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フィリピン公有林の木材生産構造(生物生産学科)

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Timber production structure of the Philippine public forest¹

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Key words : Forest resources, Forest Management Bureau, timber production, log export ban, forest degradation

Summary

This study defines the characteristics of timber production structure in the Philippine public forest (state forest) that deals with forest resources and timber production processes. In addition, the impact and implication of timber production on socioeconomic development is discussed.

The public forests has been managed in association with timber production, especially dipterocarp forest which are growing abundantly in Luzon and Mindanao regions. Timber license agreements (TLA) are issued for the harvesting of timber using the selective logging system. Geographically, Mindanao region has the most number of TLA holders and has also much higher log production followed by Luzon. Visayas region is a minor factor in timber production.

TLA holders are the main promoters of timber production and plays a vital role in industrial and economic development. They had provided employment and export earnings. However, the present practices of producing timber causes the reduction of forest areas annually at a fast rate. This prompted the government to impose a total log export ban. The export restriction caused the decrease in the number of TLA and in log production, as well as in the number of employees in the logging sector. The solution to these problems shall be dealt with seriously by all foresters, concerned citizens, the government and the industry. A dynamic and progressive approach to the problem shall always be sought, and tested in such a manner that the country's forest resources will be managed on a sustained-yield and multiple-use basis.

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I. Introduction

The growing demand for goods and services in the context of a declining resource makes forest management extremely complex. This is also true in the Philippines where land use conflicts are very severe. On the one hand there is an urgent need to utilize forest resources to promote economic development. An understanding on how existing forest management, specifically timber production system, in the Philippines to fulfill their different objectives could provide valuable information and indication on the future existence of the country's forest.

Recognizing this importance, the study opens therefore with a brief account of the prevailing characteristics of timber production structure in the Philippine Public forest and certain salient features of the evolution of the system which is now receiving constant criticism from every sector of society. In this study the current status of the public forest resources is defined. This include land area classification; vegetative cover, types and characteristics; and growing stock. Likewise, forest ownership as well as timber harvesting that describe timber production processes are discussed. And finally, an objective analysis on the impact and implication of timber production on socioeconomic development is conducted according to certain categories which include, among others, economic contribution, production vs. log export ban, and production vs. forest denudation.

II. Forest resources

A) Land Area Classification

The areas of the different land categories are given in table 1. This table pertains to the classification of the public domain into two broad categories, i. e. Forest land and Alienable & Disposable Land (A & D). The

Table 1. Land area classification as of December 1990

Category	Area, in ha.	Percent
A. Forest Land	15,882,271	52.94
1. Classified Forest	15,001,114	50.00
a. Established forest reserves	3,272,912	10.91
b. Established timber land	10,015,381	33.39
c. National Parks, GRBS/WA *	1,340,997	4.47
d. Military and Naval reserves	130,330	0.43
e. Civil reservations	165,946	0.55
f. Fish Ponds	75,548	0.25
2. Unclassified Forest	881,157	2.94
B. Alienable and disposable lands	14,117,729	47.06
Total	30,000,000	100

* Game Refugee and Bird Sanctuary/Wilderness areas
Source : Philippine Forestry Statistics, 1990.

former category is for forestry purposes, while the latter is for agriculture and other non-forestry uses. The criterion for determining A & D is primarily based on the slope gradient of zero to eighteen percent (0-18%), except those areas within 40 meters from the shoreline measured during high tide and 20 meters from both sides of rivers or streams having a width of 5 meters or more. As of December 1990, forest lands comprised about 15.9 million ha or 53% of the total land area of the country. Of these forest lands, about 15 million ha or 94% have been classified into various categories while 0.881 million ha or 6% remained unclassified. Roughly 14.1 million ha or 47% have been certified as A & D.

