



## CHAPTER 3 DEFORESTATION AND FOREST DEGRADATION

### 3.1 The Dynamics of Deforestation: An Overview

Deforestation in Indonesia is largely the result of a corrupt political and economic system that regarded natural resources, especially forests, as a source of revenue to be exploited for political ends and personal gain. The country's growing wood-processing and plantation crop industries proved lucrative over the years, and their profitability was used by the Suharto regime as a means to reward and control friends, family, and potential allies. Over the past 30 years, the country vastly increased its output of forest products and plantation crops grown on former forest land. Indonesia today is a major producer of logs, sawnwood, plywood, woodpulp, and paper as well as such plantation crops as palm oil, rubber, and cocoa. This economic development was achieved with virtually no regard for the sustainable management of forests or the rights of local people.

- More than half of Indonesia's forests are allocated for timber production on a selective felling basis. Many logging concessions override traditional patterns of land ownership or use rights. Lack of corporate oversight and accountability means that forestry management is poorly supervised and, over time, many production forests have been overexploited. The government now classifies nearly 30 percent of surveyed logging concessions as being in a "degraded condition." Below a productivity threshold, degraded concessions are vulnerable to reclassification to a category that allows plantation operators to apply for a conversion license. If granted, the forest may then be cleared completely and converted to a timber or estate crop plantation.
- Industrial timber plantations have been widely promoted and subsidized as a means of both supplying Indonesia's booming demand for pulp and taking pressure off natural forests. Nearly 9

million ha of land have been allocated for development as industrial timber plantations, but much of this land was natural forest. The land has either been cleared already or is likely to be cleared soon. Only about 2 million ha have actually been planted, leaving up to 7 million ha of cleared and unproductive land.

- The boom in estate crop plantations, especially oil palm, is another cause of deforestation. Nearly 7 million ha of forest had been approved for conversion to estate crop plantations by the end of 1997, and this land has almost certainly been cleared. But the area actually converted to oil palm plantations since 1985 is about 2.6 million hectares, while new plantations of other estate crops probably account for another 1-1.5 million ha. This leaves close to another 3 million ha of cleared forest land lying idle. Many of the same companies that operate logging concessions also own estate crop plantations, and corrupt relationships have developed in which

operators apply for a license to establish a plantation, clear the forest, use the timber for pulp, then move on and abandon the cleared land.

- Logging concessions, timber plantations, and forest clearance combined provide less than half the wood needed by Indonesia's wood processing industries. Imports are relatively small, and illegal logging makes up the shortfall. Indonesia today is plagued by organized wood theft on a massive scale: 50-70 percent of wood supplied to the forest products industry each year is cut illegally. The total area of forest lost to illegal logging is not known, but a former senior official of the Ministry of Forestry, Titus Sarijanto, recently claimed that theft and illegal logging have destroyed an estimated 10 million ha of Indonesian forests.<sup>6</sup>
- The role of small-scale traditional agriculture, relative to other causes of deforestation, has been the subject of great controversy. No accurate data are available for the area of forest cleared by small-scale farmers since 1985, but a plausible estimate in 1990 suggested that shifting cultivators might be responsible for about 20 percent of forest loss. This calculation would translate to clearance of about 4 million ha between 1985 and 1997.
- The transmigration program, lasting from the 1960s to 1999, relocated people from densely populated Java to the outer islands. According to

estimates by the Ministry of Forestry, the program was responsible for nearly 2 million ha of forest clearance over that period. In addition, small farmers and opportunistic small-scale investors have contributed to deforestation by establishing cash crops, especially oil palm and cocoa, in forests opened up by larger-scale logging or plantation operations. Recently, "spontaneous" transmigration has increased with the movement of people looking for greater economic opportunity or seeking to avoid social unrest and ethnic violence. Reliable national-scale estimates of forest clearance by these migrants have not been made.

- Deliberate fire-setting by large-scale plantation owners to clear land and by local communities to protest plantation or logging operations has led to uncontrolled wildfires of unprecedented extent and intensity. More than 5 million ha of forest burned in 1994 and another 4.6 million ha burned in 1997-1998. Some of this land is regenerating as scrubby forest, some has been colonized by small-scale farmers, but little systematic effort has been made to restore forest cover or establish productive agriculture.

As this brief summary makes clear, deforestation must be seen as a complex phenomenon in which all these factors interact. An overview of some of these interactions is provided in Figure 3.1.

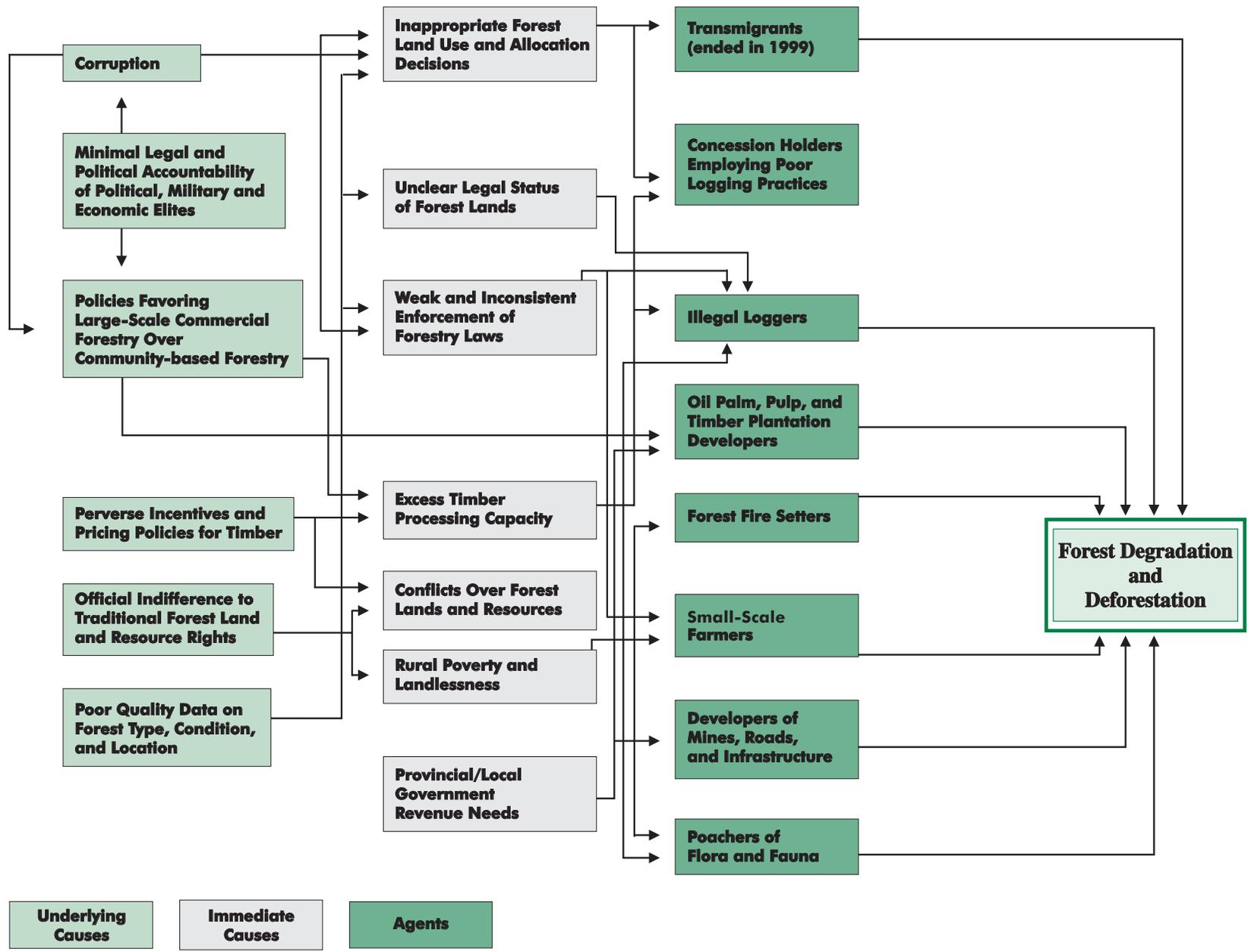
## 3.2 Timber Extraction: Logging Concessions (HPHs)

Even though logging concessions are intended to maintain forest lands in permanent production, the concession system has, in fact, been a major cause of deforestation and forest degradation.

When Suharto's "New Order" regime came to power in the late 1960s, economic planners took immediate steps to develop Indonesia's weak economy and create the legal framework to permit private firms to harvest and export timber. Sumatra and Kalimantan were the first targets of forest exploitation because they had the largest stocks of commercially valuable tree species and were closest to Asian markets.

The 1967 Forestry Act provided the legal basis to award timber harvesting rights, and many large 20-year logging concessions (*Hak Pengusahaan Hutan* or HPHs) were granted soon after. Exports of unprocessed logs rose sharply in the 1970s, providing foreign exchange, capital to build Indonesia's emerging business empires, and employment. From 1969 to 1974, for example, nearly 11 million ha of logging concessions were granted in East Kalimantan alone (GOI and IIED, 1985). Only 4 million m<sup>3</sup> of logs were cut from Indonesian forests in 1967, mostly for domestic use, but by 1977 the total had risen to approximately 28 million m<sup>3</sup>, at least 75 percent of which was exported (Romm, 1980). Gross foreign exchange earnings from the forestry sector rose from \$6 million in 1966 to more than \$564 million in 1974. By 1979, Indonesia was the world's leading producer of tropical logs, with a 41 percent share (\$2.1 billion) of the global market.

Figure 3.1 Processes of Forest Degradation and Deforestation in Indonesia



This figure represented a greater export volume of tropical hardwoods than the exports of Africa and Latin America combined (Gillis, 1988:43-104).

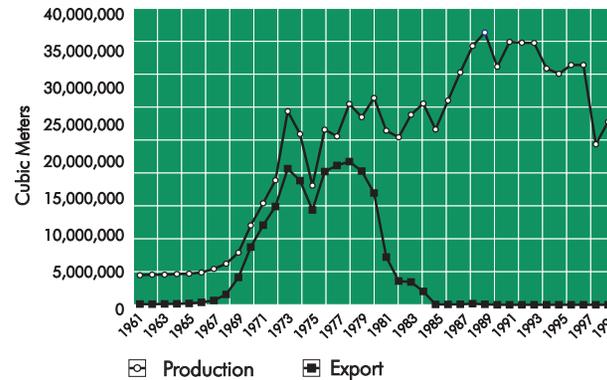
Roads, towns, and other infrastructure were built in Sumatra and Kalimantan in the wake of the timber bonanza, and the island populations grew substantially. East Kalimantan, which was undergoing a simultaneous oil boom, doubled its population between 1970 and 1980, transforming the landscape as agricultural settlers followed the loggers into the forests (Mackie, 1984:63-74).

### Consolidation in the Timber Industry

The timber industry went through a period of consolidation when a ban on log exports was imposed in the early 1980s, creating a few mammoth timber firms that concentrated on plywood production. Industry concentration was further encouraged by an HPH regulation requiring companies that sought a concession license to own a processing facility or have a corporate relationship with one. This requirement tended to limit concession ownership to big groups that owned plymills. The number of plywood mills in the country rose from 21 in 1979 to 101 in 1985, and production rose from 624,000 m<sup>3</sup> in 1979 to nearly 4.9 million m<sup>3</sup> in 1985, then doubled again to over 10 million m<sup>3</sup> in 1993. Nearly 90 percent of production in that year was exported. (See Figures 3.2 and 3.3.)

From the 1980s onward, the timber industry became increasingly concentrated in the hands of a small number of firms connected to the government. By 1994, the top 10 timber groups controlled 28 million ha (45 percent) of the logging concessions in the country, a figure that rose to 64 percent in

Figure 3.2 Production and Export of Logs, 1961–1999



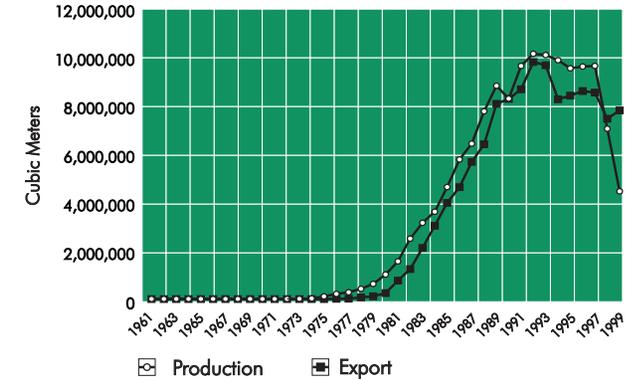
Source: FAOSTAT. FAO online database.

