.54	0.22	1.24
1989	100.00	97.65	0.30	2.05	100.00	97.66	0.30	2.05
1990	100.00	98.29	0.00	1.71	100.00	98.29	0.00	1.71
1991	100.00	97.33	0.00	2.67	100.00	97.33	0.00	2.67
1992	100.00	48.51	0.00	51.49	100.00	48.48	0.00	51.52
1993	100.00	0.00	0.00	100.00	100.00	0.00	0.00	100.00
1994	100.00	0.00	0.00	100.00	100.00	0.00	0.00	100.00

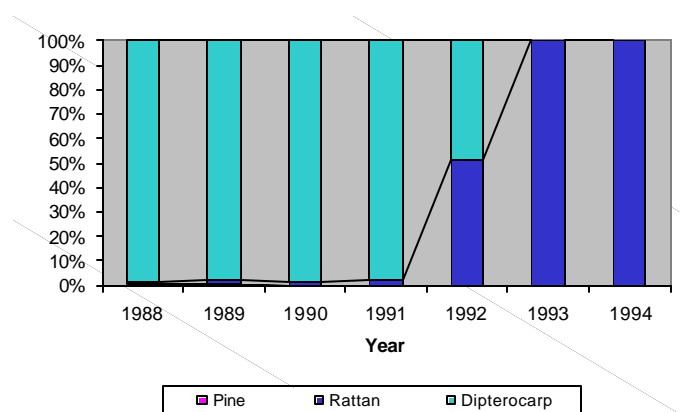


FIGURE 7. PERCENTAGE SHARE OF DEPLETION BY TYPE OF FOREST, 1988-1994

On the other hand, the percentage shares of the closing stock of forest by type of forest almost remained the same for the period 1988 to 1994. For both current and constant prices, dipterocarp forest accounted for around 90-91 percent, with pine accounting for around 8-9 percent. Rattan resources, however, reduced its share from

around 0.6 percent in 1988 to around 0.4 percent in 1994. The following table and chart further illustrate the percentage shares of the closing stock of the different types of forest resources.

TABLE 6. PERCENTAGE SHARE OF THE VALUES OF CLOSING STOCKS OF DIPTEROCARP, PINE, RATTAN, AT CURRENT AND CONSTANT PRICES, 1988-1994

YEAR	CURRENT PRICES				CONSTANT PRICES			
	TOTAL	DIPTEROCARP	PINE	RATTAN	TOTAL	DIPTEROCARP	PINE	RATTAN
1988	100.00	90.43	8.94	0.63	100.00	90.43	8.94	0.63
1989	100.00	90.98	8.46	0.56	100.00	90.98	8.46	0.56
1990	100.00	90.73	8.71	0.56	100.00	90.73	8.71	0.56
1991	100.00	90.40	9.05	0.55	100.00	90.40	9.05	0.55
1992	100.00	90.22	9.24	0.54	100.00	90.45	9.02	0.53
1993	100.00	91.07	8.46	0.47	100.00	91.07	8.46	0.47
1994	100.00	91.27	8.29	0.44	100.00	91.27	8.29	0.44

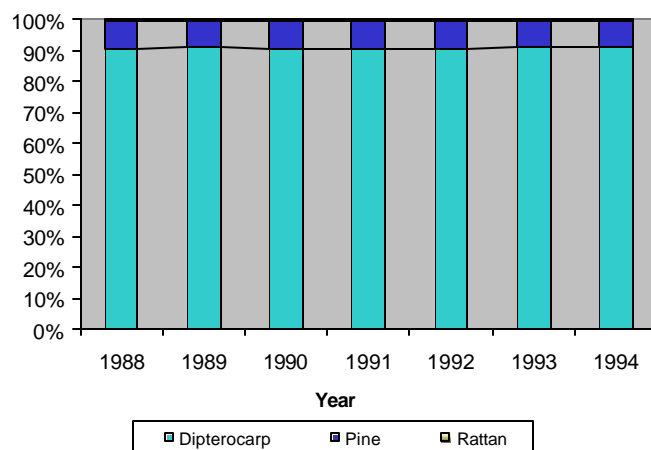


FIGURE 8. PERCENTAGE SHARE OF CLOSING STOCK OF FOREST RESOURCE, BY TYPE OF FOREST, 1988-1994

ACRONYMS

ADB	Asian Development Bank
BSWM	Bureau of Soils and Water Management
CPI	Consumer Price Index
DENR	Department of Environment and Natural Resources
ERDB	Ecosystems Research and Development Bureau
FMB	Forest Management Bureau
FRIP	Forest Resources Inventory Project
GDP	Gross Domestic Product
GVA	Gross Value Added
IPIN	Implicit Price Index
MPFD	Master Plan for Forestry Development
MPR	Margin for Profit and Risk
NAMRIA	National Mapping and Resource Information Authority
NIPAS	National Integrated Protected Areas System
NRAP	Natural Resources Accounting Project
NRDC	Natural Resources Development Corporation
NRMP	Natural Resource Management Program
NSCB	National Statistical Coordination Board
NSO	National Statistics Office
PC	Production Cost
PCARRD	Philippine Council for Agriculture, Forestry and Natural Resources Research and Development
PFS	Philippine Forestry Statistics
SD	Statistical Discrepancy
SEC	Securities and Exchange Commission

SEEA System of Integrated Environmental and Economic Accounting

DEFINITION OF TERMS

AGROFORESTRY	the sustainable management of land to increase overall production; combines agricultural crops, tree crops and forest plants and/or animals while simultaneously or consequently applying management practices which are compatible with the cultural patterns of the local population.
COTERMINUS	having a common boundary; bordering.
DIPTEROCARP FOREST	forest stands dominated by trees of the dipterocarp species such as red lauan, tangile, tiaong, white lauan, almon, bagtikan, mayapis of the Philippine mahogany group, apitong and the yakal.
ENDEMIC	restricted to and constantly present in a particular locality; native to a particular region.
FOREST	areas of one hectare or more which are at least 10 percent stocked with forest trees (including seedlings and saplings) like palm, bamboo, or brush. Narrow strips of land bearing forest trees must be at least 60 meters wide and one hectare in size to qualify as forest. Industrial plantations and tree farms one hectare or more in size are also included.
FOREST LAND	includes public forests, permanent forests or forest reserves, and forest reservations.
MANGROVE FOREST	a type of forest occurring on tidal flats along the sea coast, extending along streams where water is brackish. Mangrove species along this area are obligatory halophytes or haloresistant species, the optimum salinity of which varies from one species to another.
MORPHOLOGICAL	structural.
NET PRICE METHOD	defined as actual market price of the raw material minus marginal exploitation costs including a normal return to capital.