B) Vegetative cover, Types and Characteristics

Data on vegetative cover are projections based on the results of the Second National Forest Resources Inventory conducted in 1979-1988⁴⁾. It is estimated in table 2 that as of 1990 there were only about 6.16

million ha of forest left, which is about 21% of the country's total land area. Of these forest, dipterocarp forests comprised 67%, in which 0.86 million ha or 21% were old growth or virgin forest while residual or second growth forests cover 3.29 million ha or 79%. Pine forest were estimated to be 0.24 million ha or 4% of the total forest area. The remaining 29% comprises of mangrove, mossy, and sub-marginal forests.

Table 2. Land use status and vegetative cover by major geographical region, as of December 1990

Land use/ vegetative cover type	Land area, in million hectares			
	Total	Luzon	Visayas**	Mindanao
Forest	6.16	3.37	0.46	2.33
Dipterocarp	4.15	2.01	0.39	1.75
Old-growth	0.86	0.60	0.03	0.23
Residual*	3.29	1.41	0.36	1.52
Pine	0.24	0.24	none	none
Submarginal	0.53	0.51	0.016	0.004
Mossy	1.11	0.57	0.05	0.49
Mangrove	0.13	0.04	0.004	0.086
Brushland	2.46	1.39	0.22	0.85
Other land use	21.38	9.38	4.98	7.02
total	30.00	14.14	5.66	10.20

* Residual or second growth forest

** Visayas is the term given to a group of islands in the central part of the Philippines consisting, for instance, of Cebu, Samar, Masbate, Panay, Negros and Bohol islands.

Source: Philippine Forestry Statistics, 1990.

Geographically, Luzon and Mindanao accounted for the bulk of productive forest lands in the country with about 3.37 million ha or 55% and 2.33 million hectares or 38%, respectively. These forest are described into different types and are recognized according to the prevailing tree composition and characteristics, i. e.;

1) Dipterocarp or lauan type, which is about 4.15 million ha, thrive best in wet valley bottoms and hilly or mountainous regions up to 1,000 meters above sea level. The formation is dominated by dipterocarp species that supply most of the timber produced. The group known as lauan or Philippine Mahogany in the timber trade is composed mainly of Shorea, Parashorea, Pentacme, and Dipterocarpus. These species have woods which are very similar in most respects, and have such similar ecological requirements that they are found growing together and are well distributed in the islands of Luzon and Mindanao.

2) Pine forests, consisting of about 0.24 million ha, occupy the highland regions of Northern Luzon and Mindoro island. There are two species found in the Philippines forming pure stands : Benguet Pine (*Pinus insularis*) and Mindoro Pine (*P. merkusii*). The altitudinal range of Benguet Pine extend from about 700 to 1,800 meters while the Mindoro Pine occupy an area mainly between 100 and 500 meters elevation.

3) Mossy forests, which is about 1.1 million ha, consist of dwarfish tree vegetation covered with clinging mosses, ferns, pitcher plants and orchids, and is found in high and very rough mountainous regions in the country. The ecology of this forest type is characterized by a relatively low temperature, high and uniform humidity in the form of rain and fog throughout the year, short duration of sunshine and strong winds. These forest are more valuable for protective or watershed functions rather than for their commercial value. Some

timber species such as Philippine Oak (*Lithocarpus* sp.) are associated with these forests but are not exploited commercially.

4) Molave* forest, which occur in regions with very distinct wet and dry season, are typical for the limestone soils in the coastal areas that are shallow and excessively drained. Most of the trees in this type produces woods that are highly valuable for their natural beauty and durability. This forests include several species of *Pterocarpus*, *Azalia*, Molave (*Vitex parviflora*) and Dao (*Dracontomelon dao*). * In table 2, Molave type forest is incorporated in the Dipterocarp forest.

5) Mangroves, consisting of about 0.13 million ha, occur in tidal flats bordering coastal areas along mouths of rivers where water is brackish. Most of the trees in this type are members of the Rhizophoraceae family. This forests used to be the source of tan bark for the tannin extract industry but now the wood is used more for fuel and charcoal making. Mindanao region has the largest area of Mangrove forests.

