

Annex 1 Guest Commentaries on Data Difficulties

The following contributions were solicited by Global Forest Watch from two experienced researchers in the field of Indonesian forestry. Both are based on personal experiences and offer some frank insights into the obstacles that can block the path of those who wish to compile and analyze credible forestry statistics for Indonesia. The stories are backward-looking in that they generally describe conditions prevailing under the Suharto regime. They do not reflect the genuine efforts among at least some members of more recent administrations to improve both the quality of and access to forestry data. Nevertheless, Tim Brown's observation that "official data from the Ministry of Forestry sometimes seem surreal" is as valid today as it was in the 1970s, 1980s, and 1990s.

Whose "Official" Data Should We Believe?

By Tim Brown

Central Statistics Board (BPS) Data on Indonesia's Forestry Sector¹

One current focus of policy debate in Indonesia is on the sources and trends in forest use and timber harvesting as well as on the industry restructuring needed to face the future. Estimates of wood use and industrial capacity vary all over the map (25-90 million m³ of wood per year), depending on the assumptions – and you have to use assumptions because the official data from the Ministry of Forestry are notoriously "weak."

The Natural Resources Management (NRM) Program of USAID was excited by the prospect of analyzing data on the wood processing industry from the annual *Survey of Large & Medium Manufacturers* conducted by the Central Statistics Board (*Badan Pusat Statistik, BPS*), which sets the standard for quality official data in Indonesia. This survey attempts complete enumeration of all industrial sectors based on a standard questionnaire with a response rate of over 85 percent. It provides detailed information about the structure of Indonesia's wood process-

ing sector so that wood use, efficiency, productivity, and trends can be examined. The dataset offers great advantages: it is collected independently using a consistent approach every year. The large sample allows a reasonable projection to the entire population. Best of all, compared to Ministry of Forestry sources, it provides disaggregated firm level data – no names, though – that can be analyzed by region or subsector.

Excitement turned to exhaustion after the fourth or fifth month of waiting – after we had paid – to get the electronic data from our BPS contact. Exhaustion nearly reached exasperation as we found that all this detail had to be cleaned and organized before the data could be sorted or analyzed. Because BPS works with all sectors, firms must specify their own line of products (with no codes or guidelines), which can be general or specific (e.g., plywood or teak plywood) and can use Indonesian (e.g., *kayu lapis*) or English. Self-reporting also means potential for bias, gaps, mismatched units, or such incredible results as output volumes that exceed input volumes. Also note that the general questionnaire may not offer specifics that some analysts would want (e.g., timber from "concession," "conversion," or "purchased"). Foremost among the disadvantages, though, is the delay of up to 2 years for BPS to get the data into a processed form: data from 1998 are not yet available (in 2001).

1. Based on: "Overview Of Commercial Forestry Sector: Analysis of BPS Survey of Manufacturing," Presentation by Natural Resources Management (NRM) Program Policy, and Planning Group and Protected Areas and Forest Management Group. Jakarta, Indonesia, June 2000.

Still, through much effort by a team of analysts, we were able to calculate that Indonesia's solid wood-processing industry was using at least 33.1 million cubic meters of wood per year in the mid-1990s (sawmills: 9.4 million m³; plymills: 23.7 million m³). These figures are for a period (1994-1997) when the Ministry of Forestry was reporting official log production of about 25 million m³ per year. The estimate is a lower bound because it does not include all small sawmills (potentially another 5-6 million m³ per year) or the pulp and paper sector, which was then using as much as 15 million m³ per year.

Though this is just one in a sea of estimates, it carries the credibility of BPS and establishes a realistic lower bound backed by firm level data. This "minimum estimate" represents a prodigious volume of wood and a major pressure on Indonesia's forests. Further, it is about 40 percent higher than the Ministry of Forestry reports. The enormous potential of this database remains untapped, mainly owing to constraints of time, money, and demand from counterparts.

A Series of Troubles with Time Series ²

Indonesia's financial (and political) crisis is not over. In addition to profound human effects, most people believe that the crisis has important impacts on natural resources. Discussions of this topic usually rely on anecdotal evidence, however, rather than on rigorous analysis. Consistent time series data are the key to tracing the effects of the crisis on forests.