NIPAS	stands for “National Integrated Protected Areas System”. It is the classification and administration of protected areas according to categories to maintain their natural conditions as much as possible. It was created by an act of Congress and enacted into law on June 16, 1992 by then President Corazon C. Aquino.
PINE FOREST	forest stands composed primarily of the native species, e.g., Benguet pine in the Mountain Province and the Mindoro pine in Mindoro and Zambales province.
PROLIFIC	producing much; abundantly productive.
RATTAN	refers to a group of cane-like climbing palm species such as the palasan and the limuran, belonging to the family Palmae, generally found in moist tropical rain forests; may come in split or unsplit forms which are used primarily in furniture and household fixtures.
STUMPAGE VALUE	the value of the standing timber/rattan pole; is equal to the price of the product less the cost of harvesting, the cost of transport and a margin for normal return to capital which represents an allowance for marginal profit and risk associated with the production activity; is approximated by the opportunity cost of capital or what the operator would earn from an alternative investment.
SUBMARGINAL FORESTS	tropical rain forests dominated by Leguminosae and lesser utilized species, mainly restricted to shallow and excessively drained limestone soils.
TIMBER	major forest product; standing tree.

APPENDICES

**APPENDIX TABLE 1. AREA ACCOUNTS OF OLD GROWTH DIPTEROCAP FORESTS, 1988-1994
IN THOUSAND HECTARES**

	1988	1989	1990	1991	1992	1993	1994
OPENING AREA 1/	1,219.689	988.300	922.000	861.200	804.900	804.900	804.900
Changes due to economic activity	(97.300)	(50.000)	(35.000)	(35.000)	0.000	0.000	0.000
Reforestation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Afforestation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Depletion (-)							
Logged Area 2/	97.300	50.000	35.000	35.000	0.000	0.000	0.000
Other Accumulation (+/-)							
Forest area converted to non-forest use 3/	(14.000)	(10.000)	(9.800)	(9.700)	0.000	0.000	0.000
Other volume changes (+/-)	(120.089)	(6.300)	(16.000)	(11.600)	0.000	0.000	0.000
Additions 4/							
Other changes (s.d.)	(120.089)	(6.300)	(16.000)	(11.600)	0.000	0.000	0.000
Net Change in Area	(231.389)	(66.300)	(60.800)	(56.300)	0.000	0.000	0.000
CLOSING AREA	988.300	922.000	861.200	804.900	804.900	804.900	804.900

Note:

- 1/ Based on the RP-German Forest Inventory as indicated in the Philippine Forestry Statistics (PFS). The Opening area in a given year is based on the area of old growth forest in the preceding year (PFS).
- 2/ From Master Plan for Forestry Development (MPFD): Appendix 15
- 3/ 1988 and 1989, from Table 9 of Tonie Balangue's paper; 1990-1991 : from MPFD, Appendix 8 (Current trends scenario:total logging ban) 1992 onwards assumed to be zero.
- 4/ There is no additional area for old growth forest.

**APPENDIX TABLE 2. VOLUME ACCOUNTS OF OLD GROWTH DIPTEROCARP FORESTS, 1988-1994
IN THOUSAND CUBIC METERS**

	1988	1989	1990	1991	1992	1993	1994
OPENING VOLUME 1/	318,739	243,105	227,123	212,416	198,792	198,792	198,792
Changes due to economic activity	(24,152)	(12,411)	(8,688)	(8,688)	0	0	0
Reforestation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Afforestation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Depletion (-)							
Logged 2/	24,152	12,411	8,688	8,688	0	0	0
Other Accumulation (+/-)							
Forest converted to non-forest use 3/	(3,475)	(2,482)	(2,433)	(2,408)	0	0	0
Other volume changes (+/-)	(48,007)	(1,089)	(3,587)	(2,529)	0	0	0
Natural growth 4/							
Natural mortality 4/							
Other changes (s.d.)	(48,007)	(1,089)	(3,587)	(2,529)	0	0	0
Net Change in Volume	(75,634)	(15,982)	(14,707)	(13,624)	0	0	0
CLOSING VOLUME	243,105	227,123	212,416	198,792	198,792	198,792	198,792

Note:

- 1/ Opening volume for a given year is based on the volume of old growth forest in the preceding year (PFS).
- 2/ Volume logged equals logged area multiplied by 248.22 cu.m./ha. (mean harvestable volume of old growth forest).
- 3/ Volume of forest converted equals converted forest area multiplied by 248.22 cu. m. / ha.
- 4/ Net stand growth is zero in old growth forest: tree growth equals tree mortality.

