

Agricultural-Forestry Linkages: Development Of Timber And Tree Crop Plantations Towards Sustainable Natural Forests

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ABSTRACT

There are at least two problems left unsolved that calls for our attention, namely: (i) millions of hectare of logged over areas and most of them are degraded and others are underutilized and left unproductive, and (ii) high supply-demand gap of logs, due to a huge excess demand for logs and pulpwood. Industrial timber and estate crop plantations are considered to be the alternative way out towards reaching sustainable natural forest management.

Evidence suggests that many logging companies are in fact more interested on clear-cutting timber than truly establishing the plantation. The main reason has been the need to get cheap timber for fulfilling an excess demand for pulpwood by pulp and paper industries. Many logging companies who also own estate crop plantations apply for a license to establish (timber or estate crop) plantation in the conversion area, clear the forest for logs and pulpwood, and eventually abandon the cleared land

The paper presents a historical perspective of agricultural development in Indonesia, focusing on food and cash crop developments particularly in the outer islands of Indonesia. The authors explore agricultural-forestry linkage is highlighted in section present a discussion on further development of industrial timber and estate crop plantation as logical ways towards sustainable forest management in the future.

Keywords: Indonesia, forestry, agriculture, timber, estate crop, sustainable forestry.

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**AGRICULTURAL-FORESTRY LINKAGES:
DEVELOPMENT OF TIMBER AND TREE CROP PLANTATIONS
TOWARDS SUSTAINABLE NATURAL FORESTS**

Erwidodo and Satria Astana¹

1. Introduction

Since the early 1970s, the forestry sector in Indonesia has played a significant role in national development. It has contributed substantial foreign exchange earnings to the national economy, as the export value of wood and forest products has been the second largest after that of oil and gas. It has promoted industrial development and employment opportunities across regions in the country. However, continuous excessive timber harvesting for commercial purposes have significantly degraded the quantity and quality of natural forest resources. During 1985-1997, the country lost about 20 million ha of forest (The World Bank 2001). The current figure should likely be higher if we consider an accelerated rate of illegal logging and deforestation in the last five years.

Nearly 9 million ha out of that 20 million ha in forest loss, much of it natural forest, has been allocated for the establishment of industrial timber plantation. Yet only about two million ha have actually been planted with fast growing species, the rest of 7 million ha are lying idle. By end of 1997, nearly 7 million ha of forest land had been approved for conversion to estate crop plantations, but the actual planted area was less than 6 million. This implies that more than 3 million ha of former forest lands are lying idle. A plausible estimate in 1990 suggested that around 4 million ha of forest lands has been cleared by shifting cultivators, and most of them are left unproductive. In addition, more than 5 million ha of forest was burned in 1994 due to deliberate fire-setting, and another 4.6 million ha was also burned in 1997-1998. Some of this land is regenerating as scrubby forest, some has been occupied by small-scale farmers and shifting cultivators, but there has been little effort to restore forest cover or establish productive farming.

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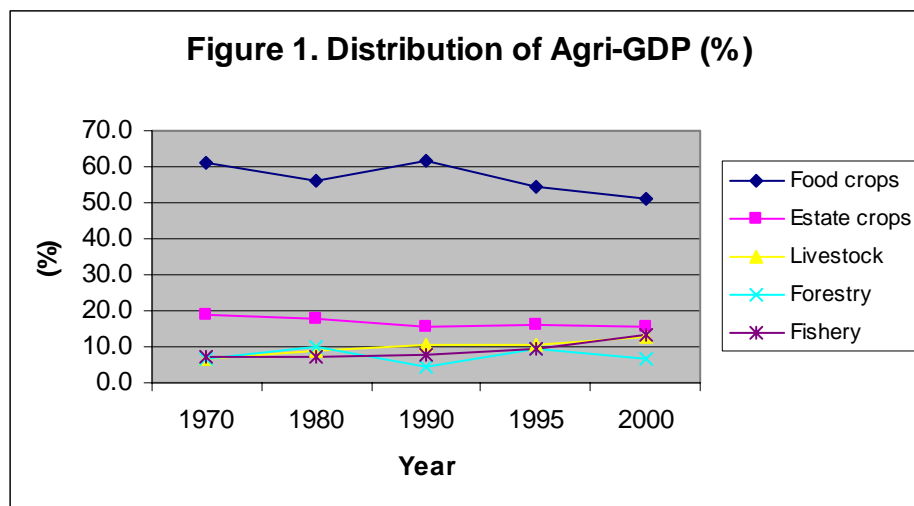
Conventional wisdom suggests that the rapid growth of deforestation was closely associated with rapid growth of agricultural and plantation development as they demand for land for crop cultivation, both by smallholders and by large plantation companies. It has also become common in many circles in Indonesia to blame the deterioration in land resources outside Java on the continued existence of shifting cultivation. In particular, those who wish to see Indonesia's current logging policies retained argue that the greater part of the damage done to forests is the work of non-sedentary cultivators who practice slash-and-burn agriculture. While governments, forest services and international forestry agencies attribute tropical deforestation principally to shifting cultivation, the environmental movement holds the commercial logging industry responsible.

The fact that millions ha of degraded forests have been left unproductive calls for serious attention. One question, among others, is how can we rehabilitate them back into their originally stated functions, or make them more productive in the case of conversion forestland. Moreover, how can we prevent the forestland from any further degradation in the future? The Indonesian government is facing mounting pressures domestically and internationally to take action, but progress has been too slow, while at the same time not all ongoing policy reforms are necessary good news for the forest.

This paper aims at analyzing the linkages between agriculture and forestry in their development perspective to see whether strong (positive or negative) linkages are existent. The paper seeks alternative ways of putting the degraded forestland to productive uses. The paper is organized as follows. The following section, section 2, presents a historical perspective of agricultural development in Indonesia, focusing on food and cash crop developments particularly in the outer islands of Indonesia. Section 3 explores forestry sector developments in particular on logging activities and forest based industrial development initiatives. An assessment on agricultural-forestry linkage is highlighted in section 4. Section 5 presents a discussion on further development of industrial timber and estate crop plantation as logical ways towards sustainable forest management in the future. The last section, section 6, presents some conclusions and policy recommendations.