C) Growing Stock

The dipterocarp forest comprises the majority of the country's timber resources, accounting for 671 million cubic meters or 96% of the total volume of timber in the public forest estimated at 695 million cubic meters. The pine forest accounts for 25 million cubic meters or 4%. Table 3 shows the estimated growing stock by major geographical groupings. Luzon and Mindanao comprise the biggest volume of timber which is 402 million cubic meters or 58% and 234 million cubic meters or 34%, respectively, of the total volume.

Table 3. Total growing stock by major geographical region as of December 1990, in 1,000 cubic meter

Geographical region	Total	Forest type			
		Dipterocarp			pine
		Old-growth	Residual	Total	
Luzon	401,921	149,7542	227,408	377,162	24,759
Visayas	59,556	8,985	50,571	59,556	none
Mindanao	33,835	53,677	180,158	233,835	none
Total	695,312	212,416	458,137	670,553	24,759

Source : Philippine Forestry Statistics, 1990.

III. Timber production process

A) Forest Ownership

Forest in the Philippines are owned by the state. The government agency entrusted to manage these resources is the Forest Management Bureau or FMB (formerly Bureau of Forest Development) which is under the Department of Environment and Natural Resources or DENR (formerly Ministry of Natural Resources).

Most of the timber land has been licensed to concessionaires for exploitation and development. There are at present several types of licenses and/or permits issued by this agency. For the cutting and gathering of timber, the most commonly issued license is the timber license agreement (TLA). It is a long term license executed by and between the Secretary of the DENR on behalf of the government and the grantee for the harvesting, and removal from the public forest of timber, and in appropriate cases also of other forest products. It is subject to

review at least once every five years to ascertain compliance with the terms and adjust such terms to major policy changes. Other forms of license agreements are those issued by the government for short term duration including pulpwood license, provisional timber license, private land timber license, softwood timber license, special timber license, civil reservation license and others. Definitions of such forms of licenses are found in any Philippine Forestry Statistics handbook^{3, 4, 1, 11, 12}.

DENR⁴) reported that in 1990, Mindanao had a total of 42 TLA holders which is about 56%, followed by Luzon which has 32 or 43% and the least number in Visayas region, which has only one TLA holder.

B) Timber Harvesting

Since timber harvesting is entrusted entirely to private enterprisers through a system of licenses, these license holders are the ones harvesting timber. The FMB is, however, ultimately responsible for ensuring that the public forest is properly managed under the concepts of sustained yield and has the responsibility of prescribing the management system to be adopted for ensuring the optimum sustained harvest of raw materials. It has the responsibility to provide guidance in the preparation of harvesting plans to be drawn up by the licensee holders and approved by the FMB.

The main logging systems in operation are the modified selection system in the dipterocarp forest, and the seed tree method in the pine stand. The selection system is defined as the systematic removal of the mature, overmature and defective trees in such a manner as to leave uninjured and adequate number and volume of the desired species to ensure a future crop of timber and forest cover for the protection and conservation of soil and water⁷). This system is widely known as the selective logging system developed under Forestry Administrative Order no. 23 in 1954.

Although logging in the Philippines started in the most primitive way, it was the Americans who eventually introduced advanced technologies and machineries. The logging systems commonly used in the country include truck logging, tractor logging and high-lead or cable yarding.

IV. Timber production and socioeconomic development - impact and implication

A) The Economic Contribution

The Philippine forest play a vital role in industrial and economic development. It is one of the major sources of foreign exchange earnings and revenues needed to sustain the various projects and programs of the government for the economic improvement of the local population. They have provided employment to thousands of skilled and unskilled workers in the rural areas.

According to the DENR⁴), in 1990 for instance, some 60,559 people were employed by various timber licensees and forest based industries. Mindanao region provides more employment with about 34,108 workers or 56% of the total work force in the forestry sector. In addition, there are thousands of other skilled and unskilled workers in related forest based minor industries such as rattan industry, furniture and fixture manufacture, and builders woodwork.