**APPENDIX TABLE 3. ECONOMIC ACCOUNTS OF OLD GROWTH DIPTEROCARP FORESTS, AT CURRENT PRICES
1988-1994, IN THOUSAND PESOS**

	1988	1989	1990	1991	1992	1993	1994
OPENING STOCK	284,570,145	238,053,574	255,350,909	243,003,904	256,839,656	296,838,020	325,778,466
Changes due to economic activity	(23,649,961)	(13,953,497)	(9,938,729)	(11,224,526)	0	0	0
Reforestation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Afforestation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Depletion (-)							
Logged	23,649,961	13,953,497	9,938,729	11,224,526	0	0	0
Other Accumulation (+/-)							
Forest converted to non-forest use	(3,402,872)	(2,790,699)	(2,782,844)	(3,110,797)	0	0	0
Other volume changes (+/-)	(47,009,585)	(1,224,121)	(4,103,235)	(3,266,912)	0	0	0
Natural growth							
Natural mortality							
Other changes (s.d.)	(47,009,585)	(1,224,121)	(4,103,235)	(3,266,912)	0	0	0
Net Change in Stock	(74,062,417)	(17,968,318)	(16,824,808)	(17,602,235)	0	0	0
Revaluation	27,545,846	35,265,653	4,477,803	31,437,987	39,998,364	28,940,447	12,838,704
CLOSING STOCK	238,053,574	255,350,909	243,003,904	256,839,656	296,838,020	325,778,466	338,617,170

Note : Values are derived by multiplying the volume by the corresponding stumpage values at current prices

**APPENDIX TABLE 4. ECONOMIC ACCOUNTS OF OLD GROWTH DIPTEROCARP FORESTS, AT CONSTANT PRICES
1988-1994, IN THOUSAND PESOS**

	1988	1989	1990	1991	1992	1993	1994
OPENING STOCK	277,440,392	213,057,948	203,689,005	169,780,245	151,231,245	160,428,761	163,620,498
Changes due to economic activity	(21,166,715)	(11,130,463)	(6,943,921)	(6,609,178)	0	0	0
Reforestation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Afforestation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Depletion (-)							
Logged	21,166,715	11,130,463	6,943,921	6,609,178	0	0	0
Other Accumulation (+/-)							
Forest converted to non-forest use	(3,045,570)	(2,226,093)	(1,944,298)	(1,831,686)	0	0	0
Other volume changes (+/-)	(42,073,578)	(976,460)	(2,866,819)	(1,923,610)	0	0	0
Natural growth	0	0	0	0	0	0	0
Natural mortality	0	0	0	0	0	0	0
Other changes (s.d.)	(42,073,578)	(976,460)	(2,866,819)	(1,923,610)	0	0	0
Net Change in Stock	(66,285,864)	(14,333,016)	(11,755,038)	(10,364,474)	0	0	0
Revaluation	1,903,420	4,964,073	(22,153,722)	(8,184,527)	9,197,516	3,191,737	(7,643,984)
CLOSING STOCK	213,057,948	203,689,005	169,780,245	151,231,245	160,428,761	163,620,498	155,976,514

Note: Values are derived by multiplying the volume by the stumpage values at constant 1985 prices

**APPENDIX TABLE 5. AREA ACCOUNTS OF SECOND GROWTH DIPTEROCARP FORESTS, 1988-1994
IN THOUSAND HECTARES**

	1988	1989	1990	1991	1992	1993	1994
OPENING AREA 1/	3,618.919	3,412.800	3,350.900	3,287.600	3,224.300	3,131.900	3,041.758
Changes due to economic activity	(15.945)	(14.595)	(7.500)	(5.250)	(5.250)	0.000	0.000
Reforestation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Afforestation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Depletion (-)							
Damage from logging 2/	15.945	14.595	7.500	5.250	5.250	0.000	0.000
Other Accumulation (+/-)	40.355	32.705	(17.600)	(29.250)	(28.250)	(56.900)	(55.900)
Old growth area converted to second growth area 3/	90.355	82.705	42.500	29.750	29.750	0.000	0.000
Forest area converted to non-forest use 4/	(50.000)	(50.000)	(60.100)	(59.000)	(58.000)	(56.900)	(55.900)
Other volume changes (+/-)	(230.529)	(80.010)	(38.200)	(28.800)	(58.900)	(33.242)	0.000
Other changes (s.d.)	(230.529)	(80.010)	(38.200)	(28.800)	(58.900)	(33.242)	0.000
Net Change in Area	(206.119)	(61.900)	(63.300)	(63.300)	(92.400)	(90.142)	(55.900)
CLOSING AREA	3,412.800	3,350.900	3,287.600	3,224.300	3,131.900	3,041.758	2,962.655

Note:

- 1/ Based on the RP-German Forest Inventory as indicated in the Philippine Forestry Statistics (PFS). The Opening area is in a given year is based on the area of old growth forest in the preceding year (PFS).
- 2/ Equivalent to 15% of logged area in previous year, for logged landings, roads, skidding/yarding trails
- 3/ Area logged in old growth forest in previous year less 15% for log landings, roads, skidding/yarding trails
- 4/ 1990 onwards: from MPFD, Appendix 8 (Current trends scenario:total logging ban); 1988 and 1989, from Table 9 of Tonie Balangue's paper

**APPENDIX TABLE 6. VOLUME ACCOUNTS OF SECOND GROWTH DIPTEROCARP FORESTS, 1988-1994
IN THOUSAND CUBIC METERS**

	1988	1989	1990	1991	1992	1993	1994
OPENING VOLUME 1/	588,753	475,991	467,125	458,137	449,161	435,695	423,480
Changes due to economic activity	(1,068)	(978)	(503)	(352)	(352)	0	0
Reforestation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Afforestation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Depletion (-)							
Damage from logging 2/	1,068	978	503	352	352	0	0
Other Accumulation (+/-)	2,704	2,191	(1,179)	(1,960)	(1,893)	(3,812)	(3,745)
Old growth converted to second growth 3/	6,054	5,541	2,848	1,993	1,993	0	0
Forest converted to non-forest use 4/	(3,350)	(3,350)	(4,027)	(3,953)	(3,886)	(3,812)	(3,745)
Other volume changes (+/-)	(114,397)	(10,079)	(7,306)	(6,665)	(11,222)	(8,403)	(7,308)
Net stand growth 5/	22,961	18,564	18,218	17,867	17,517	16,992	16,516
Other changes (s.d.)	(137,359)	(28,643)	(25,524)	(24,532)	(28,739)	(25,395)	(23,823)
Net Change in Volume	(112,762)	(8,866)	(8,988)	(8,976)	(13,466)	(12,215)	(11,053)
CLOSING VOLUME	475,991	467,125	458,137	449,161	435,695	423,480	412,427

Note:

- 1/ The Opening volume in a given year is based on the volume of old growth forest in the preceding year.
- 2/ Area damaged from logging multiplied by the harvestable volume of 67.0 cu.m./ha.
- 3/ Area logged in old growth forest in the previous year multiplied by density of 67.0 cu.m./ha.
- 4/ Area converted to other uses multiplied by the residual density of 67.0 cu. m./ha.
- 5/ Net stand growth equals opening volume multiplied by annual growth rate taken from the Revilla study (Yeal 10).