Note: Exports of logs have not been zero since 1986. ITTO reports log exports of nearly 300,000 m<sup>3</sup> in 2000 and this excludes illegal trade.

timber-rich East Kalimantan (Brown, 1999:12-13). These big firms formed a cartel (Apkindo) that not only made Indonesia the world's largest plywood producer but also succeeded in raising international plywood prices (Gellert, 1998). Suharto's family and inner circle were important players in the industry. According to the watchdog group Indonesian Corruption Watch, Suharto's family alone controlled more than 4.1 million ha of logging concessions.<sup>7</sup> (See Annex 2, Table 2.)

By 1995, some 585 concessions covered 63 million ha, approximately one third of the nation's total land area (Brown, 1999:13). In the mid-1990s, however, many concessions were withdrawn, in part because of violations by concession holders and in

Figure 3.3 Production and Export of Plywood, 1961–1999

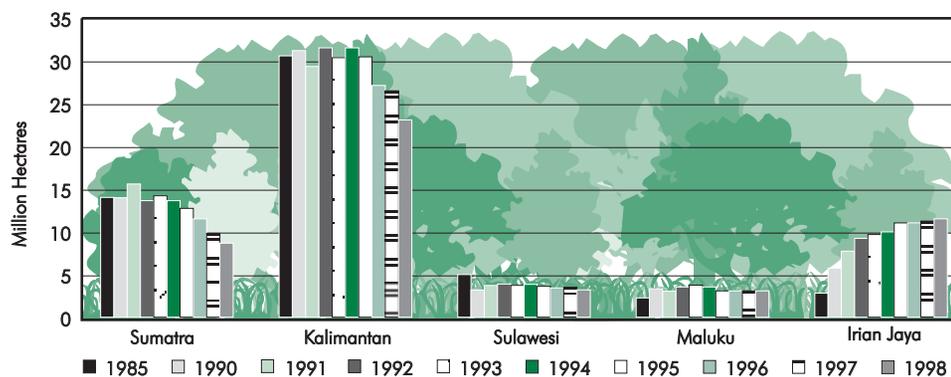


Source: FAOSTAT. FAO online database.

Note: It seems implausible that production levels fell below export levels after 1998. ITTO and the Indonesian Ministry of Forestry record smaller decreases in production after 1997. (See Note 18.)

part because the value of timber stands in many concessions was declining, a situation that reduced their attractiveness as long-term commercial operations. Brown estimates that the total number of concessions fell to 464, while the area of forest under concessions fell to 52 million ha. (See Figure 3.4.) The majority of withdrawn concession licenses were in Sumatra and Kalimantan; concession area continued to expand in Irian Jaya, which is still rich in unlogged forest resources. In practice, the “withdrawal” of over 100 concessions did not mean that they ceased operations. Numerous concessions whose 20-year contract period had ended were either transferred to five state-owned forestry corporations (Inhutani I-V) or reconstituted as joint ventures between private firms and one of these

Figure 3.4 Concession Area in Major Provinces, 1985–1998



**Sources:** Forestry Statistics Indonesia, 1998; Concession names and locations from Agriculture Census, 1993, BPS; CIC, Study and Directory of Forest Management Rights (HPH) in Indonesia, 1999.

**Notes:** The data underlying this chart are presented in Annex 2, Table 3. Data from 1996 onward are for HPHs believed to be currently active.

state firms. By mid-1998, only 39 million ha remained wholly in the hands of private concession holders; 14 million ha were being managed by the five Inhutani firms, 8 million ha were under state-private joint ventures, and an additional 8 million ha had been slated for conversion to nonforestry uses (Fox et al., 2000). The armed forces also benefited from the redistribution of concessions. Their concession area nearly doubled, to 1.8 million ha. (Brown, 1999:12, 40).

Despite this major shake-up in the industry, the top 10 timber companies were virtually unscathed; their ranking and control over concession area changed little. (See Table 3.1.)

### Area and Status of Logging Concessions

In preparing this report, we were not able to obtain spatial data that would have identified the distribution of active and inactive concessions today. In fact,

the true status of many concessions – whether they are in active operation, officially inactive but actually in operation, or no longer operating – remains hard to establish. In early 2000, the Ministry reported that 387 concessions were still actively operating, out of a total of 500 licensed to operate over a total forest area of 55 million ha.<sup>8</sup> However, a subsequent Ministry analysis released in July 2000 stated that 652 recognized concessions existed, covering an area of 69 million ha. Of these, 293 were apparently still operating under valid licenses (nearly 34 million ha), 288 had expired licenses but had not returned the land to government control (nearly 30 million ha), and 71 (about 5.5 million ha) had been formally returned to government control. (See Table 3.2.)

In January 2001, the Ministry of Forestry awarded 11 new concessions with forest areas totaling 599,000 ha. All but two were in Central or East Kalimantan and most ranged between 40,000 and

50,000 ha. The exceptions were one concession of 45,000 ha in Riau province, Sumatra, and one much larger concession, of 175,000 ha, in Irian Jaya.<sup>9</sup> The extent and distribution of logging concessions in the early 1990s, the most recent years for which spatial data are available, are shown in Map 8.

### Concession Mismanagement and Forest Condition

The close connections between the Suharto regime and most of the major timber groups resulted in a lack of oversight and transparency, which was one reason for poor forestry management. Concession holders took little responsibility for forestry practices in the field, and there is no good evidence that the situation has improved. In early 2000, the Ministry of Forestry reported that “most” of the forest under logging concessions was in “damaged condition.”<sup>10</sup> It appears that timber firms regularly violate various provisions of the Indonesian Selective Cutting

<b>Table 3.1 Ranking of Top 10 Timber Groups by HPH Holdings, 1994–1995 and 1997–1998</b>			
<b>1994–1995</b>		<b>1997–1998</b>	
<b>Timber Group</b>	<b>Area of HPH (Ha)</b>	<b>Timber Group</b>	<b>Area of HPH (Ha)</b>
Barito Pacific	6,125,700	Barito Pacific	5,043,067
Djajanti	3,616,700	Djajanti	3,365,357
Alas Kusuma	3,364,200	KLI	2,806,600
KLI	3,053,500	Alas Kusuma	2,661,376
Inhutani I	2,422,000	Inhutani I	2,609,785
Bob Hasan Group	2,380,800	Bob Hasan Group	2,131,360
Korindo	2,225,000	Armed Forces/Navy	1,819,600
Surya Dumai	1,801,400	Korindo	1,589,228
Satya Djaya Raya	1,663,500	Kodeco	1,081,700
Tanjung Raya	1,530,500	Sumalindo	1,057,678
<b>Subtotal</b>	<b>28,183,300</b>	<b>Subtotal</b>	<b>24,165,751</b>
<b>TOTAL (including other groups)</b>	<b>62,543,370</b>	<b>Total (including other groups)</b>	<b>51,251,052</b>
<b>Top 10 as % of Total (including other groups)</b>	<b>45%</b>	<b>Top 10 as % of Total (including other groups)</b>	<b>47%</b>

**Source:** D. Brown, “Addicted to Rent: Corporate and Spatial Distribution of Forest Resources in Indonesia.” (Jakarta, Indonesia: Department for International Development (DFID), Indonesia-UK Tropical Forest Management Programme (ITFMP). 7 September, 1999:12–13, 40–41.

**Note:** Total concession area differs slightly from that presented in Annex 2, Table 3.

<b>Table 3.2 Logging Concession Status and Area, Reported in 2000</b>		
<b>Logging Concession Status</b>	<b>Number of Units</b>	<b>Area (Ha)</b>
20-Year Concession Grant Still Operating	293	33,950,000
20-Year Concession Grant Expired	288	29,980,000
Expired Concessions Formally Returned to State Control	71	5,470,000
<b>TOTAL</b>	<b>652</b>	<b>69,400,000</b>

**Source:** *Penataan Kembali Pengelolaan Hutan Produksi di Luar P. Jawa Melalui Restrukturalisasi Kelembagaan Usaha di Bidang Kehutanan* [Reorganizing Management of Production Forests Outside Java by Restructuring Forestry Sector Management Institutions]. (Jakarta, Indonesia: Ministry of Forestry and Estate Crops, 2000). Online at <http://www.dephut.go.id/informasi/umum/restrukturalisasi.htm>.

### Box 3.1 Common Illegal Practices of Timber Companies

When opening a new area for cutting, companies often build substandard logging roads without drainage systems (gutters, culverts, etc.), leading to erosion and landslips. Bridges are constructed by piling up timber logs, causing forest water channels to become clogged. Water then seeps into the surrounding areas, creating waterlogging which rots tree roots. Felling activities are frequently contracted out to other parties, who operate without supervision. Subcontractors tend to cut for short-term profit – as much as they can as fast as they can – which results in cutting of trees with diameters smaller than the felling limit (50 cm at breast height), removing trees from river and stream banks, or felling on steep slopes. Protected trees may also be cut indiscriminately. Cutting often occurs outside designated cutting blocks (which are specified each year in an annual plan) and even outside concession boundaries. Cut logs are often not collected or stored at the designated sites. In many concessions, it is not difficult to find numerous former unofficial log storage sites where the forest has been cut and the land so degraded that scrub is the only regrowth. Concessionaires are required to replant 2 years after they have logged an area, but some have been observed to plant only a small area where forestry officials are most likely to visit. Seedbeds may be established but owing to the difficulties of producing seedlings from dipterocarps, saplings often do not survive.

**Source:** Reports from the field by environmental activists.

**Table 3.3 Forest Condition in 432 Current and Expired Logging Concessions**

Forest Condition	Concession Areas (320 Units)		Expired Concessions Managed by State Forestry Corporations Inhutani I–V (112 Units)		TOTAL	
	Area (Ha)	%	Area (Ha)	%	Area (Ha)	%
Primary Forest	18,300,000	45	600,000	11	18,900,000	41
Logged Forest in Good-Moderate Condition	11,100,000	27	2,500,000	44	13,600,000	29
Degraded Forest, Scrub, and Agriculture	11,600,000	28	2,600,000	45	14,200,000	30
<b>TOTAL</b>	<b>41,000,000</b>	<b>100</b>	<b>5,700,000</b>	<b>100</b>	<b>46,700,000</b>	<b>100</b>

**Source:** *Penataan Kembali Pengelolaan Hutan Produksi di Luar P. Jawa Melalui Restrukturalisasi Kelembagaan Usaha di Bidang Kehutanan* [Reorganizing Management of Production Forests Outside Java by Restructuring Forestry Sector Management Institutions] (Jakarta, Indonesia: Ministry of Forestry and Estate Crops, July 2000). Online at <http://www.dephut.go.id/informasi/umum/restrukturisasi.htm>.

**Note:** 7.3 million ha of 18.9 million ha (39 percent) of primary forest remaining in the area surveyed is located in Irian Jaya. The survey was based on analysis of 1997–1999 Landsat Images.

System (TPTI), which they are obliged to follow under the terms of their 20-year concession contracts (World Bank, 2001:19). (See Box 3.1.)

A report by the Ministry of Forestry in July 2000 indicated that in a survey of nearly 47 million ha of forest land under active or expired concessions, about 30 percent was degraded, reduced to scrub, or converted to agriculture, and only 40 percent was still classified as primary forest in good condition. (See Table 3.3.)

Growing environmental activism and increasingly frequent public protests have begun to put pressure on the government to take some action against offenders. On May 5, 1999, the Minister of Forestry withdrew a 39,300-ha logging concession granted in 1992 to the Medan Remaja Timber (MRT) company in Aceh Province, Sumatra. The process to revoke MRT's license began after environmental NGOs delivered information concerning the company's poor performance to the Minister. Around the same time, local people vented their anger and opposition by setting fire to the MRT



base camp, blockading the company's logging road, and seizing the heavy equipment, making it impossible for the loggers to operate.<sup>11</sup>

Indonesia has been developing a system for certifying well-managed logging concessions since the mid-1990s but, until early 1999, not one logging company was ready to be certified. In April 1999, the Diamond Raya Timber Company was awarded a "bronze medal," the lowest level of certification, by LEI, the Indonesian Ecolabelling Institute. The company failed to pass a subsequent Joint Certification Protocol agreed by LEI and the Forest Stewardship Council (FSC) but was again awarded a bronze medal by LEI in April 2001. However, in July 2001,

the company was heavily criticized by the Rainforest Foundation and WALHI, Indonesia's largest national environmental organization. The company's concession in Riau province, Sumatra, is inhabited by the highly endangered Sumatran tiger, and Diamond Raya is accused of failing to take any protective measures or to conduct environmental impact studies of its operations. Illegal logging is also allegedly rampant inside the concession.<sup>12</sup>

The number and total area of concessions have declined since the mid-1990s, and concessions are providing a smaller share of the country's timber supply than formerly. However, nearly half of Indonesia's remaining tropical forests are still under logging licenses and are either degraded or at risk of degradation unless current practices are changed. An additional threat is posed by the new regional autonomy policy, which gives local authorities much greater power to grant logging concessions. (See Chapter 5.) After many years of seeing logging revenues captured by the central government, local authorities are eager to exploit forest resources for local benefit. Without strong institutional frameworks and responsible planning, forests are being logged even more intensively for the sake of short-term gain.

