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Forestry in Contemporary Indonesia

Abstract

After a short introduction into the forestry in the Dutch and early independence periods, forest policies in Indonesia between 1945 and 1994 are reviewed. A high proportion of the Outer Islands forests are leased as private timber concessions. While most of the companies concerned are Indonesian, considerable joint venture capital has been involved, representing Japanese, Korean and Malaysian interests. The Indonesian ministry of forestry has instituted a selective cutting system and enforced regulations on local processing. In the last ten years Indonesia has become the world's leading exporter of tropical plywood with a few conglomerates controlling the entire industry. Recent emphasis has shifted to reforestation in the form of industrial plantations of exotic species destined for a growing pulp and paper industry, while natural regeneration and biodiversity maintenance have been considered less important. Most deforestation can be attributed to new settlers, both sponsored and spontaneous. Indigenous forest dwellers have been subjected to severe pressures as their traditional agricultural systems are regarded as illegal.

1. Introduction

The present paper seeks to update previous publications by the author on various aspects of forests and forestry in Indonesia (Potter, 1988; 1990; 1991; 1993) and to provide some continuity between the contemporary Indonesian situation and that prevailing during the 1930s and immediately after the Second World War, *i.e.* prior to Indonesian independence. There are three themes:
(1) the legacy of the Dutch period (section 2);
(2) forestry in post-war Indonesia, 1949–1975 (sections 3–4);
(3) forestry in contemporary Indonesia, 1975–1994 (sections 5–7).

Following an initial brief summary of forest activities in Java, the paper will concentrate on the situation in the Outer Islands, which became the major focus of interest from the 1960s and has remained of great importance to the present.

2. The legacy of the Dutch period

During the Dutch period in Indonesia, much attention was given to scientific management of the valuable teak forests which covered 800,000 hectares, mainly in Central and Eastern Java. Clear felling in blocks and replanting had been used to improve the quality of the teak stands, which had been replanted by villagers using the *taungya* or *tumpangsari* system (with food crops being grown between the rows of trees for the first few years until canopy closure). The result was an even-aged stand similar to teak plantations. The teak forests were much used in Java for construction of ships and buildings, for railway sleepers and furniture; their thinnings were a source of fuelwood, both for the railways and the local population, but there was comparatively litttle export of teak in comparison with other producers such as Burma.

After Indonesian independence, there was much rehabilitation needed in the teak forests, following the destruction and neglect of the war and the turbulent times which followed. The management of the forests was eventually restored to a system closely resembling that of the Dutch period.

Apart from teak, the other focus of foresters in Java was on the 'wildwood forests', which had formerly clothed the uplands and protected the watersheds from erosion. Although the uplands had been subjected to exploitation by cash crops such as coffee and by smallholders growing upland rice and other dry crops, the policy was to retain some reserved areas under timber and to reforest degraded lands, if necessary with fast-growing species such as *Albizzia montana* (*kemlandingan gunung*) and *Albizzia moluccana* (*sengon laut*). Recent management of these forests has continued to emphasize the planting of reforestation species, including *Pinus mercusii*, although pressures of population on upland areas and especially the peoples' fuelwood needs have led to many conflicts.

The Outer Island forests were much less known and more complex in structure, containing an amazing diversity of species. The Malesian floristic region, of which they form a part, is dominated by the important family Dipterocarpaceae. The island of Borneo, as the stable ancient core region of Sundaland, is the cradle of speciation for the dipterocarp family: 155 endemic and 112 non-endemic species occur there (Ashton, 1982). While Sumatra and the Malaysian peninsula are also rich in dipterocarps, species numbers drop and their dominance of the forests declines to the south and east, especially across Wallace's line, where it is believed the representatives of the family migrated only fairly recently (Johns, 1987). Thus Sulawesi has 7 dipterocarp species and the individual islands of Maluku vary from 1 to 6 species. Knowledge of the eastern Indonesian forests, including those in Maluku and Irian Jaya, has developed rather late. Kalimantan, especially East Kalimantan, was recognized much sooner as having a rich forest resource.

Tall, canopy-emergent trees with long straight boles, the majestic dipterocarps have one major disadvantage: unlike teak and famous local hardwoods such as

the Borneo ironwood (*Eusideroxylon zwageri*), they are not resistant to attack by termites and various other borers. They were thus perceived as almost valueless, particularly when compared with teak. It was only in the 1930s that techniques began to be developed, mainly in peninsular Malaysia, for treating such timbers to increase their resistance.