Two sources come to mind for an economist who is reaching for the closest, easiest secondary data. The Ministry of Forestry, Directorate General for Forest Utilization publishes a *Forest Utilization Statistical Yearbook* annually. It reports monthly production of roundwood (harvests from concessions, conversion, woodlots, plantations, etc.) and processed wood (in the form of plywood, sawnwood, and other types of wood products). These statistics are based on the real world (volumes harvested, hectares converted), although, admittedly, official data from the Ministry of Forestry sometimes seem surreal.

Indonesia's Central Statistics Board, which sets the standard for official data, publishes such key economic indicators as Gross Domestic Product and value of exports every quarter. It tracks economic subsectors including forestry (as part of the agriculture and natural resources sector) and forest products (as part of the manufacturing sector). Much of this information is financial, however, at least in the easily obtained *Monthly Indicators* document.

Data quality aside, it seems that these two sources should be combined and compared to analyze crisis impacts from both a financial (earnings) and real (volumes) perspective. Even without the crisis, comparing the volume data from one source with the earnings data from another source would be interesting. Easy, except for the devilish details.

Until the end of 1998, BPS's *Monthly Indicators* booklet included all the subsectors of "general

manufacturing" (including wood processing and paper) in a quarterly time series that can be traced backwards relatively easily. Starting in January 1999, though, BPS stopped including all the detailed subsector data in the booklet. These data can be obtained, but not conveniently, through monthly periodicals available through the BPS bookstore.

The Ministry of Forestry's *Statistical Yearbook* is considerably more difficult to work with. The publication is structured differently in different years. Although many of the tables are the same, content or definitions change with little warning or documentation. And because these documents have never been widely disseminated, it can become almost a word-of-mouth process to find a copy for a particular year. Most of mine are copies of copies.

Most years, the log and processed wood production data are published by month and by province. . .but not every year. For 1994 and 1995 (important precrisis years for the time series), log production is available by month, but volume of processed wood products is not. Even the log production, or harvest data, are not consistent. Some years "wood chips" are reported monthly by province but are not included under "total harvest." Is that because "wood chips" aren't "roundwood" or because they are lumped with something else? For the early 1990s, these consistency and continuity problems were even greater.

Even when monthly data on processed wood products are reported, great detail is sometimes provided

2. "Natural Resource Impacts Of Indonesia's Financial Crisis." NRM Program, Policy and Planning Group. Presentation for BAPPENAS. Jakarta, Indonesia. August 2000. Updated semi-annually.

for all minor products, such as block board, veneer, particle board, chips, pulp, moulding, dowels, and paper. Other years these details are not provided. Is that because there was no production that year? Or because the aggregation scheme was different? Watch out for the units, too: older issues report pulp in cubic meters, instead of tons, as is more usual. Seems wrong, but how can you be sure?

More recently, it has become easier to track down the people responsible for these reports and get the data on a disk. The quality and consistency of the reports are improving, as is the Ministry of Forestry website (www.mofrinet.cbn.net.id).

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Secrecy in the Indonesian Forest Products Sector: A Researcher's Experience

By David W. Brown

How difficult is it to obtain information on the Indonesian forest products industry? It is possible to get this type of information, but researchers must be tenacious and willing to live with setbacks of years at a time.

In 1993, I was awarded a grant from the U.S. Social Science Research Council and the Ford Foundation to study the Indonesian forest products industry. I was to have initiated my work that very summer, but I had to wait 2 years for approval from Indonesian authorities to begin my research. I managed to use the first year in the United States productively, but the second year was almost totally wasted. In experiencing such delays, I was not alone. In the first half of the 1990s, many researchers were denied permission to study even innocuous topics in Indonesia. However, because I was never actually denied permission to enter the country, I do not have evidence that anyone in the government objected to my topic.

I never did get formal approval from the Indonesian government to conduct research. Instead, I contacted a tropical forestry expert with the World Bank in Indonesia and asked him to sponsor my work. He agreed and arranged for a 1-year appointment in the Bank as an unpaid natural resource specialist. The visa that accompanied that appointment was indispensable to my being able to start my research.

But problems quickly emerged at my sponsoring institution, the World Bank. The forestry expert who arranged for me to enter Indonesia was reassigned to Washington. Some of those who remained in Jakarta were hostile to my research. For example, one staffer withheld a document she had been instructed to pass along to me and told me, in her own words, that she did not “trust” me. The real setback came when the Bank’s Chief of Mission barred me from coming into the Bank’s offices. I did not insist on the Bank’s honoring its commitment to me because this could have resulted in my visa being revoked. I made a decision to lay low and did not return to the Bank until years later.