### 3.3 Timber Extraction: Illegal Logging

#### Dependence on Illegal Supply

Illegal logging is widespread and systematic in many parts of Indonesia and, in 2000, appeared to be the source of 50–70 percent of the country's wood supply. An analysis that year by the Ministry of Forestry officially stated what has been common knowledge for some time:

*Illegal logging has come to constitute a well-organized criminal enterprise with strong backing and a network that is so extensive, well established and strong that it is bold enough to resist, threaten, and in fact physically tyrannize forestry law enforcement authorities. ...Illegal cutting occurs in concession areas, unallocated forest areas, expired concessions, state forestry concessions, areas of forest slated for conversion, and in conservation areas and protected forests.*

*Indeed, illegal logging is increasing in conservation areas, since these areas have better timber potential than production areas. The actors in illegal logging are: (a) laborers from communities in the forest areas and also many who are brought there from other areas; (b) investors, including traders, concession holders, or holders of legal timber cutting permits (IPK), and buyers of illegal timber from processing industries; and (c) government officials (both civilian and military), law enforcement personnel, and certain legislators.<sup>13</sup>*

### Box 3.2 What Do We Mean by Illegal Logging?

Illegal logging is an emotive term that requires some definition. This report uses the term to describe all forestry practices or activities connected with wood harvesting, processing, and trade that do not conform to Indonesian law. There are essentially two kinds of illegal logging. The first is carried out by legitimate operators who violate the terms of their licenses. The second involves outright timber theft, whereby trees are felled by people who have no legal right to cut trees at all.

Data collection and analysis by the Natural Resources Management (NRM) Program of USAID focused on the wood intake and production of Indonesia's sawmills and plywood plants. One conclusion was that any discussion of industry overcapacity and the link to illegal logging must recognize that "illegal logging" can take many forms beyond the illegal removal of trees from the forest. Examples can be found in the forest concession (HPH) system and the industrial timber plantation (HTI) system.

#### HPH/Forest Concessions Linked to Wood Processing Facilities

- Harvesting more than the annual allowable cut (AAC)
- Harvesting in Protection Forest areas (steep slopes and river banks)
- Underreporting harvest volumes and tax payable
- Ignoring selective cutting guidelines

- Harvesting outside concession boundaries
- Falsifying log transport documents

#### HTI/Industrial Timber Plantations Linked to Pulp Mills

- Clear-cutting natural forest, then failing to replant
- Not planting at rates required to maintain long-term production
- Replanting with low-quality species
- Replanting at low density
- Persistently supplementing plantation supply with "bridging" supply from conversion forest
- Accepting falsified log transport documents

Big wood processing operations are responsible – directly or indirectly – for the majority of illegal logging because they consume the most wood and because small companies lack the capacity to overharvest at significant levels. Illegal logging is also undertaken by small-scale operators who might harvest a few logs from the forest each week and sell them to larger legitimate operators. These small teams of illegal loggers are frequently funded and directed by the major companies. Illegal logs from such sources are then mingled undetectably with the legal harvest.

**Source:** "Indonesian Forestry Sector: Discussion of Data Analysis and Current Policy Issues." Presentation by the EPIQ/Natural Resources Management Program, United States Agency for International Development (USAID) at Winrock International. Arlington, VA. August 1, 2000.

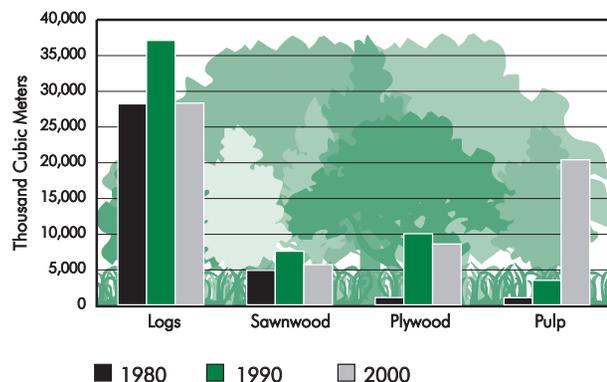
Illegal timber brokers flourish throughout the country, supplying wood processors who cannot obtain adequate supplies legally.<sup>14</sup> Corruption among civilian and military officials, many of whom are closely involved in illegal cutting and marketing, is pervasive.<sup>15</sup> Official involvement in illegal logging has become so blatant and widespread that provincial legislators in Sumatra's Jambi province felt obliged to make a public appeal to military, police, and justice officials to stop supporting illegal loggers' operations.<sup>16</sup> The Indonesian Plywood Association (Apkindo) complained in June 2000 that illegal loggers in Sumatra and Kalimantan were exporting at least 1 million m<sup>3</sup> of timber to China and undercutting the legal export market.<sup>17</sup>

Illegal logging is not always a clearly defined term. Box 3.2 explains how it is used in this report. Map 9 illustrates the distribution of reported cases of illegal logging in Indonesia between 1997 and 1998.

### The Gap Between Supply and Demand

How has such a situation arisen? The short answer is that Indonesia has pursued a policy of aggressive expansion in the forest products sector with insufficient regard for the long-term sustainability of supply. (See Figure 3.5.) Indonesia's annual log production rose from about 11 million m<sup>3</sup> in the 1970s to a peak of about 36 million m<sup>3</sup> in the early 1990s. More rapid expansion occurred in the processed wood products sector as the government encouraged a shift away from the production of lower-value unprocessed logs toward value-added products. The first boom was in plywood production, which took off during the 1980s and 1990s as part of the country's drive to increase exports. (See Figure 3.3.) Production has declined somewhat

Figure 3.5 Industrial Roundwood Production, 1980–2000



**Source:** ITTO (Logs, Sawnwood and Plywood). Indonesian Pulp and Paper Association (Pulp)

**Notes:** Pulp production data are in roundwood equivalent, using a conversion rate of 4.9 cubic meters consumed to produce 1 metric ton of pulp. ITTO production data for Indonesia are consistently higher than those from FAO. ITTO log production data for 2000 are provisional and may be revised downward. They are dramatically higher than the 2000 log production data provided by the Indonesian Ministry of Forestry.

following the economic crisis of 1997, although startling data discrepancies exist among different sources.<sup>18</sup>

The pulp and paper industries have grown even more dramatically. Since the late 1980s, production capacity has increased nearly 700 percent. (See Figures 3.7 and 3.8 in next section.) Indonesia has become the world's ninth largest pulp producer and eleventh largest paper producer. This prodigious

Table 3.4 Timber Supply from All Legal Sources (m<sup>3</sup>)

Source of Production	1995	1996	1997	1998	1999	2000
Production Forest (HPH)	17,012,949	15,595,766	16,224,228	11,867,274	8,599,105	7,661,219
Conversion Forest (IPK)	5,845,475	7,232,482	9,524,572	7,249,878	6,239,278	4,643,993
Community Forests	149,023	603,151	1,213,928	719,074	957,056	232,134
State-Controlled Timber Plantations (Perhutani) in Java	1,795,630	1,911,757	1,604,034	1,718,561	1,890,900	897,615
Industrial Timber Plantations (HTI)	514,692	474,268	425,893	480,210	4,844,493	3,779,828
<b>TOTAL</b>	<b>25,317,769</b>	<b>25,817,423</b>	<b>28,992,654</b>	<b>22,034,997</b>	<b>22,530,833</b>	<b>17,214,789</b>

**Source:** Ministry of Forestry, March 2001.

**Notes:** Ministry of Forestry data on roundwood production are consistently lower than those reported by FAO and ITTO. Data for the year 2000 could not be cross-checked because FAO log production data for 2000 were not available at the time of writing, and ITTO data were still provisional. The Ministry production figure of 17.2 million cubic meters must, at this stage, be treated with caution.

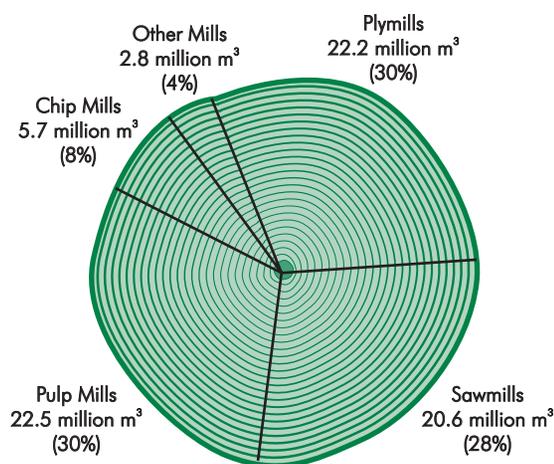
investment in plywood, pulp, and paper processing capacity has far outpaced efforts to develop adequate feedstocks from plantations, and the industry's expansion has come largely at the expense of the country's natural forests. (Plantations are discussed in greater detail in the following section.) Total wood demand in Indonesia today is conservatively estimated at 76-80 million m<sup>3</sup>. (See Figure 3.6.)

Against this picture of rapidly increasing demand for wood is a story of static or declining supply. (See Table 3.4.) According to the latest estimates from the Ministry of Forestry, output from Indonesia's production forests has declined precipitously, probably because most of the economically desirable concessions have been thoroughly logged.

Wood from conversion forests – forests cleared to make way for agricultural or industrial wood plantations – appears to have peaked in 1997, possibly because the economic and political crisis has discouraged expansion in the plantation sector. Output from industrial timber plantations remained below targets for some years but, according to recent MOF data, production rose sharply in 1999. The increase seems too large to be entirely plausible, but it may be explained by large-scale planting undertaken around 1990 and 1991. Even at this level of production, however, plantations still supply only about 5 percent of total (legal and illegal) wood consumption.

Indonesia suffers from a chronic structural imbalance between supply and demand, and the shortfall

Figure 3.6 Installed Capacity in the Wood Processing Industries, 1999



Source: Ministry of Forestry, Directorate of Forest Protection.  
Note: Total installed capacity = 76 million metric tons.

is made up largely from wood obtained illegally. Reliable data on illegal logging, by definition, are not available for undocumented and underground activities. However, the Government of Indonesia and several independent researchers have made estimates that give a good sense of the magnitude of the problem. Most estimates of illegal logging are based on comparisons of known legal supplies of wood with documented output from the wood processing industries.

A study that compared the production capacity of plymills and sawmills in 1998 with the legal supply of wood from concessions and plantations linked to those mills and from associated forest clearance

concluded that the gap that year between known legal supply and mill output was nearly 21 million m<sup>3</sup> (Brown, 1999:49). The study used conservative assumptions about mill production efficiency, and it did not include the pulp sector, which by 1998 was a significant consumer of wood. The estimate is based on probably the most careful study yet of the plywood and sawnwood sectors but as an estimate of total illegal logging in the country, 21 m<sup>3</sup> is undoubtedly much too low.

Another study of the situation in 1997 and 1998 compared national wood supply (legal production plus imports) with national wood consumption (domestic use plus exports) (Scotland, 2000). The study found that consumption exceeded supply by 32.6 million m<sup>3</sup>. (See Table 3.5.) The extent of domestic demand, as well as the volume of timber smuggled out of the country, is uncertain. The size of imports is also difficult to ascertain, because most imports are of pulp, waste paper, and wood chips, all of which must be converted to roundwood

Table 3.5 Estimated Timber Demand and Imbalance, 1997-1998

Sources of Timber Supply and Demand	Volume (Roundwood Equivalent) ('000 m <sup>3</sup> )
Logs from Domestic Production	29,500
Log Supply Equivalent from Imports	20,427
Log Supply Equivalent from Other Sources (Mainly Recycled Paper)	1,600
<b>TOTAL SUPPLY</b>	<b>51,527</b>
Domestic demand (Timber Processing Industries)	35,267
Log Equivalent of Exports	48,873
<b>TOTAL DEMAND</b>	<b>84,140</b>
<b>Net Wood Balance</b>	<b>-32,613</b>

Source: N. Scotland, "Indonesia Country Paper on Illegal Logging." Prepared for the World Bank-WWF Workshop on Control of Illegal Logging in East Asia. Jakarta, 28 August, 2000. Draft.