APPENDIX TABLE 7. ECONOMIC ACCOUNTS OF SECOND GROWTH DIPTEROCARP FORESTS, AT CURRENT PRICES, 1988-1994, IN THOUSAND PESOS

	1988	1989	1990	1991	1992	1993	1994
OPENING STOCK	262,819,308	233,050,243	262,590,740	262,054,364	290,158,448	325,291,865	346,997,528
Changes due to economic activity	(523,058)	(549,699)	(287,430)	(227,231)	(262,618)	0	0
Reforestation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Afforestation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Depletion (-)							
Damage from logging 2/	523,058	549,699	287,430	227,231	262,618	0	0
Other Accumulation (+/-)	1,323,802	1,231,786	(674,502)	(1,266,000)	(1,413,136)	(3,123,781)	(3,189,824)
Old growth converted to second growth 3/	2,963,997	3,114,963	1,628,770	1,287,641	1,488,170	0	0
Forest converted to non-forest use 4/	(1,640,196)	(1,883,177)	(2,303,272)	(2,553,642)	(2,901,305)	(3,123,781)	(3,189,824)
Other volume changes (+/-)	(56,010,215)	(5,666,041)	(4,179,204)	(4,305,274)	(8,378,023)	(6,885,133)	(6,223,874)
Net stand growth 5/	11,242,129	10,435,413	10,420,625	11,542,321	13,078,480	13,923,251	14,066,226
Other changes (s.d.)	(67,252,344)	(16,101,454)	(14,599,828)	(15,847,595)	(21,456,503)	(20,808,384)	(20,290,100)
Net Change in Stock	(55,209,471)	(4,983,954)	(5,141,136)	(5,798,505)	(10,053,777)	(10,008,914)	(9,413,698)
Revaluation	25,440,407	34,524,451	4,604,760	33,902,589	45,187,194	31,714,576	13,674,932
CLOSING STOCK	233,050,243	262,590,740	262,054,364	290,158,448	325,291,865	346,997,528	351,258,762

Note: Values are derived by multiplying the volume by the corresponding stumpage values

APPENDIX TABLE 8. ECONOMIC ACCOUNTS OF SECOND GROWTH DIPTEROCARP FORESTS, AT CONSTANT PRICES 1988-1994, IN THOUSAND PESOS

	1988	1989	1990	1991	1992	1993	1994
OPENING STOCK	256,234,510	208,579,967	209,464,093	183,090,286	170,849,876	175,806,896	174,277,658
Changes due to economic activity	(468,137)	(438,486)	(200,820)	(133,797)	(141,934)	0	0
Reforestation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Afforestation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Depletion (-)							
Damage from logging 2/	468,137	438,486	200,820	133,797	141,934	0	0
Other Accumulation (+/-)	1,184,803	982,574	(471,257)	(745,441)	(763,742)	(1,568,902)	(1,469,322)
Old growth converted to second growth 3/	2,652,778	2,484,752	1,137,977	758,184	804,295	0	0
Forest converted to non-forest use 4/	(1,467,975)	(1,502,178)	(1,609,234)	(1,503,625)	(1,568,036)	(1,568,902)	(1,469,322)
Other volume changes (+/-)	(50,129,142)	(4,519,703)	(2,919,896)	(2,535,013)	(4,527,977)	(3,458,021)	(2,866,890)
Net stand growth 5/	10,061,705	8,324,149	7,280,608	6,796,301	7,068,381	6,992,879	6,479,296
Other changes (s.d.)	(60,190,848)	(12,843,851)	(10,200,504)	(9,331,314)	(11,596,359)	(10,450,900)	(9,346,186)
Net Change in Stock	(49,412,477)	(3,975,614)	(3,591,972)	(3,414,251)	(5,433,653)	(5,026,924)	(4,336,212)
Revaluation	1,757,934	4,859,740	(22,781,835)	(8,826,158)	10,390,673	3,497,686	(8,141,862)
CLOSING STOCK	208,579,967	209,464,093	183,090,286	170,849,876	175,806,896	174,277,658	161,799,584

Note: Values are derived by multiplying the volume by the corresponding stumpage values

APPENDIX TABLE 9. COMPUTATIONS OF STUMPAGE VALUES FOR DIPTEROCARP FORESTS, 1985-1994

YEAR	LOG PRICE/SPECIES (PESOS/'000 BOARD FT.)			WEIGHTED LOG PRICE						
				WEIGHTS			P per 000 bd.ft.	P per cu.m.	Index base year 1985	1+ annual growth
	1	2	3	1	2	3				
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	
1985	3480.00	1818.00	1728.13	0.24	0.39	0.37	2183.6263	925.8575	100.00	
1986	2727.27	1842.12	1811.63	0.24	0.39	0.37	2043.2747	866.3485	93.57	0.935725
1987	2912.81	2430.88	2197.88	0.26	0.37	0.37	2469.9705	1047.2675	113.11	1.208829
1988	2860.00	2962.25	2338.75	0.22	0.41	0.37	2709.0589	1148.6410	124.06	1.096798
1989	2884.84	3894.33	1646.89	0.22	0.53	0.25	3110.3834	1318.8026	142.44	1.148142
1990	2901.93	3945.57	1741.40	0.22	0.53	0.25	3164.9267	1341.9289	144.94	1.017536
1991	3248.00	4456.71	1991.06	0.22	0.53	0.25	3574.3807	1515.5374	163.69	1.129372
1992	4117.40	5099.30	2090.29	0.22	0.53	0.25	4131.0291	1751.5563	189.18	1.155733
1993	4091.13	5793.50	2116.55	0.22	0.55	0.25	4533.7869	1922.3256	207.63	1.097496
1994	4758.49	5856.50	2246.59	0.22	0.53	0.25	4712.4603	1998.0832	215.81	1.039409