Some mapping and inventory of species had taken place in Indonesia, with forestry officials appointed to all districts by the late 1920s. In 1929 the Dutch forester Endert presented a paper to the Foresters' Congress of the Netherlands Indies, drawing together the results of various strip surveys and estimates, which provided preliminary figures on total area and stocking rate for the Outer Islands forests (Endert, 1929). These figures were still being used fifty years later (Hamzah, 1978), despite warnings by Ottow (1952) and Verkuyl (1952), that such estimates were likely to be exaggerated, especially as the technique of strip surveys tended to apply stocking rates from the best areas to the whole forest. Ottow described the magnitude of potential output suggested by Endert and elaborated by Gonggrijp (1935), as 'fantasy'. Both he and Verkuyl pointed out that considerable deforestation had already occurred at the hands of the local population, especially along the more accessible rivers.

Commercial utilization of the Outer Island forests was low, with rattan and other 'minor products' being far more important than timber. Most private concessions had failed, except in the case of the *panglongs* of coastal Sumatra, where mangroves were worked for firewood and exported to the nearby Singapore market (Kools, 1949). While local fellings of useful species were undertaken in most districts, the logs being floated down the rivers to sawmills in river mouth towns (the *banjir kap* system), little management of these forests had been attempted. In the late 1930s, rapidly increasing interest by Japanese firms in the dipterocarp stands of eastern Kalimantan prompted more serious efforts to regulate their exploitation (Potter, 1988).

Although it had been predicted that the Outer Islands, with a maximum production of one million cubic metres of roundwood in 1938, would be able to supply 10 million cubic metres 'in the near future' (Beversluis, 1940), it was 1970 before such a level was achieved. There had been plans before the war for intensive government exploitation of those few areas where single species formed almost pure stands. For example, the ironwood (*Eusideroxylon zwagerei*) and *Agathis* (*Agathis borneensis*) of Kalimantan. Immediately after the war, a start was made on working a rich *Agathis* complex near Sampit in Central Kalimantan. A large government-owned firm, the Bruynzeel-Dayak Houtbedrijven, constructed a railway into the forest and a modern sawmill in Sampit. The firm continued to function after Indonesian independence and through the disturbed period of the 1950s (Hulsinga, 1955; Djawatan Kehutanan, 1955). It had apparently still been in operation as part of Inhutani, the government's forestry company in Kalimantan, until at least 1983. On visiting the area some years later, the author saw numbered trees and the remains of a nursery, but many trees had been burnt out, perhaps following the 1982/83 drought.

3. Forestry in post-war Indonesia, 1949–1975

Events of the past twenty-five years have revolutionized forestry activity in Indonesia. The instalment of the New Order government in 1965 was followed in 1967 and 1968 by the passage of the foreign and domestic investment laws, leading to the eventual leasing out of a high proportion of the Outer Island forests as private timber concessions. In the building boom which accompanied the post-war reconstruction of Japan, large amounts of cheap timber were needed, much of it for scaffoldings and temporary use, or for conversion to plywood. Japan looked initially to the Philippines as the major source, followed by Sabah, which had largely copied the Philippine approach. In the Philippines, American foresters had early regarded the light hardwood *Shorea* species as being akin to Oregon pine, and advocated mechanized, mass production for cheap construction. After the Second World War, it was the Philippines timber industry which recovered soonest and was in the best position to meet the needs of the Japanese market.

Japanese commercial firms became interested in exploiting Kalimantan's timber from the 1950's (Nectoux & Kuroda, 1990). They were aware that domestic demand was burgeoning and predicted the rapid exhaustion of Philippine sources. There was also some knowledge of East Kalimantan from the pre-war concessions (Potter, 1988). During this period the Soekarno regime was antagonistic towards direct entry of foreign capital. Japanese firms such as Mitsui were forced to undertake production-sharing agreements with Perhutani, the State Forestry Enterprise (Manning, 1971). These agreements did not prove very successful, so that the new opportunities provided by the Suharto government were welcomed.