Note: A subsequent estimate by the same author, based on higher estimates of domestic consumption and revised roundwood equivalent conversion factors, calculated a net wood balance of -56,612,000 m<sup>3</sup> in 1998. This estimate was not widely accepted but it is plausible.

### Box 3.3 Illegal Logging: A Tale of Two National Parks

The ubiquity of illegal logging in Indonesia and the pervasive corruption and lawlessness that allow it to flourish are starkly illustrated by the assault on Indonesia's national parks. Bukit Tigapuluh National Park in Sumatra and Tanjung Puting National Park in Kalimantan are only two of the more egregious cases in which Indonesia's last reserves of intact forest are being systematically pillaged by illegal loggers operating with the connivance of civilian and military officials.

Bukit Tigapuluh National Park covers 127,698 ha of hilly and mountainous rainforest as well as some mangrove forest in the Sumatran provinces of Jambi and Riau. In addition to serving as an important watershed for the region, the park is rich in biological diversity. The park has 700 recorded plant species, some 246 of which are commonly used by local people for medicinal and other purposes. It is home to 192 recorded bird species (one third of Sumatra's total) and 59 recorded mammal species, including threatened species such as the Sumatran tiger (*Panthera tigris*), Asian elephant (*Elephas maximus*), Malay tapir (*Tapirus indicus*), clouded leopard (*Neofelis nebulosa*), and the Asian small-clawed otter (*Aonyx cinerea*). The area was declared a national park in 1995, encompassing sites previously classified by the government as protection forest and limited production forest. A

logging concession had operated in the production forest area prior to establishment of the park.

Bukit Tigapuluh's rich biodiversity and watershed functions are gravely threatened by illegal logging to feed local illegal sawmills, which multiplied from 4 in 1997 to at least 23 in 1999. This expansion was driven largely by the depreciation of the Indonesian rupiah against the dollar following the 1997 Asian economic crisis, which greatly increased the local rupiah selling price of timber for export. The most sought after commercial species are meranti (*Shorea* spp), balam (*Palaquium walsurifolium*), keruing (*Dipterocarpus* species), bayur (*Pterospermum* species), and sapat (*Ludkia borneensis*).

Logging, milling, and trading of illegal timber from the park and adjacent areas are carried out systematically and in the open, with little or no interference from Forestry Department officials or the police, who are indeed alleged to be actively involved in the business. Illegal logging originally concentrated on the abandoned concession of PT Patriadi, outside the park, but it has moved along three rivers into the park itself. The illegal timber boom in the area has increasingly drawn outside capital and labor into the area, law enforcement is effectively nonexistent, and the outlook for Bukit Tigapuluh's remaining forests is discouraging.

An even more egregious and well-documented case is that of Tanjung Puting National Park in the province of Central Kalimantan, which covers 400,000 ha on an alluvial peninsula jutting south into the Java Sea. The park includes a variety of ecosystems, including tropical heath forest, peat swamp forest, and mangrove forest, and is the habitat of over 200 bird species, 17 reptile species, and 29 mammal species. Nine of Borneo's primate species are found in Tanjung Puting, including approximately 2,000 orangutans. The area, a wildlife reserve since the 1930s, was officially declared a national park in 1984 and is also officially listed by the UN as a Biosphere Reserve.

The park's rich flora includes considerable stands of commercial tree species, notably meranti (*Shorea species*) and ramin (*Gonystylus species*). Ramin has been a particular target for illegal loggers since the early 1990s, and illegal cutting of this valuable timber has soared in recent years with the erosion of civil order and law enforcement that accompanied the economic and political crises that began in 1997-1998 and continue today. Ramin is a rare wood that grows only in lowland tropical forest areas, and it has been essentially logged out in many other parts of Indonesia. The attraction for illegal loggers is clear – sawn ramin sells for approximately \$600 per m<sup>3</sup> on international

### Box 3.3 (continued)

markets, and moulded ramin for as much as \$1,200 per m<sup>3</sup>. Major buyers include Malaysia, Singapore, Taiwan, China, the United States, and various European nations.

Illegal logging for ramin and other species occurs throughout most of Tanjung Puting, particularly along the Sekonyer, Buluh Besar, and Seruiyan rivers, which either border or bisect the park. Field investigations by the Environmental Investigation Agency (a UK-based NGO) and Telapak Indonesia (an Indonesian NGO) during 1999 and 2000 revealed that only one third of the park's forests are still intact.

In Tanjung Puting, illegal logging is a large-scale, well-organized commercial operation carried out with the tacit or active support of local military, police, and forestry officials. Abdul Rasyid, a local timber baron who also represents Central Kalimantan in Indonesia's National Assembly (the MPR), has been reported by numerous sources, including officials of the central government, as the mastermind of the operation. Illegal loggers can be ruthless in protecting their interests. Two observers from EIA and Telapak were badly beaten and held hostage for 3 days in January 2000 by employees of Tanjung Lingga, Rasyid's timber company.

Actual logging is carried out by teams of local loggers who are supplied with chainsaws and other equipment and are paid less than \$1 per m<sup>3</sup> for the ramin they cut. The wood is then processed in Rasyid's nearby factory by workers paid less than \$1 per day. In some cases, police and forestry officials are bribed to "confiscate" loads of illegally cut ramin. Indonesian law provides that confiscated timber is to be auctioned, and the company then buys the timber cheaply through a crooked auction process, receiving all necessary papers declaring the wood to have been legally obtained. Illegal ramin is thus "laundered" and becomes legal in the eyes of Indonesian law.

Despite extensive video and other documentation of the widespread illegal logging at Tanjung Puting and the central role of Abdul Rasyid in the operation, little action has been taken by the government to end the pillage of the park. Evidence to support a case against Rasyid was forwarded by the Forestry Department to the National Police in October 2000, but to date no action has been taken. Under pressure from national and international NGOs, the government did place ramin on Appendix III of the Convention on International Trade in Endangered Species (CITES) in April 2001, with a zero export quota for 2 years.

As *Newsweek* magazine noted in September 2001, "Tanjung Puting has come to symbolize the corruption and lawlessness of Indonesia's forestry sector." Indeed, the inability or unwillingness of the government to bring Abdul Rasyid to justice in such a high profile illegal logging case – in a park often cited as a "crown jewel" of the Indonesian protected areas system – bodes ill for the remaining scraps of officially protected intact forest lying within Indonesia's poorly managed system of protected areas.

#### Sources:

Department for International Development (DFID) and Worldwide Fund for Nature (WWF). 1998. *Laporan Perkembangan Sawmill Wilayah Selatan Taman Nasional Bukit Tigapuluh dan di Sekitar Areal KPHP Pasir Mayang*. [Report on Development of Sawmills in the Southern Region of Bukit Tigapuluh National Park and in the area around KPHP Report on sawmill development in the district South TN Tigapuluh Hill and surrounding area KPHP Pasir Mayang.] DFID and WWF. Report PFM/KPHP/98/7.

Environmental Investigation Agency and Telapak Indonesia. 1999. *The Final Cut: Illegal Logging in Indonesia's Orangutan Parks*. London, UK and Bogor, Indonesia.

Environmental Investigation Agency and Telapak Indonesia. 2000. *Illegal Logging in Tanjung Puting National Park: An Update on the Final Cut Report*. London, UK and Bogor, Indonesia.

"Raping Borneo." *Newsweek*, September 10, 2001.

equivalent volume. In addition, large quantities of pulp and paper are traded in both directions (imports and exports), imported pulp is processed into exported paper, and so on. The shortfall of 33 million cubic meters should be regarded as a rough approximation, but it is good enough to indicate the scale of the problem. Illegal logging in 1997–1998 appears to have accounted for more than half of total domestic production.

The imbalance between supply and demand in Indonesia appears to be worsening. The latest data available from the Ministry of Forestry indicate that legal domestic wood production in 2000 fell to a new low of just 17 million m<sup>3</sup>. Domestic production is supplemented by imports. Although imports of roundwood are negligible in Indonesia, imports of pulp and paper are an important source of supply. Data for pulp, waste paper, and paperboard are not yet available for 2000, but imports amounted to 3 million m<sup>3</sup> (roundwood equivalent) in 1999 (APKI, 2001). If imports were similar in 2000, then total wood supply in that year was a little over 20 million m<sup>3</sup>. Consumption data for the wood products industry in 2000 are not available either, but industry capacity is conservatively estimated at about 74–80 million m<sup>3</sup>. If it is assumed that industry output is approximately 75 percent of capacity, then total roundwood demand was 55–60 million m<sup>3</sup>. (This is a reasonable assumption given that pulp mills, which account for about 30 percent of total demand, produced at 84 percent of their capacity in 2000.) Demand for wood in 2000 thus exceeded supply by 35–40 million m<sup>3</sup> which, it must be assumed, was supplied from illegal sources. If these calculations are even approximately correct,

illegal logging accounted for about 65 percent of Indonesia's total wood supply in 2000.

In early 2000, a senior official of the Ministry of Forestry admitted that “the wood-processing industry has been allowed to expand without reference to the available supply of timber, resulting in vast overcapacity. The shortfall in the official timber supply is being met largely by illegal logging, which has reached epidemic proportions.”<sup>19</sup> Box 3.3 illustrates how illegal logging proceeds unhindered even in Indonesia's national parks.

The international aid agencies and lending institutions in the Consultative Group on Indonesia (CGI) have often warned that continued aid to the forestry sector is contingent on more effective action to eradicate illegal logging.<sup>20</sup> (*See Chapter 5.*) It is clearly recognized that while the supply/demand imbalance continues, illegal logging will not be brought under control. Most analysts agree that the solution lies not in combatting illegal loggers in the forest but in measures directed at the demand side. Promising actions include a moratorium on further growth in the capacity of the wood processing industries, probably followed by downsizing; elimination of direct and hidden government subsidies to the pulp industry; credible monitoring of plantation development and penalties for companies that fail to meet their planting obligations; and enforcement of agreed due diligence practices on the part of financial institutions that invest in pulp and paper facilities in order to avoid funding projects that use illegally obtained wood.



E.G. Togu Manurung

### 3.4 Industrial Timber Plantations (HTIs)

In the mid-1980s, the government launched an ambitious plan to establish vast areas of fast-growing timber plantations (*Hutan Tanaman Industri* – HTIs), especially in Sumatra and Kalimantan. The program accelerated with the issuance of a Government Regulation in 1990.<sup>21</sup> At the outset, the government justified the HTI program in terms of supplementing supplies of timber from the natural forests, rehabilitating degraded lands, and promoting nature conservation.<sup>22</sup> To this ostensible end, timber plantation entrepreneurs receive various government subsidies, including loans on generous terms from the “Reforestation Fund,” which is collected from logging concession holders.<sup>23</sup>

HTI concessions are granted for production of both pulpwood and nonpulpwood (usually sawnwood for construction). They can be established indepen-

dently or in conjunction with existing HPH logging concessions. A special category was created for HTI concessions linked to transmigration sites (HTI-Trans), where the transmigrants work on the plantations. HTI-Trans concessions usually produce wood for nonpulp uses. According to official figures, some 7.9 million ha had been allocated for all three types of HTI concession development by the end of 2000, but only 23.5 percent of that area had actually been planted. (See Table 3.6.)

According to unpublished data provided by the Ministry of Forestry, the area of land allocated for HTI concessions by May 2001 had risen to 8.8 million ha, but data on the area planted were not available.

### Forest Conversion to HTIs

The fact that less than one quarter of lands allocated for HTI concessions by 2000 had actually been planted is a symptom of several interrelated structural problems with the HTI program. The 1990 Regulation clearly states that HTIs are to be granted only on nonproductive areas of permanent forest estate and may not be granted in areas already under a logging concession (HPH). In practice, however, HTI concessions have frequently been established on still-productive forest land. According to calculations based on plantation company feasibility studies, as of June 1998, 22 percent of land managed as HTIs had been productive natural forest prior to plantation establishment (Kartodihardjo and Supriono, 2000:4). Many HTI concessions involve the conversion of a much higher proportion of natural forest area. Table 3.7 illustrates six such cases, where an average of 72 percent of the total

HTI area was formerly natural forest. Box 3.4 provides further illustrative examples.