2. Indonesia's Agricultural Development

Although its share to GDP declined, agriculture, including forestry, has played a significant role in economic development in Indonesia. In the early 1970s, its share to GDP was about 47 percent and then declined to around 20 percent in 1995. From 1970 to 1995 agricultural output growth averaged 3.2 percent per annum. Food crops have always dominated the sector, generating consistently about 50-60 percent of agricultural value added. The relative size of the other subsectors has also changed very little over this period, as smallholders and estate crops about 15-16 percent, livestock about 10-11 percent, fisheries 7-8 percent, and forestry about 4-5 percent (Figure 1).



In terms of output growth, rice has been the success story. Rice yields more than doubled over the period, and contributed about 85 percent of the increased production. From its status as the world's largest rice importer in the late 1970s, Indonesia has successfully become a self-sufficient country in rice. Two sets of factors have been critical in this success (Hill, 1996). First, there has been a strong government commitment, particularly to rice and the plantations. Rice production was boosted through realistic output pricing and large input subsidies, in particular subsidies on fertilizer, pesticides and irrigation water. The plantations, especially the state-owned ones, have received subsidized credit, equity capital injections, and assistance under

the foreign aid program. Agriculture, like the rest of the economy, has benefited from the government's large infrastructure investments. The second general factor has been a favorable external environment. Rapid technological advances have expanded production frontiers for rice, other food crops, and certain cash crops.

The record in cash crops has been much less impressive. Except for palm oil, and a few minor crops such as cocoa, output growth has been slow and erratic. Most of the increased production has been achieved through area expansion. Even though smallholder farmers dominate most cash crops, its performance has been disappointing, as its yields have either stagnated or declined. The history of the cash crop sector appears to be one of lost opportunities (Hill, 1994). After 1966 the sector might have been expected to grow more quickly, as a unified foreign exchange rate was adopted, big investments in infrastructure got underway, and the political situation became more secure. International prices in the 1970s were also generally favorable, rubber in particular benefiting from the higher cost of synthetic rubber during the oil boom period. According to Hill (1994), Indonesia's missed opportunities are nowhere better illustrated than in the case of natural rubber. Three countries - Indonesia, Malaysia, and Thailand - have dominated the world natural rubber industry since 1960, producing 75-80 percent of world output. Thailand produced about one-sixth of Indonesia's total output in 1960 and one-third in 1970 has become the largest producer since 1980s. Thai output grew rapidly at an annual rate of 5.7 percent in 1970s and 10 percent in 1980s, compared to Indonesia's rate of 2-3 percent over the two decades.

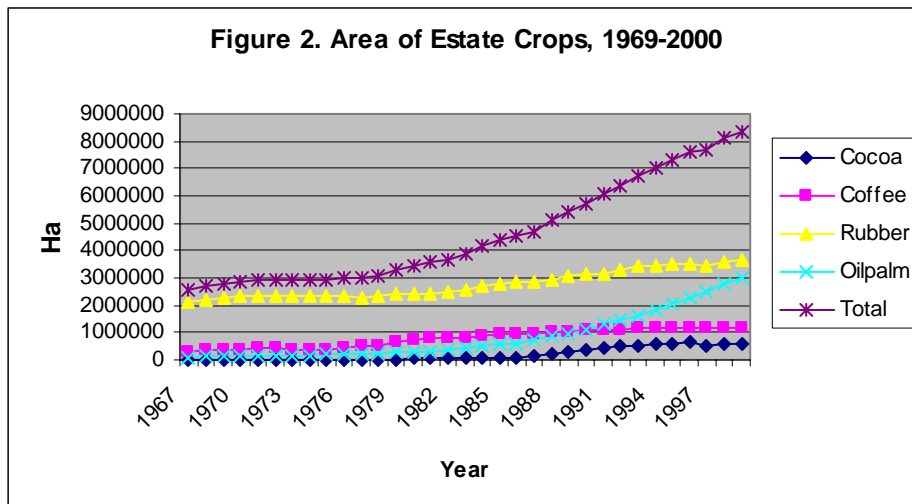
Among the other sub-sectors, forestry has expanded the most unevenly and has been the source of the greatest controversy. Output and exports, mainly from Kalimantan, grew rapidly in the late 1960s in response to high world prices. However, there have been frequent allegations of corruption in the awarding of forest concessions, and criticism of the industry's suboptimal fiscal practices. In the early 1980s, the government introduced a log export ban, to achieve conservation objectives and greater local processing. Forestry output in consequence fell during the first half of the 1980s and by 1985 was about half of that of the late 1970s. Plywood exports boomed and generated about half of the country's total manufactured exports until 1986 (Hill, 1994).

2.1 The Development of Smallholder Tree and Estate Crops

Tree or estate crops have always been important sources of growth in the development of the outer islands, as paddy has done in Java. Investment in rubber, coconut, and oil palm are economically sound with economic rates of return ranging between 18-28% (World Bank, 1989). These are roughly comparable with those of small-scale manufacturing, and remain robust at current fluctuations of prices and exchange rates, even when the economic crisis hit the country. The tree crop sub-sector does not only continue to be a major source of foreign exchange, but also simultaneously meet the objectives of increasing employment opportunities and decreasing the incidence of poverty.

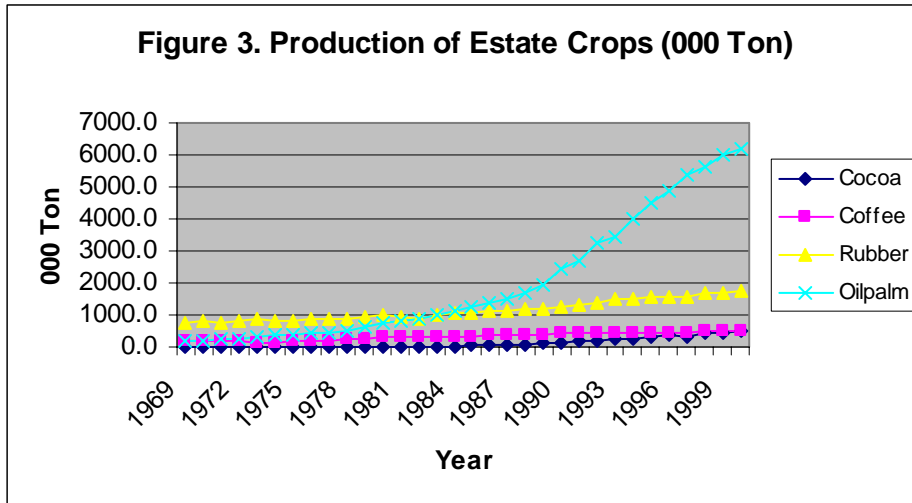
Growth in the sub-sector has been managed by the government through the following main instruments: (i) a large scale public investment program in tree crop development and transmigration, (ii) public ownership and management of a substantial share of large-scale estates, (iii) control over licensing and operation of private estates and processors, (iv) restrictions on the domestic pricing and international trade of edible oils, (v) provision of special credit facilities for production and exports, (vi) provision of subsidized fertilizers, and (vii) provision of publicly financed research and extension services and supporting public infrastructure (World Bank. 1989).