Fortunately, a forestry aid project sponsored by the United Kingdom’s Department for International Development (DFID) saw value in my work. At the end of my formal scholarly research, the DFID hired me for a consultancy, which helped me obtain a wealth of data. Later I went to work there full time. The DFID had built up a great deal of trust and goodwill in the Indonesian Department of Forestry over the course of a decade and, as an employee of their project, I benefited from that trust. When I asked the department for sensitive documents, I would usually receive them, but only because I was affiliated with the project.

Even though I came to enjoy a solid institutional entrée to the Indonesian Department of Forestry, I occasionally ran into resistance. This first happened when I was given obviously fake data on the domestic price of Indonesian roundwood. The department told me that Indonesian mills were buying logs from Indonesian timber concessionaires for US\$100 per m³, when in fact our project knew

that mills were buying legal wood for half that price and illegal wood for one fifth that price. Why would the department deliberately overstate the domestic price of logs? The government wished to obscure the fact that Indonesian plywood factories were making enormous windfall profits from buying Indonesian logs at low prices on the glutted domestic market and then processing those cheap logs into plywood and selling them at full prices on the world market. Meanwhile, Indonesia was taxing timber concessionaires and wood processors at suboptimal rates. Therefore, instead of the majority of potential revenue being officially *collected* by the government to pursue national economic development objectives, the timber industry and their patrons in the government unofficially *appropriated* the majority of revenue. To some extent, the Department of Forestry was able to hide this practice by giving out inflated domestic log price information.

A second instance of obstruction came when an official in the Indonesian Department of Forestry expressed reservations about my borrowing annual work plans for timber concessions in eastern Indonesia. When I left his office with harvesting plans for a dozen concessions, he warned me, “Don’t leak these.” When I analyzed the work plans, I began to see why he had issued this warning. Maps of one concessionaire, Brata Jaya Utama, owned by the National Police, showed that the company was logging inside a biodiversity hotspot, Manusela National Park, on Seram Island. (I never leaked this information but did report it to the former head of the department’s planning body in an official letter.) I also discovered that another timber concession, located in a biologically sensitive buffer zone between two proposed parks on

Halmahera island, which had been turned over to one of the state forestry corporations for the purpose of rehabilitation, was not being rehabilitated at all, but instead its virgin forests were being harvested.

Although I did encounter resistance from various institutions, I do not wish to characterize them as nontransparent just because some of their employees went out of their way to withhold information. Rather, it is important to take a broader view of the structural constraints on these institutions. Tropical timber as a commodity embodies high levels of windfall profit, whose very existence creates a strong *disincentive* for the proper management of the resource. Years of rent-seeking at all levels of the Indonesian government, especially at the top, have crippled the ability of institutions, including the Department of Forestry, to regulate industry properly. Meanwhile, multilateral and bilateral donors have their own sets of constraints. On the one hand, donors are compelled to give out loans or grants to economically distressed governments but, on the other hand, are institutionally incapable of ensuring that these funds are not simply appropriated by government leaders.

In summary, agencies that work in and around the tropical timber sector face structural barriers that prevent their employees from doing the right thing. Nevertheless, all these agencies have at least some good employees working in them. These staff are genuinely committed to the survival of the forest and to the people whose lives most directly depend upon it. Researchers must strive to identify these employees, befriend them, not place them in danger, and above all, report the truth.

David W. Brown worked as a political economist for the UK-Indonesia Tropical Forest Management Programme, and as a forest products investment analyst with the global investment bank of Dresdner Kleinwort Benson. In recent years he has also undertaken consultancies for the World Bank, the Indonesian Bank Restructuring Agency, and The Nature Conservancy. Brown was recently awarded a Ph.D. by the Political Science Department of the University of Washington. His dissertation explains how the secret appropriation of timber windfall profits by political leaders undermines timber revenue policy in developing nations.