The forestry sector contributed around US\$ 164.4 million annually to the national economy in the form of log exports for the period 1960-1989. In 1990, however, log exports earnings are reduced in part due to changes in production policies^{3, 4}).

In addition to this export earnings, there are government-imposed taxes on forest products cut or gathered from the forest that represents the share of the state as the owner. The charges of forest products are to be paid to the revenue officer in the municipality where the concession is located before the logs are removed or transported

from the cutting area. In table 4 for instance, from 1974-1989 an annual average of about P76.9 million (P=Phil Peso) or equivalent to USD 3.08 million forest charges were collected. In 1990 forest charges from logs cut during the year amounted to about P 75 million (or USD 3.5 million) which is 98% of the total forest charges collected by the government.

B) Production vs. Log Export Ban

The forestry sector's policy is to conserve forest resources to support national goals and objectives for the improvement of the well-being of the people and the enhancement of ecological values. This is quite a broad statement of policy that covers a wide range of values. Today, however, the Philippines still face a possible exhaustion of forest resources. This situation prompted the government to put a brake on forest exploitation with the implementation of the log export ban. The main thrusts of the ban are designed to : (1) curb the alarming destruction and denudation of the forests by destructive logging ; (2) to pursue the program of the government to rationalize the development of the wood industry to generate value added products ; (3) draw in capital investment from foreign investors for wood processing ventures ; (4) accelerate the reforestation program in anticipation of the needs of the local processing industry; and (5) encourage the establishment of industrial tree plantation.

The log export ban had its early beginning with the promulgation of Forestry Administrative Order No. 5 dated October 29, 1973, effecting a three year schedule allowing a sixty, thirty and zero percent export for the years 1974, 1975 and 1976, respectively. However, realizing the so called "unnecessary economic dislocation" the policy was ammended through Presidential Decree No.865 issued in January 19, 1976. Under the amendatory decree, beginning CY -1976 limited and selective exportation of logs shall be allowed, not to exceed 25% of the total national allowable cut. In 1986 however, the full implementation of the total log export ban was imposed.

As given in table 5, the imposition of the ban resulted in a considerable decrease on log exports from about 5.4 million cubic meters of the total 10.2 million cubic meter log production in 1974 to only 0.51 million cubic meters of the total 2.5 million cubic meters log production in 1990. The logging boom period of the 1970's clearly indicated the massive exportation of logs averaging almost over 50%. The 1990 export figures given in table 5 represents only pulpwood produced from plantation which are exempted from the ban. In addition, the consequences of the export ban also include a sharp decline in the number of employees in the logging sector¹²⁾.

There are so many issues relative to the export ban that are left unanswered. According to Mendoza⁸⁾, the proponents of banning log exports strongly believed that the social and economic well-being of the Filipinos could

Table 4. Estimated forest charges collected on logs harvested

Year	Forest Charges (in 1,000 Pesos)
FY-1974-75	19,740
CY-1976	6,384
1977	27,485
1978	24,947
1979	23,068
1980	49,860
1981	148,619
1982	140,375
1983	124,759
1984	107,968
1985	91,440
1986	96,732
1987	100,562
1988	99,269
1989	92,996
1990	75,134

1 US \$= Peso 25.00

FY indicates for fiscal year (June to May), while CY for calendar year (January to December)

Source: Philippine Forestry Statistics, 1990.

Table 5. Periodic production and export of roundwood*, in cubic meter

Year	Production (in 1, 000)	Export (in 1, 000)	Percent of export againts Production
FY 1965-66	8,047	5,534	68.80
1966-67	7,843	6,649	84.80
1967-68	11,114	7,511	67.60
1968-69	11,584	8,649	71.30
1969-70	11,005	8,616	78.30
1970-71	10,680	8,443	79.10
1971-72	8,416	7,018	83.40
1972-73	10,446	6,949	66.60
1973-74	10,190	5,434	53.30
1974-75	7,332	4,579	62.50
1975-76	8,440	3,050	36.10
CY 1976	8,646	2,332	26.97
1977	7,873	2,047	26.00
1978	7,169	2,211	30.84
1979	6,596	1,248	18.92
1980	6,368	758	11.90
1981	5,420	706	13.07
1982	4,589	807	17.58
1983	4,468	903	20.21
1984	3,872	996	25.72
1985	3,568	653	21.90
1986	3,434	412**	12.00
1987	4,147	205**	4.94
1988	3,809	174**	4.57
1989	3,169	110**	3.47
1990	2,503	51**	2.04