Foreign capital moved quickly into Indonesia after 1967. Investors either took up timber concessions, or, as was the preferred method of many Japanese companies, provided credit to finance logging teams rather than work the forests directly. By far the largest investment in concessions came from Philippine lumber firms, also trying to diversify their sources of supply (Departemen Kehutanan, 1986: vol. III; Durand, 1993). In 1967, Indonesia had provided a mere 3 per cent of Japanese log imports. This had risen to 40 per cent by 1971 (Sakai, 1987: 24). More than 40 per cent of the total supply was at that time coming from East Kalimantan (Potter, 1991).

Production had continued initially to operate on the old *banjir kap* or hand logging system. Local or immigrant cutters would fell the trees and haul them out with buffaloes or manually (along tracks of logs known as *kuda-kuda*), then float them down river. These methods were a continuation of those in vogue during the Dutch period, but the scale and pace of the increased demand soon made them obsolete. Towards the end of the 1960's not only were thousands employed in woodcutting teams, but there were in operation around 100 small, provincially issued concessions (for periods as short as five years). These contrasted with the extensive holdings of more highly capitalized, mechanized and predominently foreign firms, whose term extended for 20 years. In 1970 the cen-

tral government assumed control and the smaller concessions began to be phased out (Wood, 1985). A year later, Japanese buyers announced that forest products from non-mechanized sources would no longer be accepted, thus throwing all the cutting teams out of work (Manning, 1971). Thirteen million hectares of Indonesia's forests had already been taken up by foreign firms, or foreign firms in partnership with local interests: 70 per cent of these were located in Kalimantan, especially East Kalimantan (Durand, 1993). Timber output increased rapidly between 1970 and 1973, the end of the first Five Year Plan (Pelita I) by which time the transition to mechanized logging was complete. The following year, Indonesia's share of Japanese log imports reached a record 47 per cent, with that from the Philippines dropping to 16 per cent (from 58 per cent in 1967). Although there is clear evidence that Japanese trading houses (the *sogo shosha*) colluded to keep prices low for Indonesian timber (Sakai, 1987; Nectoux & Kuroda, 1990), returns were high enough to meet the government's main requirement of increased foreign exchange to finance development. In 1975 a new regulation made it mandatory for existing foreign firms to move towards 51 per cent Indonesian participation; further foreign investments had to be in the form of joint ventures (Lauriat & Sacerdoti, 1977). Indonesianization of the workforce, replacing the Malaysian and Filipino cutting teams who had initially arrived with their contractors, also proceeded rapidly. Foreign management of field operations, especially by Sarawak Chinese and some Koreans, has, however, persisted to the present. Japanese, Malaysian and South Korean capital, in the form of joint ventures with Indonesian firms, remains prominent in both the plywood and pulp industries, while direct American or Filipino input has disappeared.

4. The Forestry Law and the cutting system

The Basic Forestry Law (*Undang-Undang Pokok Kehutanan*, UUPK, no. 5/1967), asserted the supreme right of the Indonesian state over the forest lands and their resources. As Barber has pointed out, 'forest lands' were not biologically defined, but were areas with or without trees that were designated 'forest' by the government (Barber, 1989). Different types of forest were specified according to their functions, such as protection, production, nature conservation and recreation, although little was done in the earlier years to demarcate the boundaries of such zones. Social, traditional and individual rights to 'obtain advantage from the forest', were not permitted to interfere with the goals of the UUPK, a major one of which was timber production. The status of *adat* or customary law, still strong among indigenous groups of forest-dwellers in the Outer Islands, was thus reduced by this legislation. Barber sees it as 'the legal and ideological expression, in the forestry sector, of the New Order's general program of state power centralization and extension in the service of 'stability' and 'development' (Barber, 1989: 132). Its predecessor, the 1960 Agrarian Law, which had continued the earlier Dutch regulations on forestry and maintenance of *adat* rights,

was seen to be tainted by its association with the Communist party and land reform. The UUPK was followed by more detailed regulations, one of which (no. 21/1970) did permit the continuation of traditional collecting activities in concession areas, but not the right to cultivate forest land. Cultivation certainly continued, especially in the early years of the act, when little attempt was made to interfere with it. Reports that one large joint venture company had attempted to close its leased area to local people brought protests from the East Kalimantan governor (Manning, 1971: 59). The decree of the Director-General of Forestry (no. 35/1972), outlined the rules for the Indonesian Selective Cutting system (*Tebang Pilih Indonesia*, TPI), as well as two possible clear-cutting systems, Clear Cutting with Artificial Planting (THPB) and Clear Cutting with Natural Regeneration (THPA).