As shown in Figure 2, total area of rubber, oil palm, coffee and cocoa together increased from 2.8 million ha in 1969 to around 8.6 million ha in 2000. In 1969, rubber alone occupied 2.1 million ha, and grew at 2.8% rate during the period 1969-2000. Oil palm and cocoa area was growing much faster than other two crops, as it grew at 10.9 percent and 9.4 percent rate during 1969-2000, respectively.



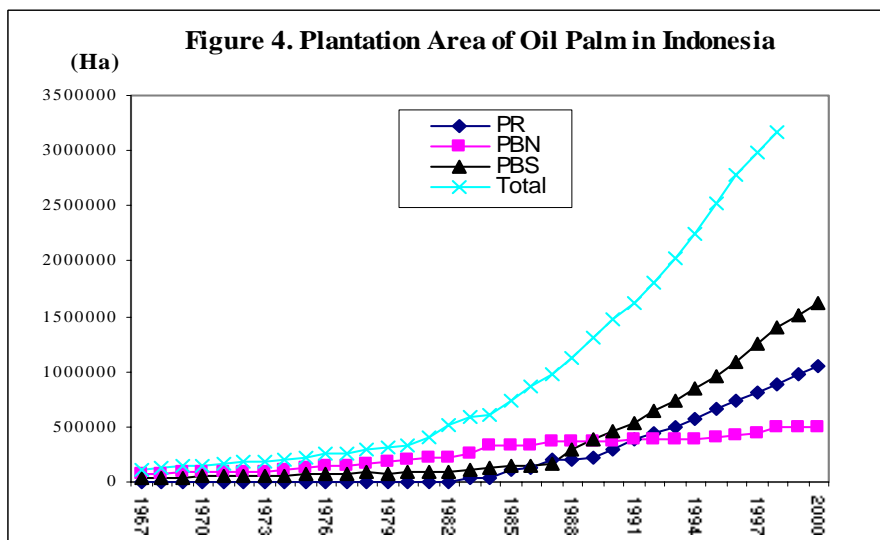
Since 1969 production has increased roughly at the same rate as area, indicating no significant productivity gain over the years (Figure 3). In general, although total production has increased significantly over decades, the production growth in the case of smallholder-dominated crops has been primarily due to the increase in area. With the exception for cocoa, smallholder yields for cash crops have been essentially flat over decades.

This remarkable performance was attributable to the government's strong commitment in the development of cash crops. In the first decade of the New Order, rehabilitation programs fostered growth as well as favorable world market prices. Since the late 1970s, however, there has been no clear trend in the development of cash crops. In particular in the case of smallholders, there has been no appreciable yield increase in any of major crops. Unlike food crops, much of the increased cash crop production has come from an expansion in area, especially during the 1980s in the case of estates and throughout the period among smallholders. This applies particularly to the two major smallholder crops, rubber and coconuts.



2.2 Development of Palm oil Industry

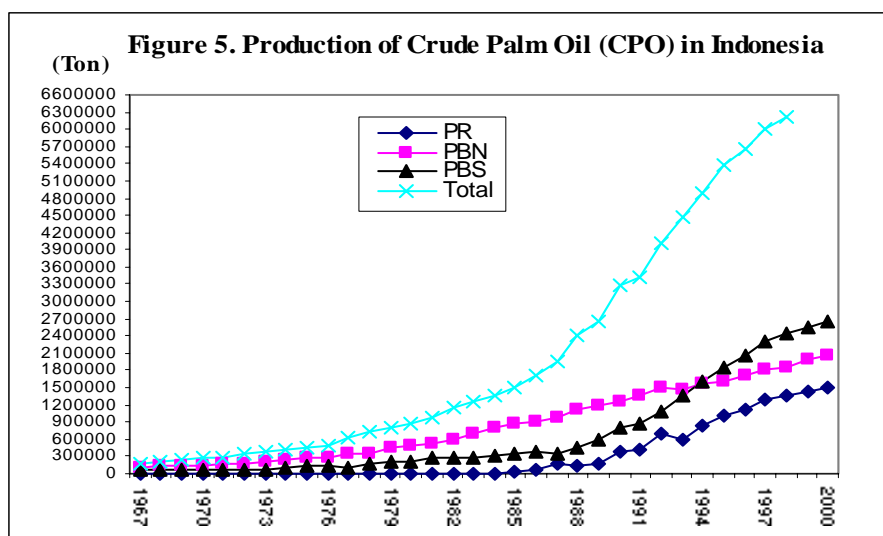
As indicated in the previous section, palm oil has been one of the most dynamic sources of Indonesia foreign exchange earnings. The palm oil sub-sector has experienced a remarkable growth since the late 1960s. The area of palm oil plantations has increased from 106,000 ha in 1967 to 3.2 million ha in 2000, implying an average growth rate of 9.4 percent per year (see Figure 4). Most of this oil palm plantation area is located in the six provinces of North Sumatra, Riau, South Sumatra, Jambi, Aceh, and West Kalimantan. While North Sumatra could be perceived as a traditional area, the others are new development areas that have experienced sharp growth in the last decade.