Annex 2 Tables

Annex Table 1 Permanent Forest Status and Actual Forest Cover, 1997								
Province	Total Land Area (Ha)	Conservation Forest (Ha)	Protection Forest (Ha)	Limited Production Forest (Ha)	Production Forest (Ha)	Permanent Forest Status (Ha)	Actual Forest Cover (Ha)	Conversion Forest (Ha)
Aceh	5,674,800	852,421	1,844,500	37,300	601,392	3,335,613	3,611,953	0
Northern Sumatra	7,250,100	253,885	1,924,535	760,958	871,183	3,810,561	1,891,819	37,797
Western Sumatra	4,169,000	846,175	910,533	246,383	407,849	2,410,940	1,944,015	189,346
Riau	9,859,700	560,237	1,323,801	0	2,649,608	4,533,646	5,071,891	334,521
Jambi	4,873,900	676,120	191,130	340,700	971,490	2,179,440	1,603,079	0
Southern Sumatra	10,226,300	822,300	879,390	298,600	2,269,400	4,269,690	1,248,209	774,100
Bengkulu	2,090,400	444,882	252,042	182,210	41,830	920,964	899,858	70,360
Lampung	3,386,700	422,500	331,531	44,120	192,902	991,053	361,319	153,459
Sumatra	47,530,900	4,878,520	7,657,462	1,910,271	8,005,654	22,451,907	16,632,143	1,559,583
West Kalimantan	14,753,000	1,435,480	2,355,045	2,421,950	2,235,700	8,448,175	6,713,026	582,320
Central Kalimantan	15,360,400	680,580	1,014,130	4,593,003	4,448,222	10,735,935	9,900,000	0
South Kalimantan	3,749,000	176,615	554,139	155,268	687,834	1,573,856	999,182	265,638
East Kalimantan	19,721,000	2,166,212	2,935,478	4,755,494	4,727,488	14,584,672	13,900,000	0
Kalimantan	53,583,400	4,458,887	6,858,792	11,925,715	12,099,244	35,342,638	31,512,208	847,958
North Sulawesi	2,655,500	429,065	341,447	552,573	168,108	1,491,193	1,300,000	34,812
Central Sulawesi	6,032,900	676,248	1,489,923	1,476,316	483,034	4,125,521	3,400,000	269,411
South Sulawesi	6,245,100	843,966	1,928,597	828,255	186,666	3,787,484	2,300,000	102,073
Southeast Sulawesi	3,681,000	274,069	1,061,270	419,244	633,431	2,388,014	2,000,000	212,123
Sulawesi	18,614,500	2,223,348	4,821,237	3,276,388	1,471,239	11,792,212	9,000,000	618,419
Subtotal: 3 Islands	119,728,800	11,560,755	19,337,491	17,112,374	21,576,137	69,586,757	57,144,351	3,025,960
Java and Bali	13,820,400	468,233	728,651	394,316	1,633,383	3,224,583	1,946,375	0
Nusa Tenggara	8,074,000	567,714	1,571,418	651,257	676,326	3,466,715	460,300	352,667
Maluku	7,801,900	443,345	1,809,634	1,653,625	1,053,171	4,959,775	5,543,506	2,034,932
Irian Jaya	41,480,000	7,539,300	11,452,990	3,365,475	10,379,684	32,737,449	33,160,231	2,671,275
TOTAL INDONESIA	190,905,100	20,579,347	34,900,184	23,177,047	35,318,701	113,975,279	98,254,763	8,084,834
Source: Holmes, 2000.								
Note: Actual Forest Cover, 1997 for Java/Bali and Nusa Tenggara are GFW estimates based on GOI/World Bank, 2000.								