These logging rules, ostensibly following the German principles of 'scientific forestry', corresponded in general to those in practice in other parts of Southeast Asia. The principles had been slowly extended from the monsoonal teak stands of Burma and Java (where experiments had begun from the 1850s and 1860s into growth measurement and calculation of 'sustained yield' over 80–year cycles), to the more complex, species-rich dipterocarp forests of the equatorial lands, such as peninsular Malaysia and Borneo. Clear felling systems had been tried in the 1930s, particularly in heavily stocked forests, aiming to produce even-aged stands of the most valuable timber, largely through natural regeneration. In the Malayan case, concentration had been focussed on the light dipterocarp (*Shorea*) 'red meranti'. The Malayan 'uniform' or 'shelterwood' system, involving clear felling and silvicultural treatments to promote that species, was fully established only in 1949. It was used in Sabah, and in the lowland dipterocarp forests of the Peninsula, but those forests began to disappear at a rapid rate in the 1970s to make way for FELDA land settlement schemes (Wyatt-Smith & Vincent, 1962). Once it became necessary to use the upland Malaysian forests, reversion to some kind of selection felling was seen as preferable, as rates of regeneration were more varied and stocking of the marketable species was lower.

In the early years after 1967, Indonesian concessionaires were instructed to use the selective logging or TPI system. Simple clear felling was, however, permitted in areas scheduled for permanent conversion to settlement or other uses. Under TPI the concession block was to be divided into compartments and cut systematically, with annual, five-year and twenty-year working plans. The regeneration cycle was estimated to be at least 35 years. Only trees with a minimum diameter at breast height (DBH) of 50 cm were to be harvested, while theoretically at least 25 medium-sized trees per hectare (DBH 35 cm) were to be retained to ensure the next cut, given a presumed growth rate of 1 cm per year for *all* species (Sumantri, Soewito & Wesman, 1981). It was soon discovered that the theorized distribution of tree sizes could not be found: the 'over-aged' nature of Indonesia's forests meant that a few very large trees occupied much of the area, leaving little space for their replacements to grow (Bohlander, 1977; Hamzah, 1978). Both Zoefri Hamzah and Long & Johnson, using evidence from the former Weyerhauser ITCI concession near Balikpapan, concluded that the cutting

system was not likely to be sustainable on a 35-year cycle (Hamzah, 1978; Long & Johnson, 1981). The management of the ITCI concession had begun establishing plantations of fast-growing species to make up for a predicted short-fall of timber.

Another aspect of the 'sustainability' debate, in terms of the TPI system, was the amount of damage occurring as a result of logging and the biological changes which were taking place in the species composition of the forest. Various aspects of these changes were examined in the Symposium on 'Long-term effects of logging in Southeast Asia' (Rahardjo, 1978). Almost all of the Indonesian contributions to this symposium dealt with research in East Kalimantan. Kuswata Kartawinata noted that half of the trees suffered damage through mechanical logging, while Tinal & Palenewen presented a more detailed discussion of such damage, with 'fallen or broken off' trees forming the largest category. Kuswata added that soils were affected, especially along tractor paths, which covered 30 per cent of the ground surface. Increased mortality of seedlings would occur through excess heat and dessication in open areas, in addition to their suppression through invasion by fast-growing secondary species (Kartawinata, 1978). Zoefri Hamzah emphasized that variation in seedling survival depended on the traffic in an area and the bulk density (compaction) of the soil (Hamzah, 1978). Another project concluded that the level of seedling growth would be inadequate to maintain stocking, necessitating enrichment planting. Rates of annual increment among the dipterocarps measured in that research varied between 0.62 cm and 0.98 cm (Dwi Sutanto, Wirakusumah & Permono, 1978). While various kinds of silvicultural treatment were recommended by the regulations to assist regeneration, the only rule widely heeded by concessionaires was that of minimum diameter, presumably because the market demanded large trees. Djamaludin, the present Minister of Forestry, wrote that up to 1980, 'in practice, concession holders only complied with the stipulation on diameter limit, while the other operational aspects (such as residual stand inventories, refining, nurseries, replanting/enrichment planting and forest tendings) had not been carried out at all' (Djamaludin, 1991: 98). Recommendations that steeply sloping ground not be logged were also largely ignored (Jenkins, 1977). It is clear that the basic level of knowledge of the forest was poor. The system was implemented hastily, with few checks, in response to market demand, and evolved gradually as knowledge improved. Some aspects were tested by the better producers as they went along, while others complied with as few regulations as possible, taking out what they could as fast as they could.