As the plantation area increased, crude palm oil (CPO) production has correspondingly increased by around 12 percent per annum, from 167,669 metric tons in 1967 to 6.2 million metric tons in 2000 (Figure 5). This remarkable growth turned Indonesia into the world's second largest CPO producer after Malaysia, with around 30 percent contribution to the 2000 global palm oil supply. Its export value increased from less than US\$ 0.5 billion in 1990 to US\$ 3.4 billion in 1997. This prolific growth has induced a somewhat wrong conclusion with regard to rapid deforestation in Indonesia (Casson, A. 2002)

“.....Yet it has also become a source of concern because much of the oil palm expansion has occurred at the expense of Indonesia's humid tropical forest cover”..... Oil palm expansion has also been held partly responsible for the 1997-1998 forest and land fires that affected more than 5 million ha in Kalimantan alone.....”

CPO is also considered to be a strategic commodity in the sense that it is the raw material of the main cooking oil consumed in Indonesia. Palm oil industries are labor intensive and therefore able to provide employment opportunities for Indonesia's growing population. In 1997, Indonesia palm oil industry employed more than 2 million people (Arifin and Susila, 1998a)



In light of the economic importance of palm oil to Indonesian economy, the government facilitated the growth of the sector through various schemes, implemented somewhat differently for three categories of estates: state-owned (PBN), privately owned (PBS), and smallholders (PR). The privately owned palm oil plantation has experienced the most rapid growth in the last decade (see Figure 5). The government encouraged greater private sector involvement in the palm oil by granting access to credit at concessionary rates for estate development, planting new crops, and purchasing crushing facilities. Newly established companies could draw on loan from an “executing bank” at subsidized rates of 11 percent during land preparation and tree establishment, and 14 percent during tree’s productive period.

Indonesian private estates of palm were dominated by 10 conglomerates: the Salim Group, Sinar Mas Group, Texmaco Group, Raja Gauda Mas Group, Astra International Group, Hashim Group, Surya Damai Group, Napan Group, Duta Palama Group, and Bakrie Group. By 1997, these 10 groups owned land concessions approximately 2.9 million ha. However, only around 812,000 ha of the total land has been planted by the end of 1997.

The prospects of Indonesian palm oil looked extremely promising, and it was expected to rapidly expand for several reasons (Casson, A. 2002). First, the CPO production process in Indonesia was highly efficient because of (i) relatively high yield of plantation, (ii) low labor costs, and (iii) favorable climate and soil conditions. Indonesia was one of the most cost-efficient countries in the world for oil palm plantation establishment. Second, from investor’s perspective, the domestic and international markets for CPO looked promising. There had been an increasing preference for CPO over other edible oils because it was cheaper than other vegetable oils. On the international market, the global demand for palm oil grew around 7 percent per annum. The processing of CPO by various industries in Indonesia, especially for cooking oil, was also expanding rapidly at an average rate of 13 percent per annum.

The third reason was that the government had demonstrated its commitment to the development of palm oil by offering numerous incentives to both domestic and international investors. Just prior to the crisis, the government had reduced the export tax on CPO products from a progressive tax to 5 percent, promoted the development of oil palm in Eastern Indonesia to KKPA scheme, designated large (forest conversion) areas for oil palm development. In 1997 the government pledged to overtake Malaysia as the world's largest oil palm producer by doubling the area to 5.5 million ha by 2000. The CPO production was expected to increase to around 7.2 million tons in 2000 and 10.6 million tons in 2005 (Arifin and Susila, 1998b).

Most of these new plantations were to be established in Outer Islands, primarily Kalimantan, Sumatra, Sulawesi and Irian Jaya. Half of the area allocated for palm oil development was to be offered to private and foreign companies. As a result, the sector attracted considerable investment from overseas, particularly from Malaysia, Singapore, England, Hong Kong, Belgium, and South Korea. In fact, foreign investment had become so strong that the government was eventually forced to close it in early 1997 because of increasing complaint from domestic palm oil companies. Malaysian investors had been especially active given the fact that land had recently become too scarce in Malaysia and increasing cost of CPO in the country. Malaysian investors were able to acquire land banks totaling at least 1.3 million ha before the crisis hit Indonesia. Most of these lands were in West and Central Kalimantan, South Sumatra, Riau and Jambi (Casson, A. 2002).

The Habibie government committed to support further development in Irian Jaya by giving permission to 28 private companies to open large scale oil palm plantation in the province. In addition to Irian Jaya, the government also had large-scale plans for palm oil expansion in Kalimantan. However, despite the government's grand plans for palm oil expansion, some oil companies are hesitant about establishing plantation in Irian Jaya and Kalimantan, due to among others: (i) ethnic and social unrest, and (ii) poor infrastructure.

Evidence suggests that some companies are in fact more interested in timber that can be harvested in the concession areas². This explains why the majority of companies set up in these regions have strong links with logging companies. It also may explain poor performance in realizing their plantation targets. For example, by March 1999, the government had issued location permits for the development of 871,211 ha of oil palm plantations in West Kalimantan, yet only 18,278 ha had actually been planted (Casson, A. 2002). Experience from the last decade indicates that performance has been extremely poor, and this fuels the suspicion that the companies are more interested in exploiting the timber from allocated concessions than in establishing plantations.

While there has been less interest in developing palm oil plantations in Kalimantan and Irian Jaya, companies continue to apply for concessions so that they can gain access to timber readily available in these two provinces. Although some of these companies intend to plant palm oil, many are primarily interested in the timber they can extract. This explains why many palm oil developments are occurring on production forestland, despite the availability of large areas of degraded land and logged-over areas in Kalimantan. Again, we can say that timber extraction was prioritized over plantation development follows.

3. Forestry Sector Development

Forestry sector development planning was stated and implemented through the Five Year Development Plan (Repelita). The objectives of forestry development change as development progresses. The objectives in the Repelita I-III were somewhat similar as: (1) to utilize forests and create employment opportunities, (2) to increase export earnings, (3) to control forest felling, (4) to reforest logged over areas, and (5) to convert some areas of natural forests into plantation forests. In addition to those objectives, the development of forestry sector in Repelita IV was also aims to support industrial development in order to increase value added and export earnings.

² Companies actually interested in establishing palm oil are more likely to choose provinces of Riau, Jambi, and South Sumatra, as these provinces possess the best climate and soil conditions and has the necessary infrastructures for oil palm plantation development and palm oil processing. In addition, these provinces are able to provide plantation workers who have better skills compared to the indigenous peoples of Kalimantan, Sulawesi and Irian Jaya.