Annex Table 2 Partial List of Suharto Family Logging and Plantation Companies

Company	Suharto Family Owner	Sector	Area (Ha)	Location
Adindo Hutani Lestari	Siti Hediati Hariyadi	Timber/Pulp Plantation	201,281	West Kalimantan
Arha Putra Internasional	Ari Sigit	Peat Forest Development	4,400	Riau
Buana Estate (I)	Probosutedjo	Plantation: Rubber, Cocoa, Coconut, Oil Palm	1,788	North Sumatra
Buana Estate (II)	Probosutedjo	Plantation: Coconut, Oil Palm, Cocoa	753	North Sumatra
Buana Estate (II)	Probosutedjo	Plantation: Rubber, Cocoa	956	North Sumatra
Buana Estate Hambalang	Probosutedjo	Plantation: Clove, Coconut, Rubber	705	West Java
Bumi Pratama Usaha Jaya	Hutomo Mandala Putra	Logging Concession	56,000	South Sumatra
Citra Lamtorogung Persada	Siti Hardiyanti Rukmana	Plantation: Cocoa	1,585	West Kalimantan
Condong Garut	Hutomo Mandala Putra	Plantation: Rubber, Coconut Oil, Palm	5,021	West Java
Dacridium II	Siti Hediati Hariyadi	Logging Concession	80,000	Central Kalimantan
Duta Rendra Mulya Sejahtera	Bambang Trihatmodjo	Logging Concession	215,000	East Kalimantan
Eucalyptus Tanaman Lestari	Siti Hediati Hariyadi	Timber/Pulp Plantation	298,900	Irian Jaya
Fajar Multi Dharma	Ari Sigit	Plantation: Coconut, Oil Palm	15,975	South Sulawesi
Gowa Manurung Jaya	Dr. Ibnu Hartomo	Plantation: Coconut, Oil Palm	10,000	South Sumatra
Gula Putih Mataram	Bambang Trihatmodjo	Plantation: Sugar Cane	18,000	Lampung
Gunung Madu Plant	Sigit Harjojudanto	Plantation: Sugar Cane	17,209	Lampung
Gunung Sinaji	Hutomo Mandala Putra	Plantation: Coconut, Oil Palm	n.d.	South Sulawesi
Hanurata	Family Foundation	Logging Concession	151,600	East Kalimantan
Hanurata	Family Foundation	Logging Concession	188,500	Irian Jaya
Hanurata	Family Foundation	Logging Concession	471,570	Irian Jaya
Harapan Kita Utama	Bambang Trihatmodjo	Logging Concession	138,500	West Kalimantan
Humpuss Graha Nabari	Hutomo Mandala Putra	Plantation: Coconut, Oil Palm	n.d.	West Sumatra
IFA	Siti Hardiyanti Rukmana	Logging Concession	248,100	Jambi
Indo Lampung Perkasa	Bambang Trihatmodjo	Plantation: Sugar Cane	21,401	Lampung
ITCI	Bambang Trihatmodjo	Logging Concession	262,573	East Kalimantan
Jabontara Ekakarsa	Ratna Hardjojudanto	Plantation: Coconut, Oil Palm	10,086	East Kalimantan
Maharani Puricitra Agung	Siti Hediati Hariyadi	Plantation: Coconut, Oil Palm	n.d.	West Sumatra

Annex Table 2 (continued)

Partial List of Suharto Family Logging and Plantation Companies

Company	Suharto Family Owner	Sector	Area (Ha)	Location
Maharani Rayon Jaya	Siti Hediati Hariyadi	Timber/Pulp Plantation	206,800	Irian Jaya
Mandala Permai	Hutomo Mandala Putra	Plantation: Cocoa	536	West Java
Mantikei	Siti Hediati Hariyadi	Logging Concession	40,000	Central Kalimantan
Melapi Timber	Siti Hardiyanti Rukmana	Logging Concession	150,000	East Kalimantan
Menara Hutan Buana	Probosutedjo	Timber/Pulp Plantation	268,585	South Kalimantan
Menara Tri Buana (IV)	Probosutedjo	Plantation: Coconut, Hibrida, Cocoa	979	South Sulawesi
Menara Tri Buana	Probosutedjo	Plantation: Coconut, Hibrida	38,095	South Sulawesi
Mertju Buana (III)	Probosutedjo	Plantation: Cocoa	4,576	Bengkulu
Multigambut Industri	Siti Hediati Hariyadi	Plantation: Coconut, Oil Palm	23,045	Riau
Musi Hutan Persada	Siti Hardiyanti Rukmana	Timber/Pulp Plantation	296,400	South Sumatra
Musi Rindang Wahana	Siti Hardiyanti Rukmana	Plantation: Coconut, Oil Palm	7,020	South Sumatra
Okaba Rimba Makmur	Siti Hediati Hariyadi	Timber/Pulp Plantation	283,500	Irian Jaya
Panambangan	Yayasan	Logging Concession	44,786	East Kalimantan
Pemuka Sakti Manis Indah	n.d.	Plantation: Sugar Cane	30,000	Lampung
Prakarsa Tani Sejati	Siti Hediati Hariyadi	Plantation: Coconut, Oil Palm	16,079	Riau
Rante Mario	Hutomo Mandala Putra	Logging Concession	114,000	South Sulawesi
Rejosaribumi (III)	n.d.	Plantation: Coconut, Cocoa, Rubber	413	West Java
Rejosaribumi (III)	Siti Hardiyanti Rukmana	Plantation: Teh, Kopi, Rubber, Antan	751	West Java
Rejosaribumi (IV)	Siti Hardiyanti Rukmana	Plantation: Clove, Rubber, Antan, Ternak	123	West Java
Rejosaribumi	Siti Hardiyanti Rukmana	Logging Concession	57,090	East Kalimantan
Saudara Sejati Luhur	Sudwikatmono	Plantation: Oil Palm	2,319	North Sumatra
Sinar Kalbar Raya	Siti Hediati Hariyadi	Timber/Pulp Plantation	72,315	West Kalimantan
Sweet Indo Lampung	Bambang Trihatmodjo	Plantation: Sugar Cane	25,435	Lampung
Tidar Kerinci Kerinci Agung	Siti Hediati Hariyadi	Plantation: Coconut, Oil Palm	18,433	West Sumatra
Tridan Satria Putra Indonesia	Siti Hardiyanti Rukmana	Plantation: Sugar Cane		East Timor
Wahana Sari Sakti	Ratna Hardjojudanto	Logging Concession	100,000	Central Sulawesi
Wonorejo Perdana	Notosuwito	Plantation: Coconut, Oil Palm, Rubber	9,091	North Sumatra