YEAR	IPIN forestry base year 1985 (k)	1+ annual growth (l)	CPI		Computed Stumpage Value(P/cu.m.) Old Growth		Computed Stumpage Value(P/cu.m.) Second Growth	
			base year 1988 (m)	base year 1985 (n)	Current (o)	Constant85 (p)	Current (q)	Constant85 (r)
			1985	100.0		89.5	100.0000	789.2974
1986	91.1	0.9114	89.1	99.5531	738.5657	741.8814	369.2828	370.9407
1987	107.4	1.1787	91.8	102.5698	892.7999	870.4313	446.3999	435.2156
1988	115.9	1.0789	100.0	111.7318	979.2212	876.4030	489.6106	438.2015
1989	120.2	1.0368	112.2	125.3631	1124.2847	896.8224	562.1423	448.4112
1990	121.7	1.0125	128.1	143.1285	1144.0000	799.2818	572.0000	399.6409
1991	138.2	1.1360	152.0	169.8324	1292.0020	760.7512	646.0010	380.3756
1992	161.6	1.1688	165.6	185.0279	1493.2091	807.0182	746.6045	403.5091
1993	159.3	0.9859	178.2	199.1061	1638.7906	823.0739	819.3953	411.5369
1994	160.6	1.0080	194.3	217.0950	1703.3742	784.6217	851.6871	392.3108

- a Log price(pesos/000 board ft) of group 1: narra, yakal, guijo (Data taken from NSO)
- b Log price(pesos/000 board ft) of group 2: apitong, tanguil, palosapis, red lauan (Data taken from NSO)
- c Log price(pesos/000 board ft) of group 3: white lauan, almon (Data taken from NSO)
- d-f Weights for a-c used in getting weighted average price. Weights were derived from volume of production by specie
- g Weighted log price derived by multiplying price per specie by weights
- h Conversion factor: 1 cubic meter = 424 board feet
- i Price index (base year 1985) of log price derived by dividing the current price by the 1985 price (x100)
- j Current year's price divided by previous year's price
- k Implicit Price Index of forestry (1985=100) from the National Accounts data of NSCB
- l Current year's IPIN divided by previous year's IPIN
- m CPI for all items, Philippines (1988=100) taken from NSO
- n Derived by dividing the current CPI by the 1985 CPI (x100)
- o Base information for stumpage value is P1144/cu.m. for 1990 (Bote,1991 adjusted for margin for profit and risk)
For years other than 1990, stumpage values are derived by using the corresponding growth rates of weighted log price
- p The constant stumpage values are derived by dividing current values by IPIN/100(Base 1985)
- q The stumpage value for second growth is assumed to be 50% of the stumpage value for the old growth
- r The constant stumpage values are derived by dividing current values by IPIN/100(Base 1985)

APPENDIX TABLE 10. AREA ACCOUNT OF PINE FORESTS, 1988-1994, IN THOUSAND HECTARES

	1988	1989	1990	1991	1992	1993	1994
OPENING AREA 1/	238.89	238.88	237.60	236.40	235.20	233.90	232.70
Closed	162.45	162.44	161.57	160.75	159.94	159.05	158.24
Open	76.44	76.44	76.03	75.65	75.26	74.85	74.46
Depletion (-)	0.90	0.16	0.00	0.00	0.00	0.00	0.00
Harvest 2/	0.90	0.16	0.00	0.00	0.00	0.00	0.00
Other Accumulation (+/-)	(1.20)	0.00	0.00	0.00	0.00	0.00	0.00
Forest Conversion	(1.20)	0.00	0.00	0.00	0.00	0.00	0.00
Other Volume Changes (+/-)	2.09	(1.13)	(1.20)	(1.20)	(1.30)	(1.20)	(1.20)
Additions	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Reductions	(0.64)	(0.64)	(0.64)	(0.64)	(0.64)	(0.64)	(0.64)
Stand Mortality	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forest Fires 3/	(0.64)	(0.64)	(0.64)	(0.64)	(0.64)	(0.64)	(0.64)
Other Changes (S.D.)	2.73	(0.49)	(0.56)	(0.56)	(0.66)	(0.56)	(0.56)
Net Change in Area	(0.01)	(1.28)	(1.20)	(1.20)	(1.30)	(1.20)	(1.20)
CLOSING AREA 1/	238.88	237.60	236.40	235.20	233.90	232.70	231.50

Note:

- 1/ Based on PFS data
- 2/ Harvest: zero harvest from 1990 - 1994 due to log ban
- 3/ Forest Fires: 640 has./year

APPENDIX TABLE 11. VOLUME ACCOUNT OF PINE FORESTS, 1988-1994, IN THOUSAND CUBIC METERS

	1988	1989	1990	1991	1992	1993	1994
OPENING STOCK 1/	25,098	24,977	24,888	24,759	24,626	24,500	24,377
Closed	17,067	16,984	16,924	16,836	16,746	16,660	16,576
Open	8,031	7,993	7,964	7,923	7,880	7,840	7,801
Depletion (-)	28	23	0	0	0	0	0
Harvest 2/	28	23	0	0	0	0	0
Other Accumulation (+/-)	(123)	(118)	0	0	0	0	0
Forest Conversion	(123)	(118)	0	0	0	0	0
Other Volume Changes (+/-)	(26)	6	(129)	(133)	(126)	(123)	(125)
Additions 3/	717	711	706	700	695	689	684
Reductions	(618)	(617)	(609)	(605)	(600)	(596)	(591)
Stand Mortality 4/	(573)	(572)	(564)	(560)	(555)	(551)	(546)
Closed	(390)	(389)	(384)	(381)	(377)	(375)	(371)
Open	(183)	(183)	(180)	(179)	(178)	(176)	(175)
Forest Fires	(45)	(45)	(45)	(45)	(45)	(45)	(45)
Other Changes (S.D.)	(125)	(88)	(226)	(228)	(221)	(216)	(218)
Net Change in Stock	(121)	(89)	(129)	(133)	(126)	(123)	(125)
CLOSING STOCK 1/	24,977	24,888	24,759	24,626	24,500	24,377	24,252