While forestry operations in East and South Kalimantan were concentrated in the dipterocarp forest, in West and Central Kalimantan an early focus was on the softwood swamp timber *ramin* (*Gonystylus bancanis*) (Snowy Mountains, 1973).[1] Extraction of *ramin* often necessitated the construction of light railway lines across the swamp, although *kuda-kuda* hauling by manual labour was still practised. The popular white *ramin*, sold as sawn timber, was also produced in

[1] Fieldwork by author in 1989 and 1992.

Sarawak; its main stands appear to be confined to Borneo, although it is present in some Sumatran swamps (Whitten *et al.*, 1987).

5. Forestry in contemporary Indonesia, 1975–1994

Beginning in the second Five Year Plan (Repelita II, 1974/75–1978/79), the Indonesian government began more firmly to implement its regulations on local processing, with each concession holder supposed to be processing 60 per cent of the out-turn within ten years of starting production (Lauriat & Sacerdoti, 1977). To demonstrate its seriousness, the government instituted an export tax on raw logs in 1977 and doubled it in 1978, up to 20 per cent. As raw logs were demanded by the Japanese importers, and there was as yet little market for Indonesian plywood, it is understandable that the concessionaires did not rush to erect sawmills and plywood plants. The latter were particularly expensive to construct, about twice the cost of their counterparts in Taiwan or Singapore (Lauriat & Sacerdoti, 1977). While incentives were available in terms of tax holidays, sanctions were also imposed, with reduction in the allowable cutting area of firms refusing to comply. Even where plants had been built, installed capacity was only half used in 1980, it still being more lucrative to export raw logs. A final date for complete phasing out of raw log exports was set at 1985, with a ceiling of 4 million cubic metres in 1982 and 1.5 million in 1984 (England, 1986). Some foreign concessionaires withdrew at that point, but there was also a rush to place stocks of logs on the market, so that exports rose to their highest levels thus far in 1979 and 1980. A fall in prices, followed by the severe drought and huge fire in East Kalimantan in 1982/83, subsequently brought drops in production for a few years.

Meanwhile, firms took out loans from various local banks and there was a rapid rise in the number of plywood plants constructed through the 1980s. By 1989 there were 114 plants, 27 of which were in East Kalimantan and another 38 in the other Kalimantan provinces. Maluku with 12 plants was also noteworthy, while Riau was the Sumatran leader with 9, out of a total of 21 for that island. Irian Jaya had just one plant, and Sulawesi two (Indonesian Commercial Newsletter [ICN]: 25 September 1989). No further new investments in plywood mills are permitted, but extensions are still allowed, especially in Irian Jaya. Production rose from 100,000 cubic metres in 1975 to 9.5 million in 1993/4 (Business News: 14 September 1994). Plywood became the dominant non-oil export, supporting a government drive to encourage diversification in times of falling oil prices and providing foreign exchange to assist the nation's external debt repayment. Exports tripled between 1984 and 1991, with Indonesia assuming the role as world's leading exporter of tropical plywood, already supplying 70 per cent of the market by 1986 (England, 1986). This occurred despite early attempts by Japan to keep out Indonesian plywood through high tariffs. Apkindo, the Wood Panel Association of Indonesia, through its powerful director, Bob Hasan, lobbied hard for its share of the market; it imposed quotas on