The economic rationale for establishing HTIs in still-forested areas is clear. First, establishing plantations on truly degraded lands is more expensive because it often requires considerable investment in land preparation to rehabilitate soil fertility. Second, HTI concessions include the right to obtain Wood Utilization Permits (IPKs), essentially licenses to clear-cut and use remaining standing timber. When HTIs are established in areas with considerable standing timber, the IPK provision furnishes the company with a large supply of essentially free timber. This dynamic, combined with the large supply of timber available from illegal sources, considerably diminishes incentives for wood-processing companies to follow through with the planting and harvest of HTIs.

Less than one fifth of the approximately 2 million ha allocated for sawnwood HTI development has actually been planted. HTIs established for production of pulp have done slightly better, with just under one quarter of the nearly 5 million ha allocated for pulp production planted. (See Table 3.6.) But it is clear from the overall low percentage of HTI area planted – only 23.5 percent of the total area allocated for all types of HTI – that planting and harvesting plantation trees is not the major reason for HTI development. Rather, growth in HTI area is being encouraged by generous financial subsidies and rights to clear-cut standing timber. (See Note 23.)

In addition, many HPH concession holders find it economically advantageous to convert degraded

### Box 3.4 Some Cases in Which Companies Have Developed Industrial Timber Plantations in Productive Natural Forest

- The entire HTI area of PT Rimba Equator Permai, covering 21,010 ha, was formerly an HPH of PT Barito Pacific Timber, with an area of 1,586 ha in virgin forest.
- Of the total forest concession area of 73,153 ha owned by PT Sinar Kalbar Raya, an area of 28,065 ha was formerly an HPH production forest owned by PT Pesada Kawi ITC, and 3,250 ha was formerly an HPH area of PT Ponti Jaya.
- The entire area of PT Adindo Foresta Indonesia's HTI, covering 111,355 ha, was formerly production forest for five HPH companies, namely PT Inhutani I, PT Pulau Laut, PT Segara Timber, PT Dana Mulia Bhakti, and PT Karya Jaya Parakawan.
- The entire area of PT Tanjung Redeb Lestari's HTI, covering 180,900 ha, was formerly an HPH production forest area. The timber harvest potential of trees with a diameter exceeding 30 cm dbh was greater than 25 m<sup>3</sup> per ha.
- The entire HTI area of PT Riau Andalan Pulp and Paper, covering 121,000 ha, was formerly production forest for 9 HPH companies with the potential for producing commercial timber of up to 24 m<sup>3</sup> per ha.

**Source:** Feasibility studies prepared by each company pursuant to the granting of their licenses.

areas of their concessions to HTIs. As a World Bank study noted in 1998, “logging operations can degrade a site with little risk of serious penalty, and in the process set themselves up to receive a license to convert the site so damaged into an HTI or tree crop estate.”<sup>24</sup> Forestry Ministry data published in 1998 reveal that more than 2.7 million ha of HPH concessions had been converted to HTI concessions. (See Table 3.8.)

### Development of the Pulp and Paper Industries

A key factor underlying the development of HTI concessions has been the rapid development of the pulp and paper industries over the past decade. Installed annual pulp production capacity grew from 1 million tons in 1990 to nearly 5 million tons in 2000 and is expected to exceed 6 million tons in 2001. Annual paper processing capacity increased from 1.2 million tons to 8.3 million tons over the same period (Barr, 2000:3). (See Figures 3.7 and 3.8.) As a result, both allocation and actual planting of HTI-pulp plantations have greatly exceeded the HTI area established for sawnwood production.

Capacity expansion in the pulp and paper industries has involved investments in large-scale mills with high fixed costs. Most facilities have entailed initial capital investments of between US\$600 million and US\$1.3 billion. Because of these high fixed costs, pulp and paper producers tend to run their mills continuously at or near full capacity and are reluctant to countenance any slowdown in production.

Four large Indonesian conglomerates together accounted for nearly all the paper industry’s growth in the 1990s: the Sinar Mas Group, the Raja Garuda

<b>Table 3.6 Allocation and Planting of Industrial Timber Plantations (HTIs) to December 2000, By Province and Type of HTI</b>				
<b>Province</b>	<b>HTI Area Allocated (Ha)</b>	<b>HTI Area Planted (Ha)</b>	<b>Percent of Allocated Area Planted</b>	<b>Number of Companies</b>
<b>HTI-Pulp</b>				
Aceh	207,899	55,290	26.6	2
North Sumatra	412,060	59,428	14.4	2
Jambi	78,240	86,918	111.1	1
Riau	550,190	289,280	52.6	3
South Sumatra	340,100	222,334	65.4	2
South Kalimantan	268,585	86,259	32.1	1
East Kalimantan	793,237	325,517	41.0	5
Central Kalimantan	185,511	0	0	2
West Kalimantan	735,306	42,785	5.8	5
Irian Jaya	1,389,200	0	0	6
<b>TOTAL</b>	<b>4,960,328</b>	<b>1,167,811</b>	<b>23.5</b>	<b>29</b>
<b>HTI-Sawnwood</b>				
Aceh	6,050	0	0	1
North Sumatra	176,893	26,778	15.1	7
Jambi	154,030	20,481	13.3	6
Riau	257,888	52,843	20.5	12
South Sumatra	58,130	3,623	6.2	3
Lampung	175,152	57,125	32.6	7
Nusa Tenggara Timur	55,074	5,945	10.8	2
South Kalimantan	77,575	26,608	34.3	5
East Kalimantan	439,719	105,020	23.9	12
West Kalimantan	152,780	45,497	29.8	3
Central Kalimantan	79,000	5,000	6.3	6

<b>Table 3.6 (cont.) Allocation and Planting of Industrial Timber Plantations (HTIs) to December 2000, By Province and Type of HTI</b>				
<b>Province</b>	<b>HTI Area Allocated (Ha)</b>	<b>HTI Area Planted (Ha)</b>	<b>Percent of Allocated Area Planted</b>	<b>Number of Companies</b>
<b>HTI-Sawnwood (continued)</b>				
South Sulawesi	57,000	4,910	8.6	3
Central Sulawesi	80,101	5,532	6.9	3
Southeast Sulawesi	72,845	5,942	8.2	2
Maluku	24,851	8,843	35.6	3
Irian Jaya	198,000	0	0	4
<b>TOTAL</b>	<b>2,065,088</b>	<b>374,147</b>	<b>18.1</b>	<b>79</b>
<b>HTI-Trans</b>				
Aceh	32,064	12,158	37.9	5
North Sumatra	6,200	3,856	62.2	1
West Sumatra	6,675	2,354	35.3	1
Riau	83,190	41,124	49.4	6
Jambi	34,835	14,712	42.2	4
South Sumatra	21,000	3,625	17.3	1
West Kalimantan	217,930	33,689	15.5	13
Central Kalimantan	132,495	61,625	46.5	13
East Kalimantan	183,989	75,934	41.3	14
South Kalimantan	41,040	20,943	51.0	4
South Sulawesi	13,300	3,930	29.6	1
Central Sulawesi	13,400	8,742	65.2	1
Maluku	49,717	26,515	53.3	3
<b>TOTAL</b>	<b>835,835</b>	<b>309,207</b>	<b>37.0</b>	<b>67</b>
<b>Grand total</b>	<b>7,861,251</b>	<b>1,851,165</b>	<b>23.5</b>	<b>175</b>
<b>Source:</b> Industrial Timber Plantations Directorate, Ministry of Forestry, 2001				

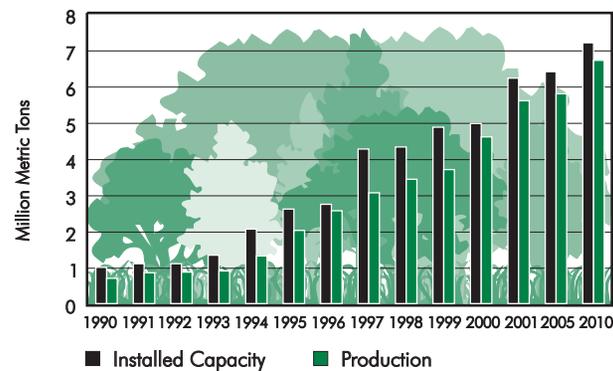
Mas Group, the Bob Hasan Group, and the Barito Pacific Group. (All four are also major logging concession holders and two, Sinar Mas and Raja Garuda Mas, are among the top ten oil palm conglomerates.) Sinar Mas and Raja Garuda Mas operate large pulp processing mills that are directly linked to affiliated paper production mills. Both groups established holding companies, Asia Pulp and Paper (APP) and Asia Pacific Resources International, Ltd (APRIL). Incorporated in Singapore, they attracted enthusiastic and substantial investment from foreign investors. However, the groups' glittering prospectuses did not survive the more open atmosphere following the political changes of 1998, including revelations about the insecurity of future sources of cheap fiber supply. Both APP and APRIL are now in severe financial trouble, facing massive debt and legal action from creditors.<sup>25</sup>

Although pulpwood plantations can be economically attractive to investors because of strong demand and a growing period shorter than that for sawnwood plantations, they still supply only a small fraction of the raw material needed for the booming pulp industry. Production of 1 ton of pulp requires 4.9-5.4 m<sup>3</sup> of roundwood. Thus pulp production in 2000 consumed 23-25 million m<sup>3</sup> of wood – more than the entire legal wood supply that year. (See Table 3.4.) At the same time, production of pulpwood from HTIs was only 3.8 million m<sup>3</sup>. Production data for industrial plantations must be treated with caution, however. At present, therefore, as much as 85 percent of the industry's pulpwood needs is coming from clearing natural forests, many of them lying within HTI concessions. One recent study estimates that pulp production led directly to

deforestation of about 835,000 ha between 1988 and 1999 (Barr, 2000:10). Nearly all this area was cleared to supply just four large pulp mills, and a single mill, Indah Kiat Pulp and Paper, owned by Sinar Mas/APP, was responsible for over one third of the total area deforested (Barr, 2000:10). The Indah Kiat mill accounts for nearly 80 percent of APP's pulp production capacity and over 40 percent of Indonesia's total pulp production.

The country's second largest mill, Riau Andalan Pulp and Paper (RAPP), part of the APRIL holding company, further illustrates the disturbing trend toward use of natural forest to supply wood. RAPP began operating in 1995 and, as of December 2000, had installed capacity of 1.3 million tons per year. Assuming an average conversion rate of 5 m<sup>3</sup> of roundwood to 1 ton of pulp, RAPP consumed up to 6.5 million m<sup>3</sup> of wood in 2000. About 80 percent of the mill's pulpwood has been sourced from natural forest clearance on the company's nearby HTI concession site, and most of the balance has come from a plantation development project. RAPP has announced plans to expand capacity further to 2 million tons per year by 2004. The company has embarked on a vigorous planting program and claims that by 2004, its *current* roundwood needs will be met from plantations, and its *expanded* roundwood needs (10 million m<sup>3</sup> per year) will be met by 2008. Industry analysts familiar with RAPP's plantation program, however, are highly skeptical that the required area will in fact be planted or the necessary yields obtained (Barr, 2000:14-20). The holding group's current financial crisis also casts doubt on their expansion plans.<sup>26</sup>

Figure 3.7 Installed Capacity and Production in the Pulp Industry, 1990–2001 (with projections to 2005 and 2010)

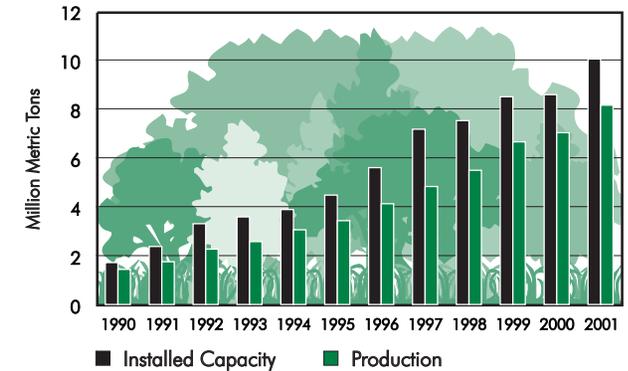


Sources: Indonesian Pulp and Paper Association, 29 August 2000. 2005 and 2010 projections from Jaakko Poyry, 1998. Cited in C. Barr. 2000. *Profits on Paper: The Political-Economy of Fiber, Finance, and Debt in Indonesia's Pulp and Paper Industries*. CIFOR: Jakarta. November 30.

