

**CONFIDENTIAL**

**REPORT NO: 11758-IND**

## **I N D O N E S I A**

# **PRODUCTION FORESTRY: ACHIEVING SUSTAINABILITY AND COMPETITIVENESS**

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This is a draft working paper, intended to promote discussion on the forestry sector in Indonesia. It should not be regarded as the final and official position of the World Bank on the subject matter discussed.

CURRENCY EQUIVALENTS

<u>Before November 15, 1978</u>		<u>US\$1.00 - Rp 415</u>
<u>Annual Average</u>	<u>1985-91</u>	
	1985	US\$1.00 - Rp 1,111
	1986	US\$1.00 - Rp 1,283 <sup>1</sup>
	1987	US\$1.00 - Rp 1,644
	1988	US\$1.00 - Rp 1,686
	1989	US\$1.00 - Rp 1,770
	1990	US\$1.00 - Rp 1,843
	1991	US\$1.00 - Rp 1,950
	1992	US\$1.00 - Rp 2,030

FISCAL YEAR

Government	-	April 1 to March 31
Bank Indonesia	-	April 1 to March 31
State Banks	-	January 1 to December 31

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<sup>1</sup> On September 12, 1986 the Rupiah was devalued from US\$1.00 - Rp 1,134 to US\$1.00 - Rp 1,644. [There was also an earlier devaluation on March 30, 1983.]

**ABBREVIATIONS, ACRONYMS AND INDONESIAN TERMS**

ADT	- Air Dry Tonne
AIFTA	- Association of Formalin & Thermosetting Adhesives Industries
AKRSP	- Aga Khan Rural Support Programme
AMDAL	- Environmental Impact Assessment
APHI	- Logging Concession Owners Association
APKINDO	- Plywood Manufacturers Association
ASMINDO	- Indonesian Furniture and Handicraft Producers Association
BAKN	- Agency for Civil Servants Administration
BAPEDAL	- Environmental Impact Management Agency
BAPPEDAs	- Provincial Planning Boards
BFL	- Basic Forestry Law
BIPHUT	- Inventory and Forest Mapping Centre
BISHH	- Forest Products Information and Certification Center
BKPH	- Forest Sub-District
BKSDA	- Natural Resources Conservation Centre
BLK	- Forestry Training Centre
BPA	- Natural Silk Centre
BPK	- Forestry Research Centre
BPKM	- GOI Investment Coordination Board
BPPB	- Seed and Inspection Centre
BRLKT	- Rehabilitation and Soil Conservation Centre
BTP PERBENIHAN	- Seed Technology Centre
BTP DAS	- Watershed Management Technology Centre
BTR	- Reforestation Technology Centre
CINTRAFOR	- Centre for International Trade in Forest Products
cum	- Cubic Metre
DBMT	- Directorate of Development for the Most Isolated (Ministry of Social Affairs)
DENR	- Department of Environment and Natural Resources
DG	- Directorate General
DINAS	- Provincial Government Office
DR	- Reforestation Levy (component of total Government of Indonesia standing timber fee transferred to Ministry of Forestry for reforestation purposes)
FAO	- Food and Agriculture Organization
FICP I	- First World Bank Forestry Institutions and Conservation Project
FICP II	- Second World Bank Forestry Institutions and Conservation Project
FICP III	- Third World Bank Forestry Institutions and Conservation Project
FICP	- Forestry Institutions and Conservation
GEF	- Global Environment Facility
GTZ	- German Agency for Technical Cooperation
HIKKINDO	- Forestry Consultants Association of Indonesia

HPH	- Natural Forest Logging
HPHTI	- Concession Rights for Industrial Timber Estates
HRAF	- Human Relations Area Files
HTI	- Industrial Timber Estates
IFAP	- Indonesia Tropical Forestry Action Programme
IFTA	- Indonesian Flora & Fauna Trade Association
IHH	- Forest Products Royalty (component of total Government of Indonesia standing timber fee which is transferred to Ministry of Finance)
INFORMAN	- Indonesia Forest Management Model
INHUTANI	- State-Owned Forest Concession Company
INKINDO	- Indonesian Consultants' Association
INTAG	- Inventory and Land Use Planning
ISA	- Indonesian Sawmillers Association
ITTO	- International Tropical Timber Organization
JAC	- Japan Architectural Center
Kanwil Kehutanan	- Ministry of Forestry Regional Offices
KLH	- State Ministry for Population and Environment (split into two Ministries in 1993 reallocation of Ministerial responsibilities)
KPHP	- New Forest Zoning System
LGUs	- Local Government Units
LITBANG	- Agency for Forest Research and Development
m <sup>3</sup>	- Cubic Metre
MoFr	- Ministry of Forestry
MOI	- Ministry of Industry
MPI	- Indonesian Forestry Community
NGO	- Non-Government Organization
NIPINDO	- Indonesian Plywood Manufacturers Association (APKINDO) Trading Organization in Japan
NPV	- Net Present Value
NTFP	- Non-timber Forest Products
PH	- Directorate General of Forest Utilization
RePProT	- Mapping Based on Regional Physical Planning Program Ministry of Transmigration
RRL	- Directorate General of Reforestation and Land Rehabilitation
RPH	- Forest Resort
SBKSDA	- Natural Resources Conservation Sub-Centre
SBIPHUT	- Inventory and Forest Mapping Sub-Centre (SBIPHUT)
SBRLKT	- Rehabilitation and Soil Conservation Sub-Centre
SITC	- Standard International Trade Classification
SKMA	- Senior Forestry High School
TAG	- Transmigration Advisory Group
TFAP	- Tropical Forestry Action Programme
TGHK	- Ministry of Forestry Official Concession Map Boundaries
TKIHH	- Coordination Team for Forest Industries
TN	- National Parks
TPTI	- Indonesian Selective Cutting and Planting Forest Management System
WALHI	- Environmental Forum for Indonesia