Note:

- 1/ Based on PFS data
- 2/ Harvest: zero harvest from 1990 - 1994 due to log ban
- 3/ Addition: 3.40 cu.m./ha/year (based on RP-German Inventory Project)
- 4/ Stand Mortality: 1.75 cu.m./ha. for open forests
2.95 cu.m./ha. for closed forests

**APPENDIX TABLE 12. ECONOMIC ACCOUNTS OF PINE FORESTS AT CURRENT PRICE, 1988-1994
IN THOUSAND PESOS**

	1988	1989	1990	1991	1992	1993	1994
OPENING STOCK 1/	43,394,442	46,582,105	48,133,392	48,478,122	54,768,224	63,700,000	62,478,251
Closed	31,829,284	32,847,752	33,136,879	37,443,531	43,538,768	42,699,580	42,833,314
Open	14,978,486	15,457,766	15,593,825	17,620,485	20,488,832	20,093,920	20,156,854
Depletion (-)	52,220	44,482	0	0	0	0	0
Harvest	52,220	44,482	0	0	0	0	0
Other Accumulation (+/-)	(229,395)	(228,212)	0	0	0	0	0
Forest Conversion	(229,395)	(228,212)	0	0	0	0	0
Other Volume Changes (+/-)	55,950	100,568	(252,582)	(295,792)	(327,600)	(315,249)	(323,000)
Additions	1,337,205	1,375,074	1,382,348	1,556,800	1,807,000	1,765,907	1,767,456
Reductions	(1,152,570)	(1,193,278)	(1,192,422)	(1,345,520)	(1,560,000)	(1,527,548)	(1,527,144)
Stand Mortality	(1,068,645)	(1,106,248)	(1,104,312)	(1,245,440)	(1,443,000)	(1,412,213)	(1,410,864)
Closed	(726,679)	(752,249)	(750,932)	(846,899)	(981,240)	(960,305)	(959,388)
Open	(341,966)	(353,999)	(353,380)	(398,541)	(461,760)	(451,908)	(451,476)
Forest Fires 3/	(83,925)	(87,030)	(88,110)	(100,080)	(117,000)	(115,335)	(116,280)
Other Changes (S.D.)	(128,685)	(81,228)	(442,508)	(507,072)	(574,600)	(553,608)	(563,312)
Net Change in Stock	(225,665)	(172,126)	(252,582)	(295,792)	(327,600)	(315,249)	(323,000)
Revaluation	3,413,328	1,723,413	597,312	6,585,894	9,259,376	(906,500)	511,917
CLOSING STOCK 1/	46,582,105	48,133,392	48,478,122	54,768,224	63,700,000	62,478,251	62,667,168

Note:

1/ based on PFS volume accounts multiplied by stumpage value

2/ Harvest: zero harvest from 1990 - 1994 due to log ban

3/ Forest Fires: 640 has./year

**APPENDIX TABLE 13. ECONOMIC ACCOUNTS OF PINE FORESTS AT CONSTANT PRICE, 1988-1994
IN THOUSAND PESOS**

	1988	1989	1990	1991	1992	1993	1994
OPENING STOCK 1/	42,307,148	41,680,480	38,396,133	33,869,994	32,248,851	34,426,850	31,378,761
Closed	28,480,032	26,202,738	23,151,596	22,047,654	23,530,653	21,445,221	19,730,671
Open	13,402,368	12,330,700	10,894,868	10,375,367	11,073,249	10,091,869	9,285,022
Depletion (-)	46,725	35,483	0	0	0	0	0
Harvest	46,725	35,483	0	0	0	0	0
Other Accumulation (+/-)	(205,257)	(182,045)	0	0	0	0	0
Forest Conversion	(205,257)	(182,045)	0	0	0	0	0
Other Volume Changes (+/-)	50,063	80,223	(176,470)	(174,169)	(177,052)	(158,329)	(148,786)
Additions	1,196,497	1,096,900	965,799	916,681	976,598	886,900	814,158
Reductions	(1,031,290)	(951,881)	(833,104)	(792,275)	(843,107)	(767,188)	(703,461)
Stand Mortality	(956,196)	(882,457)	(771,545)	(733,345)	(779,874)	(709,263)	(649,898)
Forest Fires	(75,094)	(69,424)	(61,559)	(58,930)	(63,233)	(57,925)	(53,563)
Other Changes (S.D.)	(115,144)	(64,796)	(309,165)	(298,576)	(310,544)	(278,041)	(259,483)
Net Change in Stock	(201,919)	(137,305)	(176,470)	(174,169)	(177,052)	(158,329)	(148,786)
Revaluation	(424,749)	(3,147,042)	(4,349,669)	(1,446,973)	2,355,051	(2,889,760)	(2,363,068)
CLOSING STOCK 1/	41,680,480	38,396,133	33,869,994	32,248,851	34,426,850	31,378,761	28,866,907

Note:

1/ Based on PFS volume accounts multiplied by stumpage value at 1985 prices

APPENDIX TABLE 14. STUMPAGE VALUES FOR PINE FORESTS, 1988-1992, IN PESO PER CUBIC METER

	1987	1988	1989	1990	1991	1992
Stumpage value at current price	1,729	1,865	1,934	1,958	2,224	2,600
CPI	102.57	111.8	125.4	143.1	169.8	185.0
Stumpage value at constant price	1,686	1,669	1,543	1,368	1,310	1,405