The two giant mills, Indah Kiat and Riau Andalan Pulp and Paper, are located within 100 km of each other in Riau province, Sumatra. With such a concentration of demand, it is not surprising that the pulp industry is unable to meet its raw material needs from plantations or other legal supplies and thus makes extensive use of illegally obtained wood.

The government is aggressively pushing for the development of similar facilities over the next decade. With the continuing vast imbalance between the supply of plantation pulpwood and the pulp industry's demand for raw materials, it seems inevitable that the pulp industry will be a powerful

Figure 3.8 Installed Capacity and Production in the Paper and Paperboard Industry, 1990–2001



Source: Indonesian Pulp and Paper Association.

Note: Paper and paperboard includes: Newsprint Paper; Writing and Printing Paper; Sack Kraft Paper; Liner and Fluting; Boards; Cigarette Paper; Wrapping Paper; Tissue Paper; and Other Paper (not including recycled paper).

<b>Table 3.7 Forested versus Nonforested Area in Six Industrial Timber Plantation (HTI) Concessions</b>			
<b>Company</b>	<b>Total Area (Ha)</b>	<b>Forest Area (Ha)</b>	<b>Nonforest Area (Ha)</b>
PT. Eucalyptus Tanaman Lestari	298,900	253,525 (84.8%)	15,330 (15.2%)
PT. Okaba Rimba Makmur	283,500	256,464 (90.5%)	27,036 (9.5%)
PT. Maharani Rayon Utama	206,800	203,570 (98.4%)	3,230 (1.6%)
PT. Jati Cakrawala	19,170	6,563 (34.2%)	12,607 (65.8%)
PT. Riau Abadi Lestari	12,000	7,015 (58.4%)	4,985 (41.6%)
PT. Mentaya Kalang	10,000	6,651 (66.5%)	3,349 (33.5%)
<b>Rounded Average</b>		<b>72%</b>	<b>28%</b>

**Source:** Feasibility studies prepared by each company and provided to the Ministry of Forestry, pursuant to granting of their licenses.  
**Note:** Forest area = primary forest and logged forest; nonforest area = scrub, lands under local cultivation, settlements, and grassland.

engine of deforestation over the coming decade. And although the amount of pulp harvested on HTI plantations is likely to grow, it is also likely that the development of HTI concessions will continue to serve primarily as a cover for clear-cutting natural forest. The results will be intensified deforestation, with associated negative impacts on biodiversity and hydrological functions and an increase in the area of degraded lands. In addition, HTI development has already given rise to significant local social conflicts in the many cases where allocated HTI areas overlap with agricultural and forest areas claimed by local communities. Such conflicts are likely to spread as HTI areas expand.

<b>Table 3.8 HPH Logging Concessions Converted to HTI Concessions to 1998, by Province</b>	
<b>Province</b>	<b>HPH Area Converted to HTI Concessions (Ha)</b>
Aceh	133,010
Jambi	168,648
Riau	534,094
West Sumatra	3,847
South Sumatra	113,251
North Sumatra	120,234
<b>Sumatra</b>	<b>1,073,084</b>
West Kalimantan	486,827
South Kalimantan	194,513
Central Kalimantan	286,255
East Kalimantan	614,913
<b>Kalimantan</b>	<b>1,582,508</b>
South Sulawesi	16,963
Maluku	68,551
Irian Jaya	14,945
<b>TOTAL</b>	<b>2,756,051</b>

**Source:** Ministry of Forestry, 1998.

### 3.5 Oil Palm and Other Large-Scale Industrial Estate Crops

Estate crops – the generic term for agricultural crops grown in a plantation system – include tea, coffee, cocoa, rubber, sugarcane, coconut, and oil palm. The oil palm (*Elaeis guineensis*) originated in West Africa. It was brought to Indonesia in 1848 by the Dutch and planted in the Botanical Gardens in Bogor, Java. Oil palms now cover more than 3 million ha, rivaling rubber plantations in extent and export value. Palm oil is extracted from the fruit of the tree and is widely used as cooking oil and as an ingredient in soap, margarine, and a variety of other products.

The majority of existing oil palm plantations are located in Sumatra, but expansion is proceeding rapidly in Kalimantan, especially West Kalimantan. Further rapid development of this crop is expected to occur in East Kalimantan, Sulawesi, and Irian Jaya. Although rubber, tea, and coconut plantations are each more extensive than oil palm plantations, they are older, more established crops that have experienced much lower growth rates. They are not generally considered a major factor in recent deforestation; even so, their cumulative impacts are probably underemphasized. (See Chapter 3.6.)

The distribution of estate crops on Sumatra is shown in Map 10. The map is based on information from the National Forest Inventory and is out-of-date, but it remains the most recent spatial information available. In particular, the information appears to underreport more than 600,000 ha of oil palm plantations in North Sumatra province (Casson, 2000:48).

#### The Rise of Palm Oil

Palm oil production is booming in developing countries because the oil palm is relatively cheap to grow and produces yields up to five times those of other oil crops. Indonesia is second only to Malaysia in its production of palm oil. According to *Oil World Annual 2001*, global production in 2000 was 21.8 million tons, of which Indonesia accounted for 7 million tons (32 percent).<sup>27</sup> Palm oil is an important source of Indonesian export revenue, generating more than US\$1 billion in 1999 (at 1993 constant prices) (Scotland, 2000). However, more than 40 percent of the annual harvest is consumed domestically. According to provisional data for the 2000-2001 reporting period, Indonesia consumed about 3 million tons of its palm oil production and exported about 4.3 million tons. By far the largest importer was India, followed by China and the Netherlands.

The growth of the palm oil industry in Indonesia has been phenomenal, with production growing 36-fold since the mid-1960s. The industry is dominated by three classes of producer: state-owned, smallholder, and large-scale private. The Suharto government, with World Bank assistance, invested in state-run companies from the late 1960s, and the area of oil palm on state-owned plantations rose steadily over the next decade. Smallholder estates expanded after 1979, again owing to government intervention and World Bank support. (See Chapter 3.6.) Plots of land were prepared by private developers, then transferred to small farmers; the private developers supervised smallholder operations and also purchased their crops. The large-scale private plantation sector grew most rapidly after 1986, again with government encouragement. Companies were given a range of incentives, including access to credit at concessionary rates for estate development, planting, and processing



E.G. Togu Manuring

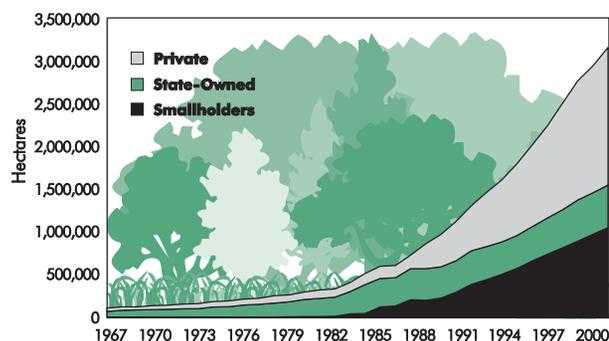
facilities. Between 1967 and 2000, the total area under oil palm plantations grew from less than 200,000 ha to over 3 million ha. (See Figure 3.9.)

#### Private Sector Concentration in the Palm Oil Industry

Indonesia's palm oil industry is dominated by some of the same conglomerates that control the logging, wood processing, and pulp and paper industries, thus tightening the connections among forest clearance, wood supply, and plantation establishment. In 1997, the private estate sector was dominated by 10 groups that, together, owned about 64 percent of the total planted area owned by private firms. In addition, these 10 groups owned "land banks" (land that has been approved for development as plantations) totaling nearly 3 million ha (Casson, 2000:5). Of these 10, 4 also held major logging concessions in 1997. (See Table 3.9.)

Foreign investment is also considerable: at the end of 1998, 50 foreign firms were involved in the oil

Figure 3.9 Growth in Area of Oil Palm Plantations, 1967–2000



Source: Ministry of Forestry, Directorate-General of Plantations.

palm sector, with total investments valued at US\$3 billion (Kartodihardjo and Supriono, 2000:4). Indonesia's state-owned forestry companies are also increasingly involved in the plantation business. In 1998, the Ministry of Forestry officially permitted the Inhutani Groups I-V to convert 30 percent of their concession areas to estate crops, including oil palm (Casson, 2000:18). A prime reason is that tree crops, unlike timber, are a short-term investment and can be expected to improve cash flow quickly.

### Forest Clearance for Estate Crop Production

The development of estate crop plantations over the past 30 years has clearly been a major factor in deforestation, but it is difficult to present definitive data on the amount of forest that has been converted to estate crops. Official data sources vary widely and are inconsistent from year to year. According to one recent analysis, the total area of forest land converted to all forms of plantation between 1982

Group	Total Land Bank Area (Ha)	Total Area Planted (Ha)	Major Logging Concession Holder
Salim	1,155,745	95,310	✓
Sinar Mas	320,463	113,562	✓
Texmaco	168,000	35,500	
Raja Garuda	259,075	96,330	✓
Astra	192,375	125,461	
Hashim	244,235	105,282	
Surya Dumai	154,133	23,975	✓
Napan	245,629	78,944	
Duta Palma	65,800	25,450	
Bakrie	49,283	23,392	
<b>Total 10 Groups</b>	<b>2,854,738</b>	<b>723,206</b>	

Source: A. Casson. 2000. "The Hesitant Boom: Indonesia's Oil Palm Sub-Sector in an Era of Economic Crisis and Political Change." Center for International Forestry Research (CIFOR). Occasional Paper No. 29. ISSN 0854-9818. June 20.  
 Note: Total land bank area held by the top 10 companies is *in addition* to the total area planted.

and 1999 was 4.1 million ha (Casson, 2000:48). Of this total, according to another study, 1.8 million ha of forest were converted to oil palm plantations between 1990 and 2000 (Wakker, 2000:6).

By law, plantations are required to be established only on forest land that has been officially designated for conversion to other uses. (See "Conversion Forest" in Glossary.) In practice, two powerful

factors undermine the law. First, most conversion forest in Indonesia is available in the relatively undeveloped eastern part of the country, but most companies prefer to be in the west, closer to a labor force, processing infrastructure, and markets. Second, establishing plantations in forest land is doubly attractive because, having acquired a land-clearing licence (IPK), a company can clear-cut the area and sell the timber to wood-processing indus-

### Box 3.5 Illegal Use of Logging Concession Land for Oil Palm in Northern Sumatra

The Leuser Conservation Foundation (Yayasan Leuser Lestari), an NGO based in Medan, North Sumatra, carried out field investigations of the practices in 13 logging concessions (HPHs) located in northern Sumatra. The investigations found that logging concessions were actively being converted to the cultivation of oil palm in 8 of the HPHs. Such clearing is illegal under both Indonesia's forestry laws and the terms of the contracts under which HPHs are granted.

The NGO investigators documented the location of the illegal oil palm plantings using GPS technology. They also documented the process of illegal conversion and planting through tape-recorded interviews with HPH workers, local day laborers, and villagers living nearby. Observations were also made directly in the field and documented with still and video cameras.

Forest clearance was carried out by both local people and concession workers at the request of the companies and under their supervision. The companies then

provided the necessary equipment and seedlings to establish oil palm plantations. In some cases, an oil palm unit of the concession company would then request an official permit for oil palm cultivation in the area; in other cases, the request was put forward by a local village cooperative unit. Sometimes a local bureaucrat with the power to grant an oil palm concession was in fact found to be an owner of the involved oil palm company.

Companies tend to justify the apparently widespread practice of converting permanent production forest to oil palm by pointing to the poor condition of the forest in the area being converted and to the ostensible greater benefits to the local community that would follow conversion to oil palm. Thus forest degradation and illegal conversion to oil palm, rather than being punished, provide the justification for granting the company or its partner company a further concession on public land.

*Source:* Leuser Conservation Foundation, 2000.

tries. This arrangement may represent a windfall profit, over and above the profits expected from future palm oil harvests. In many instances, plantation owners are also concession operators, so the "sale" of such cleared wood represents a simple transfer from one company to another within the same group, at rock bottom prices. As described in Section 3.2, timber from forest clearance provided

approximately 30 percent of (legal) wood in the second half of the 1990s, and it has become an indispensable source of supply, especially to the pulp industry. Companies therefore are vigorously pursuing applications for the release of forest land for conversion, even where the forest has previously been designated as production, protection, or even conservation forest. (See Box 3.5.)