In response to increasing concerns on environment quality and forest sustainability, the objectives in Repelita V were somewhat restated as: (1) to manage forest resource for the maximum benefits of peoples by continuously maintaining sustainability of forest functions and sustaining environment quality, (2) to maintain the role of forest in its contribution to income and job opportunities for peoples living surrounding forests, and (3) to increase production to meet industrial needs and energy demand by increasing the utilization of production forests and forest products. Other objectives were: (4) to enhance the efforts on protection, control and security of forests, (6) to undertake reforestation and convert some areas of natural forests into man-made industrial forests, and (7) to enhance the efforts on extension and marketing system development.

In Repelita VI, as forestry was separated from the agriculture sector, the development objectives were: (1) to provide benefits for maximizing people welfare by securing perpetually sustainability and continuity of forest functions, and by prioritizing sustainability of natural resources and environmental functions, and by maintaining hydrological functions of forests, (2) to enlarge opportunities of forest business and employment, (3) to increase sources of state revenues and foreign exchange, and (4) to accelerate regional development. Under the Reformasi Government, as outlined in PROPENAS 1999 – 2004 (Regional Five Year Plan), the objectives of forestry development were: (1) to increase quality and productivity of forests through efficient, fair and sustainable forest management and to increase forest contribution to regional and national economy as well as people welfare, and (2) to increase efficiency and productivity of land resource through integrated management among its various utilizations in a fair and balanced and sustainable way.

Despite its significant contribution to export earnings and employment generation, forestry sector development has been criticized due to its adverse effects on the sustainability of Indonesia's natural forests. Many claim that forestry development is nothing but commercial timber extraction from natural forests, and little has been done on sustaining their sustainability for future generation. Commercial logging has degraded the quality and quantity of natural forest resources. The very rapid establishment of wood processing industries has resulted in a huge excess demand for

logs, driving logging companies to produce logs that exceed the sustainable rates. In addition, this log demand gap has also accelerated illegal logging practices throughout the regions.

3.1 The Role of Forestry in the Indonesian Economy

Commercial development of the forestry sector in Indonesia began in the late 1960s, when extensive timber harvesting was done in response to an urgent need for diversifying sources of national income. Two laws supporting these activities were enacted in 1967: the Foreign Investment law (UU 1, 1967) and the Basic Forestry law (UU 5, 1967). Since then, the forestry sector has undergone three different phases of development: (1) the 1967-1979 phase focused on exporting logs, (2) the second phase of 1980-1990 was characterized by a rapid development of plywood and wood-based industries, (3) the third phase of 1990s witnessed by a rapid expansion of pulp and paper industries (Hardjono. 1994; Resosudarmo, 2002).

During the first phase the industry focused on the export of logs, the reason being that relatively little capital investment was required for this form of production, return could be obtained quickly and profits were good because efficient Japanese mills had capacity to pay high prices (Byron and Waugh 1988). The introduction of a ban on log export in 1980 marked a change in the direction of the industry, as most of wood leaves the country in the form of plywood and veneer with the exception of a small amount of sawn timber. With the introduction of a new export tax on this product in 1989, revenue from sawn wood fell by 80 percent in the following year, but plywood continued to lead among the country's non-oil export commodities.

The reason for imposition of the 1980 ban on log export laid in an attempt on the part of government policies to gain value added by ensuring that processing was done within the country. Large-scale investment in plywood factories, which in 1990 numbered 114, resulted in Indonesia moving from its 1979 position as the world's largest exporter of logs to world's largest exporter of plywood by 1982. However, this had a negative effect on world prices of this product. World prices have continued to fall following the expansion of plywood industry both in Indonesia and elsewhere.

The forestry sector has contributed substantial foreign exchange earnings to the national economy, as the export value of wood and forest products was the second largest after that of oil and gas. The value of forest product exports increased from around US\$1 billion in 1984 to more than US\$7 billion in 1997. Among different products, plywood has played an important role until 1997, but its role then diminished in the last 5-6 years. Forestry sector has been important in generating employment opportunities. It has also been playing a significant role in the regional development, particularly in the outer islands of Indonesia.

Despite those significant gains, three decades of continuous timber harvesting for commercial purposes have degraded the quantity and quality of Indonesia's natural forest resources. This is reflected in a decline of forest cover and in a decline in sustainable capacity to produce timber over the years. A World Bank estimate suggested that the country lost about 20 million ha during 1985-1997 (the World Bank 2001; Resosudarmo. 2002)). As shown in Table 1, timber production during Pelita I-IV was 40 million m³, declining to 31.4 million m³ in Pelita V, and to 22 million m³ in Pelita VI. The decline is expected to continue to below 20 million m³ per year by Pelita VII.

Table 1. Annual Log Production (million m³/year)

Year	Production capacity (MOF)	Log Production (MOF)	Sawlog & Veneer Log Production (FAO)
1983	40.0	15.2	25.5
1984	40.0	16.0	27.0
1985	40.0	14.6	23.5
1986	40.0	19.8	27.4
1987	40.0	27.6	31.2
1988	40.0	27.8	34.8
1989	31.4	22.3	36.7
1990	31.4	26.1	32.0
1991	31.4	23.8	35.4
1992	31.4	28.2	35.3
1993	31.4	26.8	35.3
1994	22.0	24.0	31.8
1995	22.0	24.9	31.1

Sources: (adopted from Resosudarmo, 2002).

Awareness of threats to the future of the industry led the government to introduce a selective cutting policy (Tebang Pilih Indonesia-TPI) under which felling is in theory

based on a 35-year cycle, with sections of concessions worked in blocks and trees under a certain size left to reach maturity. The TPI system was then modified into Tebang Pilih Tanam Indonesia (TPTI), as logging companies are obliged to undertake enrichment planting in their logging areas. This system was intended to ensure that natural forests could regenerate for successive harvests. Provisions for planting were part of the system. Despite its ideal goals, TPI has been criticized regarding its workability. Far from helping to maintain forests, TPI has had the opposite effect in that considerable damage is done to the remaining trees when larger ones are extracted. Moreover, with the removal of the best trees, genetic erosion is likely to occur since the trees that remain to produce seeds tend to be not only smaller but also inferior in quality (Whitten et al., 1987).