all producers and regulated prices. It also provided fixed quotas of plywood to consumers, the most important of which are Japan, China, USA/Canada and Taiwan (ICN: 27 January 1992). Nevertheless, complaints have been raised about inefficiency and mismanagement in the industry. Many mills have experienced cash-flow problems and remain heavily in debt. Employment is estimated to be about one-third more than would be required in efficient mills elsewhere (FAO/GOI, 1990) and machinery needs replacing and updating (England, 1986). There are claims that overcapacity, both in sawmilling and in plywood, has encouraged overcutting of forests, smuggling and illegal logging (ICN: 26 April 1993). Since 1989 there have been reports that some plants have been experiencing shortages of raw materials. This has been true of parts of Sumatra, West Kalimantan and even East Kalimantan, where supplies must now be brought from more remote districts, which makes them expensive. In some cases logs have been imported from Sarawak. In early 1992 plywood was described as approaching its 'culmination point', an observer commenting that 'its golden age is over' (ICN: 27 January 1992). Textiles had already replaced plywood as the most valuable non-oil export. The 1990 FAO study predicted such a decline and suggested that natural timber supplies would gradually be replaced by those from plantations. This has now become government policy, with supplies from natural forests predicted to decline steadily (FAO/GOI 1990; Business News: 28 January 1994).

The rise of plywood processing has been responsible for the growth of a few large conglomerates which now virtually control the timber industry. These firms have gradually absorbed neighbouring concessions, secured supplies of logs in several different provinces and moved to take charge of all aspects of processing. The largest groups own a range of plants (sawmills, plywood, blockboard, glue factories, pulp and paper). Some have their own shipping lines, as well as interests outside timber. The Barito Pacific group is the biggest, owning ten plywood mills and about 10 per cent of the capacity, with forest concessions covering 2 million hectares in Central Kalimantan, Maluku and Irian Jaya and large areas of reforestation for pulp and paper, especially in South Sumatra (ICN: 27 January 1992). Its chairman, Prayogo Pangestu, originally from a poor Chinese family in Singkawang, West Kalimantan, recently took control of Construction and Supplies House (CASH), a Chinese-owned Sabah firm of varied interests including reforestation projects, timber concessions and plywood mills in Sabah, Papua-New Guinea and Shanghai (Ng, 1994; Wangkar & Attamimi, 1994). There is a suggestion that Prayogo and Lee, CASH's managing director, might be aiming to acquire some of the Sabah Foundation's extensive timber concessions in Sabah (Tsuruoka, 1994).

6. Reforestation, forest plantations and pulp and paper

A Presidential Decree issued in 1980 stipulated that all concession holders were required to carry out regeneration and reforestation operations on their

holdings. They were asked to pay into a reforestation fund (*dana reboisasi*), with a promise that the money would be reimbursed after they had completed reforestation activities. The fee levied, $ 4.00 per cubic meter of roundwood, was raised to $ 7 in 1989. According to Djamaludin, only 11 per cent out of the total of 528 concessionaires in 1987 had fully implemented the provisions of the replanting/enrichment planting program.

In 1989 the TPI system was renamed the TPTI, the selective cutting *and planting* system, further emphasizing the government's insistence on regeneration and replanting. The reforestation fee was increased to $ 10 and became simply a tax appropriated by government, to be used in development of industrial timber estates and land rehabilitation (Djamaludin, 1991). In 1993 it was raised further, its sliding scale reflecting the logging district and type of timber: the fee for mixed forest produce in Kalimantan is now $ 16, in Maluku $ 13 (ICN: 26 April 1993).

Despite warnings about the dangers of 'monoculturization' (WALHI/YLBHI, 1992) and earlier assessments that plantations were not the answer to the problems of natural regeneration (IIED/GOI, the government has committed itself to creating large areas of industrial forest (*Hutan Tanaman Industri*, HTI), planted with fast-growing species such as *Acacia mangium*, *Eucalyptus urophylla* and *Paraserianthes falcataria*. The plan is to convert 4.4 million hectares of 'unproductive forest', *i.e.* with a yield below 20 cubic metres per hectare, into HTI by the end of the century (Indonesian Tropical Forestry Action Programme, 1991). Grassland, scrub and otherwise denuded land is also a high priority for plantation development. It was recommended by the FAO studies that the proportion of pulpwood and timber/sawlog trees in these estates should be around 40/60 by the year 2000. However, there are fears that the quality of much of this rapidly grown timber will not be suitable for any purpose other than pulping. *Acacia mangium*, for example, suffers from 'heartrot' and is prone to insect attack, reducing its quality. Ability of the plantations to produce subsequent crops beyond the first is also questionable, given the poor soils of many districts.