It appears that some companies have no intention of establishing plantations but instead pursue conversion licenses solely for the timber profits that can be realized through forest clearance. In West Kalimantan, for example, the head of the Plantation Service threatened to revoke the licenses of 21 companies and warned 29 others because of their failure to establish plantations as agreed (Sunderlin, 1999:564). Map 11 shows the extent of plantations established in former logging concessions; the data are from the early to mid-1990s and do not reflect the nearly 50 percent increase in oil palm area that occurred between 1995 and 2000, some of it in former concessions.

#### Competition for Forest Land

The area actually planted and in production is reasonably well known for the major commercial crops, but much confusion surrounds the status of estate concessions – areas that are *under application* by companies for development, areas that have been *allocated* (agreed in principle) by government officials for development, and areas that have been *released* to companies for development. Vast tracts of forest land are under application for conversion to estate crops but have not yet been developed. Some have been cleared but not planted. Applications, and indeed allocations, for estate crop development frequently overlap with competing claims for development as industrial timber plantations or with forest that is not designated for conversion at all. If all applications currently outstanding were granted, they would greatly exceed the area of conversion forest that is legally available for development.

Two recent studies have produced conflicting but illustrative evidence of the situation. Table 3.10,

based on Kartodihardjo and Supriono, indicates that by the end of 1997, nearly 7 million ha of forest had been approved in principle for conversion to estate crop plantations. All data should be regarded as approximate.

In addition to the 6.8 million ha approved for plantation development, a further 9 million ha are the subject of applications for development, according to Kartodihardjo and Supriono. Even without taking into account these 9 million ha, if the 6.8 million ha already approved for conversion are in fact all converted to plantations, Sumatra and Kalimantan face serious shortfalls in available forest land. A study by Casson came to somewhat different conclusions, finding that applications for the release of some 4.5 million ha of forest for conversion were outstanding as of February 1999. About 840,000 ha were already approved, 70 percent of them for oil palm. Nearly all the applications applied to forest land in Sumatra and Kalimantan.

Whether the higher or lower numbers are more accurate, approval of the existing applications for conversion would lead to deficits in the availability of conversion forest in Sumatra and Kalimantan. This situation results in part from the declining availability of conversion forest area. In 1981, more than 33 million ha of forest were allocated for conversion; by 1990, the number had fallen to 19 million ha and by 1997, to between 8 and 9 million ha. The squeeze on conversion forest in the west stems also from the industry's reluctance to establish plantations in the east. However, the situation is beginning to change. Some oil palm companies are waking up to the possibilities of the timber that can be harvested from the rich forests of East Kalimantan and Irian Jaya. The majority of companies that have begun opera-

<b>Table 3.10 The Balance Between Designated Conversion Forest Area and Applications for Conversion of Forest to Plantation Crops</b>					
<b>Province/Region</b>	<b>Permanent Forest Status (Ha)</b>	<b>Actual Forest Cover (Ha)</b>	<b>Conversion Forest (Ha)</b>	<b>Applications Approved (Ha)</b>	<b>Surplus/Deficit of Applications Approved and Conversion Forest Available (Ha)</b>
<b>Sumatra</b>	22,451,907	16,632,143	1,559,583	4,080,530	-2,520,947
<b>Kalimantan</b>	35,342,638	31,512,208	847,958	2,056,300	-1,208,342
<b>Sulawesi</b>	11,792,212	9,000,000	618,419	366,890	251,529
<b>Java, Bali, and Nusa Tenggara</b>	6,691,298	2,406,675	352,667	—	352,667
<b>Maluku</b>	4,959,775	5,543,506	2,034,932	—	2,034,932
<b>Irian Jaya</b>	32,737,449	33,160,231	2,671,275	292,780	2,378,495
<b>TOTAL INDONESIA</b>	<b>113,975,279</b>	<b>98,254,763</b>	<b>8,084,834</b>	<b>6,796,500</b>	<b>1,288,334</b>

**Sources:** Columns 1-4: D. Holmes, 2000, "Deforestation in Indonesia: A Review of the Situation in 1999." (Jakarta, Indonesia: World Bank, July 3 draft), Table 2. Note that Actual Forest Cover in Java, Bali, and Nusa Tenggara was calculated by GFW. Column 5: H. Kartodihardjo and A. Supriono, 2000, "The Impact of Sectoral Development on Natural Forest Conversion and Degradation: The Case of Timber and Tree Crop Plantations in Indonesia." (Bogor, Indonesia: Center for International Forestry Research). Occasional Paper No. 26(E). ISSN 0854-9818, Table 3. Column 6: author's calculation. **Notes:** The area of conversion forest given in Holmes (8,084,834) differs slightly from that given in Kartodihardjo and Supriono (8,418,000 ha). The areas of conversion forest surplus or deficit calculated in column 6 therefore differ slightly from those given in Kartodihardjo and Supriono. Note that recent, unpublished revisions to Permanent Forest Status appear to have increased allocated conversion forest area, to nearly 14 million ha. Numbers may not add due to rounding.

tions in these regions have strong ties to logging companies (Casson, 2000:23). Meanwhile, the shortage of conversion forest in Sumatra and Kalimantan has encouraged the government to release production forest in these islands for conversion to estate crops and to allocate broad swaths of forest in more remote locations. (See Box 3.6.)

The obvious solution would appear to be policy reforms that require companies to establish new plantations not in conversion forest, as at present,

but on the millions of hectares of land already cleared (for estate crops or industrial timber plantations) but never planted, and on land already degraded by severe fires. This change does not appear likely in the short term. According to recent unpublished Ministry of Forestry data, the latest revisions of Permanent Forest Status have *increased* allocated conversion forest area to nearly 14 million ha. All the new conversion forest is located in Maluku and Irian Jaya, where Indonesia's most extensive remaining intact forests are found.

### Box 3.6 Clearing Natural Forests for Plantation Development on Small Islands: The Case of Wawonii Island in Southeast Sulawesi Province

Land clearing for plantation purposes does not occur only in former logging concession areas. In some places, plantations are replacing relatively intact natural forests. This trend is particularly damaging for small islands, where levels of species endemism are high and local people depend heavily on natural forests for watershed protection and livelihood needs. Wawonii Island (40,480 ha) in Kendari regency, Southeast Sulawesi province, is one example. As of 1995 (the most recent data available), 45 percent of the island was forested, with some 9,275 ha zoned as state forests and an additional 8,758 ha held as community forests. Twelve rivers originate in the island's forests and, while the forest was maintained, Wawonii did not face the water supply problems of Buton and other islands in the area.

The situation changed when the provincial government granted a license to two companies, Hoga Prima Perkasa (HPP) and Hasil Human Utama (HHU), to convert some 5,500 ha of the island's natural forest area – about 30 percent of the total –

into a cocoa plantation. Political connections played a prominent role in this deal because one of the owners of HPP is the son of the then-governor of the province.

Although the cocoa project was steadfastly opposed by several parties, including the affected local Wawonii communities, it went ahead as planned. Indeed, the two companies did not even wait for the government's official issuance of their concession to begin cutting and clearing the forest with heavy equipment; they cleared a 7 km access road 6 meters wide during their first 3 months of operation. Timber from this 42,000 ha swath was removed from the island by the firms, so it was not even available for local use. Local people are already reporting major changes in river flows, with previously clear waters becoming muddy and silt-choked.

A consortium of local NGOs and community groups have vocally opposed the project, pointing out that the companies began operation before receiving an official license to do so from the government, and that they never carried out the required environmental impact

assessment procedure. The latest information received by Forest Watch Indonesia from Wawonii indicates that the two companies, having cut and removed a great deal of timber, are no longer operating on the island. This situation has heightened suspicions that the "cocoa plantation" scheme was merely a ruse to gain access to the timber available from land clearing for the project. As has been true on many similar small islands in Indonesia, grievous harm has been done to the local ecosystem and local livelihoods for the financial benefit of a few unscrupulous and politically connected businessmen.

#### Sources:

Kendari Central Bureau of Statistics, 1995. *Kendari dalam Angka* [Kendari in Numbers], 1995.

Interview with M. Yakub Azis, Head of The Group of Twelve (a local NGO coalition), 2000.

*Kendari Express*, February 21, 2000.

Field Investigations by Yayasan Suluh Indonesia and Yayasan Cinta Alam (local NGOs), 2000.

### More Expansion May Be on the Way

Oil palm planting rates and production, which slowed abruptly following the 1997 economic crisis and the political confusion that followed, appeared set for renewed growth by 2000. The industry was encouraged by lower interest rates, a reduction in the export tax on crude palm oil, new government

regulations that facilitate oil palm plantation establishment, and a surge in the availability of land for planting because of the great fires of 1997-1998. More recently, continued political uncertainty and economic crisis seem to have dampened recovery prospects. However, the global outlook for the industry is robust. World demand for palm oil is forecast to rise 40.5 million tons by 2020, nearly

twice the output in 2000 (Oil World, 2001). One industry analyst has estimated that if world production is to increase by 20 million tons by 2020, an additional 300,000 ha of new plantations will have to be established every year for the next 20 years. The study predicts that most of this expansion would occur in Indonesia, "where labor and land remain plentiful" (Sargeant, 2001:vi).

Although oil palm development has so far occurred primarily in Sumatra, and South and West Kalimantan, the next phase of expansion seems likely to be in East Kalimantan and Irian Jaya. Large tracts of forest in these regions are already allocated as logging concessions or conversion forest. Recent government policy changes have paved the way for oil palm expansion into these same forests. In addition to increasing the area of allocated conversion forest in Irian Jaya and Maluku, the government has increased the incentive for companies to establish new plantations in production forest. Regulation No. 614/Kpts-II/1999 about Directives on the Development of Mixed Forest Plantings allows companies to establish timber plantations or estate crops in “nonproductive production forests.” These are defined as logging concession forests containing less than 20 m<sup>3</sup> of timber per hectare. Sixty percent of the nonproductive area must be converted to timber plantations, and the rest may be used for estate crop plantations. The new Regulation clearly risks encouraging companies to overharvest their logging concessions, reduce them below the productivity threshold, and apply for conversion licenses that will allow them to clearcut the entire area (Wakker, 2000:27). The area of forest that will be cleared in these regions is likely to exceed what is actually planted, unless industry performance improves markedly.

### 3.6 Small-scale Farming

Indonesia’s population now exceeds 212 million. The country is urbanizing rapidly, but 64 percent of the people (136 million) still live in rural areas, where the majority of the workforce is engaged in

the agriculture and forestry sectors. Without doubt, the increasing population density in rural Indonesia has had a role in forest clearance, but the importance of small-scale farming relative to other causes of deforestation has been the subject of great controversy. Small farmers clear land to grow food for their families, plant tree crops to supplement their income, or establish small-scale plantations of cash crops like oil palm and rubber. The clearance rate fluctuates with government development policy, the cost of living, commodity prices, available technologies, weather patterns, the availability of alternative work, and other factors.

#### Shifting Cultivation

During the 1980s and 1990s, shifting cultivation was widely blamed as a significant, perhaps even the dominant, cause of deforestation in Indonesia. Prominent reports by the FAO and the World Bank claimed that the “slash and burn” practices of traditional farmers, combined with high rates of rural population growth, were placing unsustainable pressure on forest resources. Subsequent analysis has shown that the assumptions behind this claim were oversimplistic, stemming from a failure to distinguish among different types of small-scale farming (Sunderlin, 1997). Traditional shifting cultivation involves mainly subsistence crops grown in a rotational system that includes a long fallow period. Land is used for only 1-3 years, then fallowed for up to 20 years, allowing regrowth of vegetation and restoration of soil fertility. At the opposite end of what has been dubbed the “forest farming continuum” are pioneer farmers, who clear forest land for the long-term production of cash crops, typically coffee, cocoa, rubber, and other tree crops.

Traditional farmers have responded to land pressure by shortening their fallow periods and turning to cash crop cultivation to supplement their incomes. While it would be naive to ignore this source of pressure on Indonesia’s natural forests, recent commentators have downplayed the role of shifting cultivators in deforestation. One influential study estimated that traditional farmers may be responsible for no more than 21 percent of total forest loss (Dick, 1991). Given the scale of forest clearance for timber and estate crop plantations since that study, and the acceleration of logging operations since 1997, even this estimate may exaggerate the role of shifting cultivation in deforestation today.