**PRODUCTION FORESTRY: ACHIEVING SUSTAINABILITY  
AND COMPETITIVENESS**

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INDONESIA

PRODUCTION FORESTRY: ACHIEVING SUSTAINABILITY AND COMPETITIVENESS

Executive Summary

INTRODUCTION

- i. **The role of forests.** Indonesia has one of the largest tracts of tropical moist forest remaining in the world: estimates vary, but something in the order of 100 million hectares of the country is forested. Indonesia is highly dependent on this resource. In measurable economic terms, total output from the sector is around \$8 billion per annum, which amounts to about 7% of GDP, and 20% of non-oil exports. It is, however, of greater significance to the economic development of Indonesia than is indicated by these figures. Many millions of people in Indonesia earn a significant part of their income directly from the forest, through the extraction of nontimber forest products. Millions more depend heavily on the soil and water quality benefits provided by forests in the major watersheds: these are vital to agriculture, which remains a major livelihood in Indonesia.
- ii. **From the viewpoint of the global community, the Indonesian rainforest resource represents one of the most species rich ecosystems left on earth; it is also a massive carbon sink - a matter of some significance given current concern about emission of greenhouse gases into the atmosphere.**
- iii. **The resource: an asset, and a source of contention.** Possession of a large forest resource represents a major asset to Indonesia, but in the context of Indonesia's rapid economic growth imperative, it also sets up conflicts:
- iv. **There are strong differences in opinion in Indonesia as to how forest land should be used. Some of the land occupied by forests is potentially convertible into productive, profitable, and sustainable alternative uses. Such conversion offers not only relatively high returns, but gainful occupation for rural dwellers who, in many instances, have few alternatives. Although some would disagree, it is both likely, and inherently logical, that such land should be converted. However, there will be a gradation from land of this type, to land which should remain under forest. The latter includes not only areas of biodiversity value, but also areas where sustainable forest management will be the most effective use of the land, for reasons of terrain, soil type, location, infrastructure factors, and so on. Given the very large area of forest, it is reasonable to argue that most of it will not be converted to intensive crop use, for reasons of investment capital and market demand limits. The choice, more often, will be between retention as forest, or conversion to various forms of shifting agriculture, some of which will be neither sustainable, nor particularly profitable from the national point of view.**
- v. **Where the line between permanent forest and conversion forest is drawn, and by whom, is a major source of contention in the sector. This review takes the view that, in the Indonesian context, decisions of this nature are essentially political. Better information, and streamlining of institutional structures and consultative decision making frameworks, will improve the quality of decisions made, but will not transform them into apolitical ones. This is an important point, because it defines the need for inputs into the sector, to a large extent. While every effort to codify and objectify all major land use decisions by use of information and technology should be made, some vital changes in approach are needed now, and should be made without delay.**

vi. One such area of change, requiring an essentially political decision, relates to the role of local and regional governments. It will be argued (see under The Interest Groups below) that these institutions presently receive very little of the proceeds from forest production - and for areas under conservation or preservation, they receive even less. Revision of the revenue sharing formula is needed, to ensure that local and regional governments are given some incentive to participate in sustainable management or preservation: their role, especially in working with communities likely to encroach upon forests, will be crucial.

vii. Even when lines are drawn, and institutional jurisdiction and revenue shares are clarified, internal conflict in managing the resource is by no means eliminated. A forestry agency or other land management agency may, in theory, take a long term view of the resource under its management, but this view may not be shared by private sector users of the resource, nor by local populations who perceive more value in the land than in the trees on it. Both such groups are likely to have stronger field presence and impact than the regulatory agencies. The classic response to this problem is to attempt to strengthen the field implementation capability of the regulatory agency. Results from this approach - in Indonesia and elsewhere - have been disappointing. Regulatory institutions may well require strengthening, but they require both policy and institutional reform more urgently. The need for policy development is a central argument of this review, and institutional reform must accompany it.