While there have long been small paper plants in Java, using *bagasse* from the sugar industry, rice straw and recycled paper as their raw material, it is only recently that large wood-using pulp or integrated pulp and paper mills have been set up in the Outer Islands. Current technology dictates that new pulp mills have a capacity of 300,000 tons, and paper mills at least 150,000 tons per year respectively (ICN: 28 September 1992). Sumatra leads the way with three large mills already producing pulp and 8 more planned. Kalimantan may eventually have 12 mills, 10 in East Kalimantan and two in West (though none have yet been built), and there are plans for 3 or 4 in Irian Jaya (ICN: 28 September 1992; WALHI/YLBHI, 1992). Most of these mills will be dependent on the new production from forest estates, which takes at least seven years to mature. Establishment of such estates or other guaranteed sources of supply is therefore essential before further mills are constructed. Existing mills in Sumatra, such as Inti Indorayon Utama (IIU) (North Sumatra) and Indah Kiat (Riau), already have

difficulty in securing raw materials and land for HTI and have been accused of rampant forest destruction. There was a famous case involving IIU in which a group of women were arrested for destroying eucalyptus planted on village land, which they asserted had been appropriated with no reference to traditional systems of land transfer and little compensation (WALHI/YLBHI, 1992). Indah Kiat, which recently expanded its pulp production capacity to 790,000 tons annually, has been accused of clear-cutting much productive forest while waiting for its estate timber to become available. Prayogo Pangestu's Barito Pacific group have acquired and planted up large areas in South Sumatra in preparation for their Tanjung Enim plant. Again there are rumours of villagers' rights over some of this land being ignored.

Three paper mills will be constructed in East Kalimantan during the next five years and similar worries have surfaced there about the raw material problem: only 20 of the 93 active concessions presently have HTI and much of this production is already earmarked for other new wood-using industries, such as medium density fibreboard, a kind of cheaper plywood (Kompas: 7, 18 March 1994). Dick notes that the proposal by P.T. Kiani Kertas (in which Bob Hasan has an interest) for a pulp mill/plantation project near Tanjung Redeb would involve the clear-felling and conversion of 200,000 ha of excellent natural forest with a stocking rate of 40–50 cubic metres per hectare, far removed from the degraded shrubland which is supposed to be used for such ventures (Dick, 1991). Such examples lead the WALHI/YBLHI group to believe that the planting of industrial forests, far from taking pressure off the natural forests, as has been claimed, will only intensify it. Much biodiversity will be lost, while the increased raw material demand from the new industrial establishments will lead to higher levels of forest conversion (WALHI/YBLHI, 1992). More pressure is already being felt by the human populations of the forest areas, as the polluting pulp and paper plants tend to locate near their sources of supply, not far away like the plywood industries.

One benefit which was supposed to accrue as a result of the extension of forest plantations, was the local employment which they were said to generate. Yet in many areas preference has been given to employing Javanese or other transmigrant labour in preference to local. The reforestation activities have been formally linked with transmigration, through the 'HTI-trans' schemes, in which the migrants become simply a plantation workforce, described by the chairman of one forest NGO as 'akin to slavery in a modern guise' (Economic and Business Review Indonesia: 7 May 1992).

7. Land use zoning, deforestation and problems of forest dwellers

One feature of forest management which did not occur until 1980/1983, after most concession areas were firmly in place, was the 'agreed' subdivision of the forest estate into land use zones. These were identified as: protection forest; limited production forest; ordinary production forest; conversion forest and

parks and reserves. The proclamation of the TGHK (*Tata Guna Hutan Kesepakatan*) meant that the Basic Forestry Law was now being enforced. Boundaries drawn on maps could restrict peoples' activities in ways which had not previously occurred. Human populations were not welcome in protected forest or nature reserves, even though occupied villages might have existed in such areas for millennia. Conversion forest, on the other hand, included major rivers and coastal regions, in which human activity had already affected forest quality. Transmigrant settlements, where these occurred in forest zones, were supposed to be located in the conversion forest. One feature of the TGHK was that criteria of slope and erosion potential were used to fix the boundaries between protected forest and production forest, and between the two categories of production forest. Such boundaries were not related to the state of the forest, or even its presence. Thus some areas of 'protection forest' were pure grassland. Under the TGHK, more land was placed under the control of the Forestry Department than actually bore trees (Potter, 1991).