* includes sawlog/veneer log, poles and piles, and pulpwood

** represents only pulpwood from plantation

Source: Philippine Forestry Statistics, 1977 and 1990.

further be enhanced by the retention of the added value due to local processing. On the other hand, the proponents of the continuance of log exports insist that log exportation is still beneficial to the country's economy and one of the top earners of foreign currency. These issues shall be settled only when a thorough study concerning forest conservation and development strategies are finalized. It must identify the advantages and disadvantages of banning log exports in environmental, social, political, economic, and other considerations; the per capita requirement of the people; and the area of forest required to sufficiently sustain local wood requirements.

C) Production vs. Forest Degradation

The state of the Philippine forest is a community of the country's ecological condition that is presently viewed by many experts as critical. The country has been experiencing symptoms of environmental stresses (i. e. drought, pollution, and floods, among others) that are either related or leading to the ecological crises. Major factors causing the country's environmental crises is the massive exploitation of forest resources, and growing population⁹⁾. Because of the prevailing economic needs in the country constant pressures on the forest, especially logging, are continuing. Logging, when not properly implemented, causes tremendous devastation to forest concession areas. Unscrupulous loggers have constantly diminished forest areas into desolate lands without regard for their renewal. The lucrative log export trade had greatly encouraged extensive logging activities. Nevertheless, with the continuous imposition of the log export ban, it has been noted that forest destruction by logging has declined. In 1980 for instance as provided in table 6, forest destruction by logging showed 7, 348 ha or 23% of the total 32, 640 hectares forest destroyed, while in 1989 it registered to only 1, 727 hectares or 13% of the total 12, 814 hectares.

Table 6. Estimated forest destruction by different forms of destructive agents

Year	Total (in ha)	Kaingin* (in ha)	Logging (in ha)	Others (fires/pest diseases, ect)
1980	32, 640	6, 302	7, 348	18, 990
1981	24, 605	5, 826	6, 108	12, 671
1982	16, 654	3, 286	4, 954	8, 414
1983	121, 326	2, 241	1, 015	118, 070
1984	4, 895	1, 137	478	3, 280
1985	14, 632	941	1, 918	11, 773
1986	7, 682	1, 991	90	5, 601
1987	7, 146	570	676	5, 900
1988	10, 255	2, 914	4, 474	2, 867
1989	12, 814	4, 683	1, 727	6, 404

* Kaingin is synonymous to shifting cultivation
Source : Philippine Forestry Statistics, 1989.

Another significant factor affecting the country's deforestation crises is population. Metin and Paje⁹⁾ consider this as the crux of the crises, for the higher the population, the greater is the burden to the environment. This constitutes a vicious cycle in the sense that the higher the population, the more scarce the country's resources become, thus the greater the poverty incidence. The greater the poverty incidence, the more massive and destructive the utilization of resources becomes, hence the greater the damage to the country's resources. The more destroyed the resources is, the less productive it becomes, thus the greater the poverty incidence.

Presently, the Philippine population is estimated at about 62 million, 25 million of which live in the urban centers while the rest are in the rural areas. The operations of timber concessions, mostly in the rural areas, together contributed to the socioeconomic upliftment of the communities. But the least, it offers encouragement to the kaingineros (or shifting cultivators) who are in great need of economic improvement. The thousands of kilometers of road network built by logging connected the once inaccessible areas to population centers. In some

cases new towns or villages were established. Thus, population increased, which in turn causes expansion of agricultural areas, and hence, deforestation.