APPENDIX TABLE 15. VOLUME ACCOUNTS OF RATTAN, 1988-1994, IN THOUSAND LINEAL METERS

	1988	1989	1990	1991	1992	1993	1994
OPENING STOCK 1/	4,343,670	4,112,320	3,894,400	3,820,970	3,627,140	3,511,170	3,370,720
Depletion (-)	355,860	343,080	199,180	317,380	235,660	255,690	245,730
Harvest 2/	205,070	197,710	113,810	181,360	134,670	146,110	112,450
Waste 3/	150,790	145,370	85,370	136,020	100,990	109,580	133,280
Other Accumulation (+/-)	(69,630)	(65,450)	(61,270)	(59,870)	(59,190)	(57,790)	(57,100)
Forest conversion 4/	(69,630)	(65,450)	(61,270)	(59,870)	(59,190)	(57,790)	(57,100)
Other Volume Changes (+/-)	194,140	190,610	187,020	183,420	178,880	173,030	168,530
Addition due to growth (+) 5/	312,957	307,272	301,480	295,670	287,920	278,930	271,680
Reduction due to stand mortality (-) 6/	118,817	116,662	114,460	112,250	109,040	105,900	103,150
NET CHANGE IN STOCK 7/	(231,350)	(217,920)	(73,430)	(193,830)	(115,970)	(140,450)	(134,300)
CLOSING STOCK 8/	4,112,320	3,894,400	3,820,970	3,627,140	3,511,170	3,370,720	3,236,420

Note:

- 1/ closing stock of the previous year based on the RP-German FRIP (1988)
- 2/ split rattan harvest + unsplit rattan harvest * % of understatement * % of inventory per diameters
split & unsplit rattan harvest is based on PFS
% of inventory for large diameter rattan = 42% based on PFS
% of inventory for small diameter rattan = 58% based on PFS
% of understatement = 488% based on Silviconsult-ADB report
- 3/ % of waste * merchantable lengths felled
% of waste = 50% based on Virtucio & Sy (1987) Industry Representative
merchantable length = 150% of harvest
- 4/ forest area converted * rattan stock density in residual forest
forest conversion projection is based on MPFD
rattan stock density in residual forest is based on FRIP
- 5/ rattan stock density in residual forest * residual forest area * growth rate
residual forest area is based on PFS
growth rate is based on assumption of PCARRD (1988) which is 0.70 meter per year
- 6/ residual forest area * rattan stock density in residual forest * % of stand mortality
% of stand mortality = 5% of stand in residual forest based on Nur Supardi Md. Noor & Wan Razali Mohd. (1987)
- 7/ depletion +/- other accumulation +/- other volume changes
- 8/ opening stock - net change in stock

**APPENDIX TABLE 16. ECONOMIC ACCOUNTS OF RATTAN AT CURRENT PRICES, 1988-1994
IN THOUSAND PESOS**

	1988	1989	1990	1991	1992	1993	1994
OPENING STOCK	3,268,620	3,290,324	3,188,243	3,129,408	3,329,342	3,712,994	3,456,140
Depletion (-)	303,990	304,302	178,148	314,514	279,199	299,577	270,905
Harvest	175,180	175,365	101,793	179,722	159,548	171,187	132,761
Waste	128,810	128,937	76,356	134,792	119,651	128,390	138,144
Other Accumulation (+/-)	(54,536)	(53,197)	(50,421)	(55,966)	(64,675)	(62,250)	(61,997)
Forest conversion	(54,536)	(53,197)	(50,421)	(55,966)	(64,675)	(62,250)	(61,997)
Other Volume Changes (+/-)	128,542	130,800	129,941	144,777	165,611	157,372	154,501
Addition due to growth (+)	221,603	225,620	224,134	249,710	284,749	271,446	266,503
Reduction due to stand mortality (-)	93,061	94,820	94,194	104,934	119,138	114,074	112,002
NET CHANGE IN STOCK	(229,984)	(226,699)	(98,629)	(225,704)	(178,264)	(204,455)	(178,402)
Revaluation	251,688	124,618	39,793	425,639	561,915	(52,399)	27,557
CLOSING STOCK	3,290,324	3,188,243	3,129,408	3,329,342	3,712,994	3,456,140	3,305,295

Note: values = volume x stumpage value at current prices

**APPENDIX TABLE 17. ECONOMIC ACCOUNTS OF RATTAN AT CONSTANT PRICES, 1988-1994
IN THOUSAND PESOS**

	1988	1989	1990	1991	1992	1993	1994
OPENING STOCK	3,186,721	2,944,888	2,543,270	2,186,562	1,960,397	2,006,807	1,735,881
Depletion (-)	272,076	242,743	124,475	185,194	150,902	150,466	124,789
Harvest	156,789	139,889	71,124	105,825	86,233	85,980	61,155
Waste	115,287	102,854	53,351	79,369	64,669	64,485	63,635
Other Accumulation (+/-)	(48,811)	(42,435)	(35,230)	(32,954)	(34,956)	(31,266)	(28,558)
Forest conversion	(48,811)	(42,435)	(35,230)	(32,954)	(34,956)	(31,266)	(28,558)
Other Volume Changes (+/-)	115,047	104,339	90,791	85,248	89,510	79,042	71,169
Addition due to growth (+)	198,338	179,978	156,606	147,035	153,902	136,337	122,761
Reduction due to stand mortality (-)	83,291	75,638	65,814	61,787	64,392	57,295	51,593
NET CHANGE IN STOCK	(205,839)	(180,838)	(68,913)	(132,900)	(96,348)	(102,690)	(82,179)
Revaluation	(35,993)	(220,780)	(287,794)	(93,265)	142,758	(168,236)	(131,157)
CLOSING STOCK	2,944,888	2,543,270	2,186,562	1,960,397	2,006,807	1,735,881	1,522,546