While government policy obligates logging companies to replant, incentives for enrichment planting of secondary forests are inadequate (Tarrant et al., 1987). As consequence, large numbers of concession holders are known to have violated the regulations by over-harvesting, damaging residual stands, failing to replant, or logging outside their logging blocks (Resosudarmo, 2002). A study on 60 concession revealed that in 1995 only 52 percent of the TPTI provisions were implemented (Kartodihardjo, 1998).

An examination of timber extraction shows a record of log production that exceeds the sustainable rate. This is because the demand for logs for wood-base industries has always been well above the forests' sustainable production threshold. One of the most clear and alarming signals of the decline in timber production of natural forest is the government's acknowledgement of the need to depend on high levels of supply from timber plantations. The MoF had planned to produce 23 million m³ per year of logs from timber plantations during 1999-2004. This is virtually impossible, because the 1997 production capacity was reported 1.8 million m³ per year. This situation indicates that if timber plantations do not follow the planned schedule, incentives to overharvest natural forests will be greater.

3.2 Industrial Timber Plantation (HTI)

In the mid-1980s, the government launched an ambitious plan to establish vast areas of fast-growing industrial timber plantation (Hutan Tanaman Industri -HTI),

especially in Sumatra and Kalimantan. The program accelerated with the issuance of Government Regulation No. 7/1990 regarding Industrial Timber Plantation. At the outset, the government justified the HTI program in terms of supplementing supplies of timber from natural forests, rehabilitating degraded lands, and promoting nature conservation. Logging companies receive various government subsidies, including loans on generous terms taken from “dana reboisasi” (Reforestation Fund).

HTI concessions are granted for production of both pulpwood and sawn-timber. They can be established independently or in conjunction with existing HPH logging concessions. According to official data, some 7.9 million ha had been allocated for all categories of HTI concessions by end of 2000, but only 23.5 percent of that area had actually been planted.

A key factor underlying government policy on industrial timber plantation (HTI) development has been the rapid development of pulp and paper industries over the past decade. Installed pulp production capacity grew from one million tons in 1990 to nearly 5 million tons in 2000 and is expected to exceed 6 million tons in 2001. Regulation clearly states that HTIs are to be granted only on non-productive areas and may not be granted in areas already under logging concession. However, there have been some cases in which logging companies developed industrial timber plantations in productive natural forest. Realization of HTI, in general, is well below target. Less than one fifth of approximately 2 million ha allocated for sawn-wood HTI has actually been established. HTI for pulpwood has done slightly better, as it planted one-quarter of the 5 million ha allocated area. It is obvious from the overall low percentage realization of HTI, that planting and harvesting trees is not the main reason for HTI development. Rather, it is encouraged by generous financial subsidies and rights to clear-cut standing timber.

In recent years, timber plantations have been prioritized to secure raw material for the pulp and paper industry. The industry grew rapidly in 1990s and is now one of the major export commodities. In 1997 there were 15 pulp producers in Indonesia with a total production capacity of 3.9 million tons per year. Between 1993-1997, pulp production increased by 37.1% annually, contributing to increased export earnings

from less than US\$0.5 billion in 1993 to US\$2.7 billion in 1999 (Resosudarmo, 2002).

Rapid development of the pulp and paper industry is posing a threat to natural forest. One threat is the emerging disparity between the overcapacity of the pulp and paper mills and the undersupply of raw materials from timber plantations (Mulyadi and Roesad 1996). As with plywood, this encourages overexploitation of natural forests to pay back the high capital costs of establishing such plants. Many of the pulp plants face difficulties in procuring raw material because of the slow development of timber estates. By October 1998, out of 5 million ha of land with timber plantation permits, more than 3 million ha were reserved for the development of pulp plantations, but only 1 million have in fact been established.

The negative effect of the pulp and paper industry on the forests may be even greater in the future because of its potential attractiveness compared with the plywood industry. The attractiveness of the pulp and paper industry would appear to offer incentives for stakeholders in the plywood business to invest in this industry. There is strong indication that producers of pulp are often stakeholders in plywood and palm oil enterprises.

4. Agricultural-Forestry Linkages: Causes and Consequences

Understanding agricultural-forestry linkage is critical to assess the cause and effect of one sector on the performance of the other sector with regard to development perspectives. The main problematic issue at the moment is the ‘negative’ performance of forest development, namely overexploitation and excessive use of forest resources. The question is whether agricultural development in general, in particular cash crops sub-sector, has contributed to over-exploitation of forest resources, as it is commonly believed. If evidence strongly suggests that there is a negative association, or tradeoffs, between the two sectors, the question is then how to anticipate and minimize it.

It has long been believed that the rapid growth of deforestation was closely associated with a rapid growth of agricultural and plantation development as they demand for

land for crop cultivation, both by smallholders and by large plantation companies. It has also become common in many circles in Indonesia to blame the deterioration in land resources outside Java on the continued existence of shifting cultivation. In particular, those who wish to see Indonesia's current logging policies retained argue that the greater part of the damage done to forests is the work of non-sedentary cultivators who practice "slash-and-burn" agriculture (Hardjono 1994). Yet although governments, forest services and international forestry agencies attribute tropical deforestation principally to shifting cultivation, the environmental movement holds the commercial logging industry responsible.

The above common claim is understandable, given the fact that nearly 7 million ha of forest had been approved for conversion to estate crop plantation by the end of 1997. This area has almost certainly been cleared (FWI/GFW. 2002). Data suggest that the area actually converted to palm oil plantation since 1985 is around 2.6 million ha, while new plantation of other estate crops is estimated around 1-1.5 million ha. This leaves another 3 million ha of cleared forest lying idle. As mentioned before, many logging companies who also own estate crop plantations apply for a license to establish plantation in the conversion area, clear the forest for logs and pulpwood, and eventually abandon the cleared land.