A study conducted by FAO in 1966-1970 on kaingin practices in the Philippines showed that the worst problem groups are the rural unemployed and underemployed who moved up from the lowland into the forest lands in their attempt to obtain basic food supply for family needs⁶⁾. As given in table 7 this group is growing in number and is a significant factor in reducing the areas of productive forest. Forest occupants consisted of 62,000 families covering 330,000 hectares in 1976 and markedly increased to 279,000 families and 891,000 hectares occupied in 1985. This is equivalent to a growth of approximately 78% in the number of families and 63% in terms of area occupied. Although, differences of data exist as to the relation on destruction by kaingineros as given in table 6, and area occupied as given in table 7, there is a clear indication that they contributed to the reduction of forest area in association with logging. To the kaingineros, logging areas are worth while to settle in because they are easily accessible. Since the logging roads are already constructed, it requires less effort to make their life comfortable.

Table 7. Annual census of forest occupants covering the period 1976-1985, in 1,000 units

Year	Family	Dependent	Area occupied (in ha)
1976	62	NA *	330
1977	70	NA *	348
1978	101	366	355
1979	154	676	512
1980	156	593	565
1981	165	625	605
1982	178	686	634
1983	224	817	718
1984	253	901	816
1985	279	974	891

* NA – not available

Source: Philippine Forestry Statistics, 1985.

V. Conclusion

The public forest has been managed in association with timber production. The dipterocarp forest comprises the majority of the country's timber resources and are growing abundantly in Luzon and Mindanao regions, which has also the largest area of timber land.

The DENR/FMB issues license to private individuals or companies for the harvesting of timber, in which forest charges are also collected. The most commonly issued license is the timber license agreement (TLA). The TLA holders are the main promoters of timber production which is practiced in accordance to the selective logging system. Mindanao region has the most number of TLA holders and also has much higher production followed by Luzon. Visayas region is a minor factor in timber production.

Similarly, TLA holders play a vital role in industrial and economic development. They had provided

employment and export earnings. However, the practices of producing timber causes the reduction of forest areas annually at a fast rate. This situation prompted the government to impose a total log export ban. The export restriction causes a decrease in the number of TLA, in log production, as well as a sharp decline in the number of employees in the logging sector. Consequently, forest destruction by logging decreased. The solution to these timber production problems shall be dealt with seriously by all foresters, concerned citizens, the government and the industry. A dynamic and progressive approach to the problem shall always be sought, and tested in such a manner that the country's forest resources will be managed on a sustained-yield and multiple-use basis. At this juncture, premised upon the policy that "ideas or plans and prospects beyond the immediate future are basic in all sound forest management".

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フィリピン公有林の木材生産構造

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要 約

この研究はフィリピン公有林（国有林）の森林資源，木材生産過程及び木材生産の社会経済開発に与える影響や意味を調べて木材生産構造の特質を明らかにする。公有林では木材生産が行われ，とくにフタバガキ科林がルソンやミンダナオ地域に豊富に生育している。長期木材伐採権（TLA）は木材生産のために発行され，伐採方法は択伐である。ミンダナオ地域は最も多い長期木材伐採権保有者を有し，またルソン地域よりも多い丸太を生産している。ヴィサヤ地域では木材生産の要因は乏しい。

長期木材伐採権保有者は木材生産の主な担い手であり，産業経済開発に重要な役割を果たしている。彼らは雇用や輸出収入をもたらしてきた。しかしながら，現在行われている木材生産は年々速い速度で森林を減少させている。このことのために政府は丸太の全面輸出禁止をせざるをえなくなった。丸太輸出の制限は伐出部門における従業員数ばかりでなく長期木材伐採権保有者数及び丸太生産も減少させることになったのである。

これらの問題はすべての林業家，関係市民，政府，伐出業によって真剣に解決されるべきである。国の森林資源の持続的収穫及び多目的利用の原理に基づく管理方法で，その問題に対するダイナミックで進歩的な解決方法が常に求められ，検討されるべきである。