Note: values = volume x stumpage value at constant prices

APPENDIX TABLE 18. COMPUTATION FOR THE STUMPAGE VALUES FOR RATTAN, 1987-1994

Year	Stumpage Values				Implicit Price Index (IPIN) of Forestry GVA (In % 1988=100)	Consumer Price Index (CPI) (In % 1985=100)
	At Current Price		At Constant Price			
	<2cm	> 2cm	<2cm	> 2cm		
1987	0.53	1.15	0.51672	1.12119	107.43	102.57
1988	0.57	1.24	0.51016	1.10982	115.91	111.73
1989	0.59	1.29	0.47064	1.02904	120.18	125.36
1990	0.59736	1.30610	0.41739	0.91259	121.68	143.12
1991	0.67861	1.48375	0.39958	0.87367	138.23	169.83
1992	0.79315	1.73417	0.42868	0.93729	161.56	185.02
1993	0.78195	1.70970	0.39274	0.85871	159.28	199.10
1994	0.78819	1.72333	0.36307	0.79383	160.55	217.09

Note: Stumpage values at current price for 1987 to 1989 are lifted from ENRAP Study

**APPENDIX TABLE 19. SUMMARY: ECONOMIC ACCOUNTS OF FOREST RESOURCES AT CURRENT PRICES,
1988-1994, IN THOUSAND PESOS**

	1988	1989	1990	1991	1992	1993	1994
OPENING STOCK	594,052,514	520,976,245	569,263,284	556,665,798	605,095,671	689,542,879	738,710,385
Changes due to economic activity	(24,529,229)	(14,851,981)	(10,404,307)	(11,766,271)	(541,817)	(299,577)	(270,905)
Reforestation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Afforestation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Depletion (-)	24,529,229	14,851,981	10,404,307	11,766,271	541,817	299,577	270,905
Harvest/logging	23,877,361	14,173,344	10,040,522	11,404,248	159,548	171,187	132,761
Waste	128,810	128,937	76,356	134,792	119,651	128,390	138,144
Damage from logging	523,058	549,699	287,430	227,231	262,618	0	0
Other Accumulation (+/-)	(2,363,002)	(1,840,322)	(3,507,767)	(4,432,764)	(1,477,811)	(3,186,031)	(3,251,821)
Old growth converted to second growth	2,963,997	3,114,963	1,628,770	1,287,641	1,488,170	0	0
Forest converted to non-forest use	(5,326,999)	(4,955,285)	(5,136,537)	(5,720,405)	(2,965,980)	(3,186,031)	(3,251,821)
Other volume changes (+/-)	(102,835,307)	(6,658,794)	(8,405,080)	(7,723,201)	(8,540,012)	(7,043,010)	(6,392,373)
Natural stand growth	12,800,937	12,036,107	12,027,107	13,348,832	15,170,229	15,960,604	16,100,185
Stand mortality	(1,161,706)	(1,201,068)	(1,198,506)	(1,350,374)	(1,562,138)	(1,526,287)	(1,522,866)
Forest fires	(83,925)	(87,030)	(88,110)	(100,080)	(117,000)	(115,335)	(116,280)
Other changes (s.d.)	(114,390,613)	(17,406,803)	(19,145,571)	(19,621,579)	(22,031,103)	(21,361,992)	(20,853,412)
NET CHANGE IN STOCK	(129,727,538)	(23,351,097)	(22,317,155)	(23,922,236)	(10,559,640)	(10,528,618)	(9,915,099)
Revaluation	56,651,269	71,638,136	9,719,668	72,352,108	95,006,849	59,696,123	27,053,110
CLOSING STOCK	520,976,245	569,263,284	556,665,798	605,095,671	689,542,879	738,710,385	755,848,395

**APPENDIX TABLE 20. SUMMARY: ECONOMIC ACCOUNTS OF FOREST RESOURCES AT CONSTANT PRICES,
1988-1994, IN THOUSAND PESOS**

	1988	1989	1990	1991	1992	1993	1994
OPENING STOCK	579,168,771	466,263,284	454,092,501	388,927,087	356,290,369	372,669,313	371,012,799
Changes due to economic activity	(21,953,653)	(11,847,175)	(7,269,215)	(6,928,169)	(292,836)	(150,466)	(124,789)
Reforestation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Afforestation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Depletion (-)	21,953,653	11,847,175	7,269,215	6,928,169	292,836	150,466	124,789
Harvest/logging	21,370,229	11,305,836	7,015,045	6,715,003	86,233	85,980	61,155
Waste	115,287	102,854	53,351	79,369	64,669	64,485	63,635
Damage from logging	468,137	438,486	200,820	133,797	141,934	0	0
Other Accumulation (+/-)	(2,114,835)	(1,467,999)	(2,450,784)	(2,610,082)	(798,698)	(1,600,168)	(1,497,880)
Old growth converted to second growth	2,652,778	2,484,752	1,137,977	758,184	804,295	0	0
Forest converted to non-forest use	(4,767,613)	(3,952,751)	(3,588,762)	(3,368,265)	(1,602,992)	(1,600,168)	(1,497,880)
Other volume changes (+/-)	(92,037,611)	(5,311,600)	(5,872,395)	(4,547,544)	(4,615,520)	(3,537,309)	(2,944,507)
Natural stand growth	11,456,540	9,601,026	8,403,013	7,860,018	8,198,881	8,016,116	7,416,216
Stand mortality	(1,039,487)	(958,095)	(837,359)	(795,133)	(844,266)	(766,557)	(701,491)
Forest fires	(75,094)	(69,424)	(61,559)	(58,930)	(63,233)	(57,925)	(53,563)
Other changes (s.d.)	(102,379,570)	(13,885,107)	(13,376,489)	(11,553,500)	(11,906,903)	(10,728,941)	(9,605,669)
NET CHANGE IN STOCK	(116,106,099)	(18,626,774)	(15,592,394)	(14,085,794)	(5,707,054)	(5,287,942)	(4,567,177)
Revaluation	3,200,612	6,455,990	(49,573,021)	(18,550,923)	22,085,998	3,631,428	(18,280,071)
CLOSING STOCK	466,263,284	454,092,501	388,927,087	356,290,369	372,669,313	371,012,799	348,165,551

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