Evidence suggests that many logging companies are in fact more interested on clear-cutting timber than truly establishing the plantation. The main reason has been the need to get cheap timber for fulfilling an excess demand for pulpwood by pulp and paper industries. Temporarily, logs obtained from the conversion of forests to non-forestland uses such as oil palm plantations could partly offset the shortage of legal supply from forest concessions, in addition to wood supply from forests that are cleared for timber plantation development. Yet it is estimated that the expansion and development palm oil and rubber plantations will be saturated in the next 10 years, meaning that forest industries will have to find other sources of raw material to fill the gap.

Studies have been undertaken to identify causes of deforestation in Indonesia. An elaborated one was found in Sunderlin and Resosudarmo (1996) paper entitled "Rates and Causes of Deforestation in Indonesia: Towards a Resolution of Ambiguities". In

addressing deforestation and resource degradation, Hardjono (1994) identified three interrelated factors that have bearing on the problem of resource degradation and depletion, namely, natural forces, population growth and development process itself. The nature of the development process itself has had implication on forest degradation. The orientation of development policies, particularly in certain sectors, has exerted considerable influence on the direction of natural resource exploitation both in Java and in the outer islands of Indonesia. With regard to the nature of forestry development process, Resosudarmo (2002) highlighted five characteristics that promote unsustainable management of forest resources in the country:

- Rates of timber extraction is higher than its sustainable rates
- Inefficient logging methods
- Logging methods that cause excessive ecological disturbances
- Logging methods that contribute to unplanned forest conversion to non-forest uses
- Poor reforestation and forest regeneration practices.

Many also believe that the above characteristics are in fact the prime causes of rapid forest degradation in Indonesia, rather than shifting cultivation or estate crop plantation establishment.

Forest Watch Indonesia-FWI (2002) claimed that excessive deforestation in Indonesia is largely the result of a corrupt political and economic system treating forest resources as mainly a source of revenue to be exploited for political ends and personal gain. The country's growing wood processing and cash crop industries proved lucrative over the years, and gains was used by the regime in power to reward and control friends, family and potential allies. Official data suggest that the number of logging companies and their forest concessions increased dramatically from 34 units (3.9 million ha) in 1969 to 229 units (21.7 million ha) in 1973. Up to the implementation of Pelita V (1989-1993), this number continuously increased over the years, but started to decline since then (see Table 2). The data suggest that, regardless of other factors causing deforestation, government policy was in fact designed to allocate forest concessions excessively. This strongly indicates the orientation of forest development policies has exerted considerable influence on the direction of natural forest exploitation in Indonesia.

Table 2 Number of Logging Companies and Concession Areas

Year	Number Companies (Units)	Concession Areas (million ha)
Pelita I 1969	34	3.9
1973	229	21.7
Pelita II 1974	237	24.2
1978	382	35.9
Pelita III 1979	462	44.9
1983	521	53.4
Pelita IV 1984	523	53.8
1988	565	57.6
Pelita V 1989	565	57.6
1993	575	61.7
Pelita VI 1994	565	60.0
1998	388	48.4

Source: Forestry Statistics of Indonesia (various issues)

The introduction of a ban on log export in 1980 marked a change in the direction of the industry, as most of the timber leaves the country in the form of plywood and veneer with the exception of a small amount of sawn timber. The reason for imposition of the 1980 ban on log export laid in an attempt on the part of government policies to gain value added by ensuring that processing was done within the country. Large-scale investment in plywood factories, which in 1990 numbered 114, resulted in Indonesia moving from its 1979 position as the world's largest exporter of logs to world's largest exporter of plywood by 1982. Up to mid-1990s, plywood continued to lead among the country's non-oil export commodities. However, this rapid installment of the nation's sawn-wood, plywood, and pulp industries have created an excessive demand for logs and fibers that substantially exceeds the sustainable capacity of log supply from natural forest.

While aggregate round-wood consumption capacity for the three industries stood at approximately 78 million m³ during 1997, it is conservatively estimated that these three industries consumed 61 million m³ of round-wood (Barr. 2002). This figure is 36 million m³ higher than the volume of timber removals that the Ministry of Forestry claims is sustainable as an annual harvest. The existence of such a substantial timber deficit is a central driving factor of illegal logging and timber trade. Estimates of illegal log removals in recent years have ranged from 12 to 32 million m³ per year (ITFMP, 1999). These illegal logs were expanded dramatically since the financial

crisis began. These illegal logging were carried out by concession holders who extract logs above their annual allowable cut or by logging in areas that have not been approved by the MoF including those outside their concessions.

5. Developing Closer-Linkages: Timber and Estate Crop Plantation

There are at least two problems left unresolved that calls for our attention, namely: (1) millions hectare of logged over areas of which most of them are degraded and other are underutilize and left unproductive, (ii) high supply-demand gap of logs, as the demand for logs and pulpwood has been well above the sustainable supply capacity of natural forest. The most recent Report of the Forest Watch Indonesia-Global Forest Watch (2002) stated that more than 20 million ha of forests have been cleared, but most of them have not been put into alternative productive uses. The following is the detail:

- Nearly 9 million ha of forestland, much of it natural forest, has been allocated for the establishment of industrial timber plantation. Yet only about two million ha have actually been planted with fast growing species, mostly *Acacia mangium*, to produce pulpwood. The rest of 7 million ha are lying idle.
- By end of 1997, nearly 7 million ha of forestland had been approved for conversion to estate crop plantations, and these lands have almost certainly been cleared. However, the area actually converted into palm oil plantations up until 1997 was only around 2.6 million ha, and new plantation with other estate crops probably account for another 1-1.5 million ha. This implies that more than 3 million ha of former forestland are lying idle.
- A plausible estimate in 1990 suggested that shifting cultivators might be responsible for about 20 percent of the forest loss. This would account for about 4 million ha of forestland cleared by shifting cultivators, and most of them are left unproductive.
- Transmigration program was responsible for about 2 million ha of forest clearance during 1960-1999. In addition, spontaneous migrants and illegal settlement at the margins of logging concessions and national parks has greatly accelerated since 1997, but reliable estimates of forest clearance by these migrants have not been made.

- More than 5 million ha of forest land was burned in 1994 due to deliberate fire-setting, in combination with weather anomaly of El Nino, and another 4.6 million ha was also burned in 1997-1998. Some of this land is regenerating as scrubby forest and has been occupied by small -scale farmers and shifting cultivators, but there has been little effort to restore forest cover or establish productive farming.