#### Forest Pioneers

Forest pioneers, as the name implies, are farmers who open up new land for agricultural production. They may grow subsistence food crops, but their primary business is cultivating cash crops for sale both domestically and in international markets. Many forest pioneers are “spontaneous transmigrants” who voluntarily relocate to take advantage of abundant land in more sparsely populated parts of the country or to escape from civil unrest and conflict at home. Logging roads, plantation development, and the infrastructure associated with government-sponsored transmigration sites all provide opportunities for small farmers to follow with land clearance of their own. In the absence of comprehensive surveys, it is impossible to estimate the amount of forest land cleared by pioneer farmers. Not all newly cleared land was formerly forest, and anecdotal evidence suggests that the impact of newcomers is sometimes exaggerated by local farmers who see their lands and traditional practices threatened.<sup>28</sup> Nevertheless,



KP/SHK

pioneer farmers are known to be encroaching on natural forests, including those in national parks and other protected areas. Such encroachment has increased with the breakdown of political authority and law enforcement since 1998.

### **Small-scale Tree Crop Cultivation and Smallholder Plantations**

Indonesia is a world giant when it comes to tree crop production. The country is the second largest producer of palm oil and natural rubber, the third largest producer of cocoa, and the fourth largest producer of coffee.<sup>29</sup> With the exception of oil palms, the great majority of these crops are grown by small-scale farmers. Large-scale oil palm plantations have attracted the ire of environmental organizations because they have so visibly affected forest cover, but the extent of smallholder tree crops and their role in forest clearance have probably been understated.

### **Box 3.7 Transmigration and Forest Clearance**

Transmigration, the government's long-running program to resettle people from densely populated Java and Bali to Sumatra, Kalimantan, and the other "outer islands," opened up 1.7 million hectares of agricultural land and transported some 8 million people between 1969 and 1993 (GOI, 1993).

Transmigration sites were commonly established in one of three patterns. Between the 1960s and 1980s, transmigration focused on developing subsistence agriculture. The Food Crop Pattern allotted each transmigrant household 2 ha of farmland, of which half was cleared and ready for use and half was still forested and awaiting clearance. During the 1990s, until the formal end of the Transmigration Program in 1999, the emphasis shifted away from subsistence agriculture and toward providing wage labor on industrial timber estates and oil palm plantations. The People's Nucleus Plantation Pattern involved associations between private oil palm companies (the nucleus or *Inti*) and transmigrant families (the *Plasma*). Each household received 3 ha of land, of which 2 ha were to be developed for oil palm. The Industrial Timber Estate Pattern involved transmigrant families receiving land in exchange for their labor on privately owned timber plantations. In addition, families received land on which to establish their own crops.

Almost 39 percent of timber estate areas that have actually been planted lie in transmigration sites (Potter and Lee, 1998), and nearly 1 million ha of oil palm plantations with a formal link to transmigration sites had been established by the end of 1995.

The actual impacts of transmigration projects on forests have probably been greater than these numbers imply, given the often poor site choices and the land-clearing practices employed. Transmigrant families who were (and are still) unable to support themselves from their allotted site typically strayed into neighboring unallocated forest. In addition, their presence often increased the land pressure felt by indigenous inhabitants, leading to further forest clearance.

Transmigration projects have sometimes encroached on national parks, as in the case of Wasur National Park in Irian Jaya. Wasur covers 413,810 ha of seasonally inundated grasslands, mangrove forests, monsoon forests, and savanna in Irian Jaya's far southeast corner, bordering New Guinea and the Arafura Sea. Although gazetted as a national park, the government nevertheless gazetted a transmigration area covering 3,000 ha around the traditional village of Sota within the park in 1994, legally backed up by the issuance of various government decrees (Decree, 1994;

### Box 3.7 (continued)

Site Allocation Letter, 1994; Decree, 1995). The main rationale for creation of this enclave was to bolster “security” in an area where the government was fighting separatist rebels, supplemented by the local government’s desire to develop the area economically. A second transmigration area of 3,000 ha (Sota II) was designated for development soon thereafter, but it was postponed because of criticism from NGOs and donor agencies after the clearing of some 200 ha. Wasur is only one of the numerous transmigration sites developed in protected forest areas across Indonesia.

A 1994 World Bank evaluation of the US\$560 million in loans it made to Indonesia for the program during the 1970s and 1980s concluded that land clearing was not carried out according to agreed legal and contractual guidelines. Slopes over 8 percent had been cleared, trees were bulldozed into waterways, erosion measures along contours were not taken, and no attempt was made to harvest the commercial timber left partly burned in the field after clearance. Impacts on local communities, particularly traditional indigenous groups, have been extremely negative. In the case of the forest-dwelling Kubu of Sumatra, for example, the report concluded that “there has been a major negative and probably irreversible impact” (World Bank, 1994).

Official data on the number of families moved under the Transmigration Program and the total area of land cleared are often widely divergent. Table 3.11 presents two Ministry estimates of forestland cleared under the program.

#### Sources:

Decree of the Regional Forestry Office No. 848/KWL-6.C/1994 Regarding Relinquishment of Wasur Wildlife Management Forest Area for a Settlement for Retired Army Officers in Sota Village; Site Allocation Letter of the Merauke Regent No. 95/1994, June 12, 1994; and Decree of the Minister of Forestry No. 1639/Menhut-VI/1995, November 14, 1995.

Government of Indonesia, 1993. *Sixth Five Year Development Plan*. Jakarta: National Development Planning Agency.

Potter, L. and J. Lee. 1998. *Tree Planting in Indonesia: Trends, Impacts, and Directions*. Occasional Paper No. 18. Center for International Forestry Research (CIFOR), Bogor, Indonesia.

World Bank. 1994. *Indonesia Transmigration Program: A Review of Five Bank-Supported Projects*. Report No. 12988, Washington, DC.

In recent years, small-scale tree crop production has expanded rapidly from an already large base as farmers sought to increase their income and establish a hedge against volatile crop prices. Tree crops are often established in forest clearings near agricultural fields, so they are implicated in deforestation. Although many families plant trees independent of government help, many others participate in smallholder development schemes that provide farmers with money and access to land (in the form of forest conversion rights). Farmers typically manage tree crop plantations of 1-5 hectares. A study of 8 villages in Riau province, Sumatra, found that 80 percent of households had traditional (low-yield) rubber gardens of 2.5-3.5 ha, and just over 10 percent had high-yielding rubber plantations established through the Smallholder Rubber Development Program (Angelsen, 1995:1721-22). The total area of rubber managed by the villagers (excluding transmigrant families) was about 12,000 ha, the equivalent of one quarter of the secondary forest in the study area.

Given the fuzzy boundary between small-scale tree crop cultivation and smallholder plantations, the numbers that follow do not attempt to distinguish between them. Small farmers today manage about one third of the total area under oil palm plantations in Indonesia, just over 1 million ha, according to the latest Ministry of Forestry data. Small farmers are far more dominant in the rubber subsector, managing about 3 million ha in 1997, more than 80 percent of the total rubber plantation area in that year (Kartodihardjo and Supriono, 2000:3). The number of hectares is surely higher today.<sup>30</sup> Mature coconut plantations producing copra covered about 2.7 million ha in 2000, but this figure does not

include immature coconut trees or trees not used for copra production (Oil World, 2001). Coffee plantations covered an estimated 1.1 million ha in 2000.<sup>31</sup>

From the mid-1980s, the government actively encouraged smallholders to establish plantations, especially of oil palm. Some farmers already lived around the boundaries of existing large oil palm estates; others arrived as part of transmigration settlement schemes. (See Box 3.7.) Smallholder oil palm plantations grew by nearly 1 million ha between 1986 and 1996. Small-scale rubber, coffee, and coconut plantations cover significantly more land in total, but they experienced much lower growth rates than oil palm during the decade. Their impact on deforestation over this period was therefore relatively minor. However, small-scale rubber planting appears to have grown significantly since 1997, despite low prices for rubber (Sunderlin et al., 2000:23-24).

Smallholders who establish plantations generally do not clear primary forest because they lack the necessary equipment. Rather, they tend to use secondary forest, degraded land, or plantations abandoned by conglomerates. Smallholders, however, do contribute to forest clearance associated with larger-scale private development because they continue to benefit from government-sponsored clearance programs. Of the nearly 7 million ha of conversion forest officially approved for estate crop development by 1997, nearly 1 million ha were designated for development under the smallholder plantation program (Kartodihardjo and Supriono, 2000:7).

**Table 3.11 Forest Area Released for Transmigration Site Development, to 1998**

Province	Ministry of Forestry Data (1998)		National Forest Inventory Data (1998)
	Number of Sites	Area (Ha)	Area (Ha)
Aceh	12	39,376.65	39,594.67
North Sumatra	12	28,530.44	22,549.85
West Sumatra	12	26,992.25	13,472.80
Riau	17	75,448.78	64,575.19
Jambi	12	76,489.53	256,657.33
Bengkulu	9	26,809.45	12,032.95
South Sumatra	30	123,195.28	104,221.82
Lampung	17	138,401.20	10,918.23
<b>Sumatra</b>	<b>121</b>	<b>535,243.58</b>	<b>524,022.84</b>
West Kalimantan	17	49,199.16	43,434.35
Central Kalimantan	27	66,135.77	133,500.79
South Kalimantan	10	47,711.50	40,928.63
East Kalimantan	9	39,891.09	74,711.38

### Small Farmers and the Economic Crisis

Palm oil, rubber, coffee, cocoa, copra, black and white pepper, cinnamon, and other smallholder products are primarily export crops. Small farmers are therefore exposed to fluctuations in international commodity prices and to shifts in the value of the

Indonesian rupiah against the U.S. dollar. The central impact of the economic crisis that began in 1997 has been the precipitous depreciation of the rupiah. Beginning in July of that year, the rupiah prices of black pepper, white pepper, coffee, and cocoa rose by as much as 450 percent, only to fall again in mid-1998. The prices of palm oil, rubber, and cinnamon,

**Table 3.11 (cont.) Forest Area Released for Transmigration Site Development, to 1998**

Province	Ministry of Forestry Data (1998)		National Forest Inventory Data (1998)
	Number of Sites	Area (Ha)	Area (Ha)
<b>Kalimantan</b>	<b>63</b>	<b>202,937.52</b>	<b>292,575.15</b>
South Sulawesi	8	11,622.65	7,696.96
Central Sulawesi	18	39,464.23	32,858.56
North Sulawesi	6	21,257.56	5,506.46
Southeast Sulawesi	26	56,161.21	56,126.63
<b>Sulawesi</b>	<b>58</b>	<b>128,505.65</b>	<b>102,188.61</b>
West Nusa Tenggara	2	2,950.00	3,737.25
East Nusa Tenggara	no information	no information	no information
<b>Nusa Tenggara</b>	<b>2</b>	<b>2,950.00</b>	<b>3,737.25</b>
<b>Maluku</b>	<b>11</b>	<b>23,776.58</b>	<b>28,388.33</b>
<b>Irian Jaya</b>	<b>22</b>	<b>117,194.48</b>	<b>128,028.00</b>
<b>TOTAL</b>	<b>521</b>	<b>1,880,244.56</b>	<b>2,001,464.03</b>

did not benefit from windfall export profits as much as might be expected because the costs of living and agricultural production rose faster than gross income. As a result, farmers turned to the forests to compensate for lost earnings. Nearly 70 percent of the farmers said they had cleared new land between 1996 and 1999, with the amount of land cleared each year rising sharply after the economic crisis (1998-1999). Forest clearance yielded income from timber, and the land could then be planted to food crops or, increasingly, export-oriented tree crops. The study concluded that forest clearance was strongly linked to price changes and also to the decreased policing of forest boundaries that followed Suharto's fall in 1998.

however, rose only modestly before dipping below their 1997 levels, reflecting weak world prices. Small-scale producers experienced marked effects on their incomes, both positive and negative.

Evidence suggests that the uncertainty and volatility experienced by small farmers since 1997 led to an

increase in rates of forest clearance. A recent study of more than 1,000 small farmer households in Sumatra, Kalimantan, and Sulawesi examined the effects of the crisis in terms of farmers' perceptions of their standard of living and their adaptive responses (Sunderlin et al., 2000). Despite marked regional differences, the study revealed that farmers