A mapping project organized by the Transmigration Department and executed by a British team, seeking out suitable sites for future transmigration settlements, eventually provided the most accurate base maps for assessment of land use type and vegetation category, although the information presented by their 1:250,000 map series is a reflection of the situation around 1982. The Regional Physical Planning Project for Transmigration or 'REPPPROT' reports critically examined the TGHK boundaries, suggesting many changes. The Forestry Department is also engaged in an extensive inventory, like 'REPPPROT' using available satellite imagery to map the state of the forests. This project seems rather slow in publishing its results and might well be overtaken by events.

A World Bank study has noted a gradual extension of the powers of the Forestry Department, through their broadening of the categories of 'forest' land. Much more land than had been considered 'forest' in 1967 or 1972 has now been brought under their control (World Bank, 1990). This becomes important when 'shifting cultivation' (which includes a variety of agricultural systems practised by both traditional and non-traditional people), is classified as illegal under the Basic Forestry Law, as now seems to be happening (Owen Davies, 1993). One initiative from government has been to work through the concessionaires and encourage them to change the agricultural systems of people living on their concessions. The *HPH Bina Desa Hutan* programme, or 'concessionaires developing forest villages', initiated in January 1992, takes as its guiding principle an assumed need to move people out of shifting cultivation. The technique of simply presenting people with hoes and fertilizer appears quite inappropriate and unlikely to benefit them. Once people's farming systems are seen to be operating outside the law, then it becomes easier to remove them from lands they have traditionally occupied, in order for an alternate form of land use to be substituted, such as a forest estate. Land inside the formal forestry boundaries (except the conversion forests) cannot legally be titled, so that people can never acquire full ownership rights to their traditional lands (World Bank, 1994).

Spontaneous migrants cannot receive tenure either, which might have encouraged them to adopt more sustainable systems.

A second important question concerns the rates of deforestation which are said to be taking place and the identification of the 'culprits' who are causing such destruction. In the first report to attempt to put numbers on deforestation, the World Bank (1990) noted 'smallholder conversion' in Kalimantan, as being responsible for more than half the total forest loss from the period 1980–1986. The overall annual rate of deforestation (excluding the fire in East Kalimantan), was put at 860,000 hectares per year. The FAO studies in 1990 arrived at a rate of 937,000 hectares, also excluding the fire. It is interesting that such figures blame spontaneous transmigrants, not locals, for causing the greatest deforestation. Dick calculates a total rate of smaller magnitude, at 623,000 hectares per year (Dick, 1991). He makes the point that the different activities are not all additive, as smallholders tend to occupy lands which have been already partly disturbed by other activities. He notes that in fact, according to the available sources, it has been government encouraged migration, both official and spontaneous, which has caused two-thirds of the destruction. Dick would not place too much credence on any of the official figures, however. He comments: 'Much of the existing information on land use change and forest conversion is so inconsistent, so contradictory, and collected to such poor standards of quality that it is not possible to treat rates of deforestation with any confidence' (Dick, 1991: 39).

The Indonesian government has recently undertaken a propaganda exercise, defending the activities of the Forestry Department and others and claiming that the TPTI system is sustainable. They quote Dick's lower reforestation figure as the correct one, but they do not repeat his other conclusions about the issue.

8. Conclusion

One feature which is painfully striking when one contemplates the manner in which the forests have been rapidly destroyed in the past 25 years, is that these amazing storehouses of biodiversity have been considered too cheap to be bothered preserving. The original machinations of Japanese companies to keep log prices down; the sometimes reckless overcutting of the big plywood cartels and their avoidance of the difficult task of natural regeneration; their present willingness to substitute industrial plantations for logged-over forests: all indicate a lack of appreciation of anything beyond the commercial value of the timber and a greed for short-term gain which is disturbing. At each step in the saga, whether in the period of raw logs, the present plywood age (which is coming to a close), or the era of planted plantations, the official perception of forest people as uncivilized and destructive has not changed.

It is, however, beginning to be recognized that formidable problems exist on the subject of land tenure. Local claims are making it difficult for plantation companies to acquire land in what was believed to be 'empty' grassland or scrub. People are beginning to bargain over access or else react in quiet protest

at the erosion of their customary rights. HTI's have proved mysteriously prone to arson, which does not augur well for their sustainability. The battles over forests and land in Indonesia have barely begun.

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