How can we overcome the above problems? The following discussion will only focus on the development of timber as well as smallholder tree and estate crops plantation. Yet it does not necessary mean other policy initiatives are less important. The main reasons, among others, are: (i) timber plantation is the only way to meet an increasing demand for sawn-and pulpwood in a sustainable way, (ii) smallholder and estate crop plantation is a logical way to put the degraded (forest) lands into productive use for the welfare of people surrounding the areas, and (iii) these two options are among other necessary ways towards sustainable natural forest management.

The establishment of timber plantations has been seen as an illogical way to offset timber shortages due to an ever-increasing demand for pulpwood by pulp and paper industries. Unfortunately, as noted before, the establishment of timber plantation has been very slow. Among other questions to answer are: (i) what are the problems and constraints in the development of timber plantation, (ii) what is the precondition for the program to be effectively implemented, and (iii) what government policies are needed to support the program?

Many have claimed that as long as cheap timber can be collected easily, both from legal and illegal logging, the less likely the HTI program can be implemented successfully. This suggests that combating illegal logging and hence enforcing law and regulation are critically important. Another condition for the success of HTI is a removal of trade barriers and domestic market distortion on logs and sawn-wood. Yet these are all interrelated and complex problems.

5.1 Further Development of Smallholder Tree and Estate Crop Plantation

As has been indicated previously, tree crops have always been an important source of growth in outer island economic development as paddy has done in Java. In general, investments in this sector are economically sound with high economic rates of return. They remain robust even when economic crisis hit the country. The tree crop sub-sector does not only continue to be a major source of foreign exchange, but also simultaneously meet the objectives of increasing employment opportunities and decreasing the incidence of poverty.

Establishment of plantation and estate crops was one of logical ways for making the logged over area becoming more productive. Not only is this tree-crop plantation a sensible alternative to rehabilitate critical land but it is also a suitable way to protect natural forest from further encroachment involving dwellers living in and surrounding forests. The plantation area can be used as a bumper zone of forest areas, as the dweller can intensively cultivate the land with commercial crop, earning enough income for the family, and it therefore discouraging them to enter the forest for their living. Apparently, this is the importance linkage between agriculture and forestry that needs to be further developed in the future, as long as improved people welfare and sustainability of natural forest are the nation's primary concerns.

When appropriately sited and well managed, tree crop production can utilize and stabilize marginal land in critical areas for which few other sustainable land uses may be available. However, the primary challenges for its development would be to: (i) widen the participation of the private sector in conjunction with changing the role of public sector, (ii) support a more broad-based, replicable growth, encompassing a larger group of smallholders, where the untapped potential lies, and (iii) retool some of the policies and instruments to facilitate a more sustainable and efficient growth (World Bank, 1989). Tree crop plantation developments raise a concern when they are developed inappropriately through excessive hidden government subsidies (incentives) and along with inadequately regulatory settings. It happens frequently that some of these plantations have been established on customary, or adapt lands, leading to serious conflicts with local communities.

Prioritizing tree crop investment appears to be the inescapable choice for the future. A continuing pressure on balance of payment will necessitate rapid growth in non-oil

exports. A faster growth in the labor force in the outer Islands will also require the sub-sector to continuously provide employment opportunities to nearly one-seventh of the labor force, and to arrest a decline in the real wages of unskilled labor. To meet these challenges, tree crop investment policies now need to adapt to changing resource constraints, as well as to changing social-economic and political situation. Government resource constraints, however, will limit the volume of direct public investment. According to the World Bank (1989), a greater share of investment must come from the private sector, and the incentives for private investment and trade will become increasingly important. Public sector expenditure should focus primarily on completing and consolidating past investments, while improving infrastructure and support services, to ensure efficient utilization of the existing capital stock. More rapid, broad-based growth, encompassing a large number of smallholders is required to provide a stable, replicable basis for generating productive employment opportunities. These policy prescriptions appear to remain valid at the current social, economic and political situation.

The development of tree crop plantation must be taken on the degraded land, particularly in those designated as conversion forest areas. However, it is also logical to think of the possibility to develop tree crop plantation in the degraded area of production forest, as the government's capacity to rehabilitate or put them in productive uses is limited. Developing rubber plantation is one among other sensible choices, since rubber will produce not only rubber-sheet but also eventually rubber wood, which poses a high economic value. The Research Center on Rubber has reported a new fast-growing clone of rubber tree, which is superior not only in producing natural rubber but also in its quality of wood.

6. Conclusion

There are at least two problems left unsolved that calls for our attention, namely: (i) millions of hectare of logged over areas and most of them are degraded and others are underutilized and left unproductive, and (ii) high supply-demand gap of logs, due to a huge excess demand for logs and pulpwood. Industrial timber and estate crop plantations are considered to be the alternative way out towards reaching sustainable natural forest management.

Evidence suggests that many logging companies are in fact more interested on clear-cutting timber than truly establishing the plantation. The main reason has been the need to get cheap timber for fulfilling an excess demand for pulpwood by pulp and paper industries. Many logging companies who also own estate crop plantations apply for a license to establish (timber or estate crop) plantation in the conversion area, clear the forest for logs and pulpwood, and eventually abandon the cleared land

Although timber plantation development could potentially sustain timber supply and help to maintain the remaining natural forest cover, it has actually increased pressure on the remaining natural forests because it has been done ineffectively. In addition, the development of the pulp and paper industry induced the prioritization of pulp plantations, thus undermining any efforts or intentions to develop timber plantations to address the raw material problem faced by the plywood industry.

Establishment of plantation and estate crops was one of logical ways for making the logged over area becoming more productive. When appropriately sited and well managed, tree crop production can utilize and stabilize marginal land in critical areas for which few other sustainable land uses may be available. Not only is this tree-crop plantation a sensible alternative to rehabilitate critical land but it is also a suitable way to protect natural forest from further encroachment involving dwellers living in and surrounding forests.

The plantation area can be used as a bumper zone of forest areas, as the dweller can intensively cultivate the land with commercial crop, earning enough income for the family, and it therefore discouraging them to enter the forest for their living. Apparently, this is the importance linkage between agriculture and forestry that needs to be further developed in the future, as long as improved people welfare and sustainability of natural forest are the nation's primary concerns.

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