Source: Ministry of Forestry and Estate Crops.1998. Announcement, December 8.

Annex Table 3 Concession Area by Region and Province, 1985–1998

Province	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998
Aceh	1,511,000	14,565,00	1,778,500	1,803,700	2,202,900	1,803,700	1,834,100	1,618,800	1,472,614	1,574,704.00
N. Sumatra	991,000	1,025,400	1,099,680	1,080,600	879,000	1,080,600	1,033,600	950,600	731,990	745,788.00
W. Sumatra	950,000	968,000	980,000	766,200	512,200	766,200	561,900	528,900	412,230	450,610.00
Riau	6,031,000	6,435,000	6,145,000	5,481,030	5,831,120	5,481,028	5,032,858	4,482,843	4,153,399	3,282,489.00
Jambi	2,388,000	2,662,000	2,349,000	2,218,670	2,684,101	2,218,670	2,152,700	2,154,689	1,447,779	1,113,499.00
S. Sumatra	1,986,000	2,261,000	511,000	1,871,550	1,704,300	1,871,550	1,747,850	1,406,850	1,231,850	1,120,280.00
Bengkulu	299,000	411,000	2,505,800	352,900	375,000	352,900	352,900	352,900	352,900	352,900.00
Lampung	177,000	190,000	195,000	40,000	0	40,000	0	0	0	0
Total Sumatra	14,333,000	13,952,400	15,563,980	13,614,650	14,188,621	13,614,648	12,715,908	11,495,582	9,802,762	8,640,270.00
W. Kalimantan	5,902,000	5,852,100	5,596,000	5,509,390	6,131,600	5,509,395	5,274,230	4,817,500	5,153,500	4,746,036.00
C. Kalimantan	11,145,000	11,748,000	11,097,000	11,509,750	10,864,252	11,509,750	11,152,564	9,891,509	9,563,775	7,900,494.00
S. Kalimantan	1,479,000	1,123,500	1,233,000	1,255,950	1,042,500	1,255,950	1,217,950	1,149,790	1,102,310	902,870.00
E. Kalimantan	12,009,000	12,426,800	11,356,700	13,201,430	12,286,401	13,201,425	12,770,215	11,209,199	10,624,854	9,497,024.00
Total Kalimantan	30,535,000	31,150,400	29,282,700	31,476,520	30,324,753	31,476,520	30,414,959	27,067,998	26,444,439	23,046,424.00
N. Sulawesi	492,000	542,800	755,000	599,100	261,300	559,100	676,650	676,650	676,650	676,650.00
C. Sulawesi	2,126,000	1,669,000	1,908,000	1,967,500	2,232,100	1,967,500	1,751,500	1,654,790	1,640,410	1,531,288.00
S. Sulawesi	2,126,000	279,000	647,000	651,200	587,462	651,197	529,557	437,962	486,602	486,602.00
S.E. Sulawesi	244,000	680,000	398,000	651,000	651,000	651,000	651,000	651,000	651,000	491,500.00
Total Sulawesi	4,988,000	3,170,800	3,708,000	3,868,800	3,731,862	3,828,797	3,608,707	3,420,402	3,454,662	3,186,040.00
Nusa Tenggara	20,000	90,500	80,500	80,500	81,100	80,500	80,500	80,500	80,500	80,500.00
Maluku	2,260,000	3,327,000	3,041,800	3,527,930	3,745,300	3,527,925	3,083,123	3,083,123	3,083,123	3,078,209.00
Irian Jaya	2,812,000	5,734,800	7,722,300	9,197,500	9,664,900	9,197,500	11,017,570	11,017,570	11,226,030	11,490,773.00
TOTAL INDONESIA	54,948,000	58,881,400	59,399,280	57,897,100	61,736,536	61,725,890	60,920,767	53,883,056	54,268,516	49,522,216

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. **Note:** Data from 1996 onward are for HPHs believed to be currently active.

Annex 3 Data Sources and Technical Notes

Land Cover Data

Natural Forest Cover in 1985

Source: World Conservation Monitoring Centre (UNEP-WCMC). 1996. *Tropical Moist Forests and Protected Areas: The Digital Files. Version 1*. Cambridge: World Conservation Monitoring Centre, Centre for International Forestry Research, and Overseas Development Administration of the United Kingdom.

Date: Data are from various years in the early 1980s but are generally taken to describe the situation in 1985.

Scale: 1:250,000. The dataset was gridded by GFW at 1:500,000 to enable overlay with the GOI/World Bank, 2000 dataset (see below).

Comments: The WCMC dataset represents a modified version of the RePPPProT survey. It harmonizes the 12 forest cover types of RePPPProT to 6 classes: mangrove forest, inland swamp forest, montane rainforest, lowland rainforest, montane monsoon forest, and lowland monsoon forest. Total forest area, according to GFW's analysis of the dataset, is 117.2 million ha, compared with 119.7 million ha reported in RePPPProT. The difference may be accounted for by our stricter interpretation of "no data" or otherwise unclassified areas. We found 1.1 million ha of "no data" areas and more than 6 million ha of unclassified area, most of which is probably nonforest, but some of which might plausibly be assumed to be forest. (See also Box 2.1 of this report.)

Natural Forest Cover, Logging Concessions, Industrial Timber Plantations, and Estate Crop Plantations

Source: Directorate General of Forest Inventory and Land Use Planning, Ministry of Forestry, Government of Indonesia, and Food and Agriculture Organization of the United Nations (GOI-FAO). 1996. *National Forest Inventory of Indonesia (NFI): Final Forest Resources Statistics Report*. Field Document No. 55 and associated digital files. Jakarta, Indonesia: GOI/FAO.

Date: Data are from various years in the early and mid-1990s but are generally taken to describe the situation in the early 1990s.

Scale: 1:250,000

Comment: See Box 2.1 of this report.

Natural Forest Cover in 1997

Sources: Ministry of Forestry, Government of Indonesia and World Bank (GOI/World Bank). 2000. Digital dataset on CD-ROM; D. Holmes, 2000. *Deforestation in Indonesia: A Review of the Situation in 1999*. Consultant report to the World Bank. Jakarta, Indonesia. Draft, July 3.

Date: Most data are from 1996 to 1998 but in a few areas are from 1994. An average year of 1997 is assumed.

Scale: 1:500,000

Comments: The dataset classifies forest and nonforest areas; it does not distinguish among different forest vegetation types. In the last draft of the report completed before his untimely death, Holmes did not provide estimates of forest cover in Java, Bali, or Nusa Tenggara. For this report, GFW calculated forest cover in these islands from the GOI/World Bank dataset. We note throughout where our estimates are being used.

For the sake of avoiding confusion, we quote Holmes's findings (supplemented by our own for the islands listed above) throughout this report. However, in our spatial presentations that involve the GOI/World Bank dataset (Maps 1, 2, and 3) we make no assumptions about forest cover in "no data" or "cloud cover" areas, and we depict these areas simply as "no data." This is not the case in the maps that analyze the extent and condition of low access forests (Maps 4, 5, and 6). For these maps, "no data" areas occurring in areas that appear to lie within potentially intact forest areas have been "filled" using land cover data from NFI, 1996. That is, the "no data" areas are classified as forest or nonforest, based on the information for those areas contained in the NFI vegetation cover dataset. (See also Box 2.1 of this report.)