#### DEFINING THE FRAMEWORK FOR POLICY ANALYSIS

viii. **The focus on production forestry.** It is important to consider the focus of a report of this nature. There is already a considerable body of recent work, by GOI, the Bank and other donors and interest groups, focussing on conservation and biodiversity in the forest: there is also considerable current and planned investment in this area. However, the results of all this work will be placed at considerable risk if production forestry (and its aftermath) is not controlled in Indonesia. Presently, forest operations cover some 700 000 hectares per annum. This figure is fairly close to recent estimates of deforestation in the country, and it is clear that much deforestation occurs in logged over land.

ix. It should not be assumed, however, that drastically reducing or eliminating logging (even if this were politically and economically possible) would reduce deforestation. In fact, quite the reverse could be expected, since the value of regenerating forest in such circumstances would be zero, whereas the value of the land under alternative uses would be considerable.

x. The view taken in this report is that sustainable managed production is the only approach which will allow some of the major soil, water and carbon sequestering values of the forest to be preserved, and which at the same time will provide a buffer for conservation and protection areas. This approach requires that all interest groups recognize that sustainable yield forestry is both economically and environmentally acceptable on the permanent forest estate, and this report devotes considerable space to these matters. Although there is no substitute for dedicating large areas of natural forest to conservation and preservation uses, and protecting these, there is considerable potential for conservation and preservation work to be done at a smaller scale within forest production areas, provided adequate capacity to plan, supervise and monitor exist.

xi. For these reasons, this report focusses heavily on production forestry in Indonesia. It argues that regaining control of production forestry is a necessary condition for conservation and preservation work, and that the two activities must be pursued simultaneously.

xii. The questions Indonesia must now ask, in relation to the production forest resource, are:

Can an effective forest cover - that is, one capable of maintaining a significant level of non-wood as well as wood output benefits - be sustained under existing policy and institutional circumstances in Indonesia?

Are the activities and arrangements prevalent in sector operations compatible with the Government's primary objectives on policy alleviation and equity - given the large numbers of poor people living in or near the forest areas?

xiii. **Policy development under uncertainty.** At the highest political level, Indonesia has already made important decisions about forest land use. It has committed itself to retention of some 84 million hectares of natural forest cover in the long term. It has committed itself to implementation of the guidelines for sustainable forest management issued by the International Tropical Timber Organization, by year 2000. Importantly, in the Indonesian context, support for this position has been offered by significant groups within the private sector. This review accepts that the targets for forest area laid out by the Government are reasonable. However, as is common in many countries, particularly where environmental issues are concerned, the gap between official policy and implementation is large, and a business-as-usual approach will not suffice.

xiv. This review raises and discusses a number of examples where policy and practice diverge. Management planning and field supervision of forest operations do not conform with requirements laid down in legislation and regulations. The physical location of concession areas, protection and conservation sites, and other classifications frequently overlap each other, and this problem is compounded by subsequent location of Transmigration and HTI (plantation) projects in common areas. There are now broad national goals requiring that natural resources be used for maximum economic gain (within prescribed environmental constraints), that distribution of such gains be more equitable, and especially that local communities living in close proximity to such resources should be given a more proactive role in the sustainable management of such resources. However, it is apparent that progress with these objectives has been slow in forestry.

xv. In some cases in the past, a lack of political will to deal comprehensively with policy and implementation problems has been apparent. Now, it can be said that where forests are concerned, there is strong awareness at the highest levels of government of the need to implement genuinely sustainable use and conservation. There remains the problem that political decisions made at the higher levels are not yet being transmitted downwards into effective implementation. In some cases this is due to the relative newness of the objectives: for example, the greater involvement of local communities in forest management, while always present in statutes, has only recently come to prominence as a national objective, largely on the strength of its close association with major poverty alleviation goals which have been assigned high priority by the Government of Indonesia. There are also differences in perception at different levels of government in Indonesia caused, in many cases, by the financial arrangements that pertain. An example of this (discussed under The other levels of government below) is the relatively low level of funding received by provincial governments from forest operations, and the even lower outlays they receive for conservation forest activities. Some provinces (especially those upstream from the major consequences of deforestation) have more interest in conversion of forests into landuses from which they can generate more taxation and other revenues, than retention - regardless of the economic and environmental attractiveness of retention from the national viewpoint. Lastly, as will be argued and demonstrated in various places in this report, the lack of trained personnel and appropriate institutional designs and objectives inhibits implementation of new policies even where these are generally accepted at all levels of government. This study will emphasize the importance of solutions which rely on mobilizing all available human resources - the private sector, NGOs, academics and others - rather than the traditional approach of relying primarily on expansion of the duties and capabilities of (already overtaxed) public institutions alone, to deal with the new demands.

xvi. A technical problem with major policy implications which arises at the outset is that the resource and extraction data base, upon which decisions at the macro and micro levels are made, is unreliable. Even if current estimates of the overall area of forest in Indonesia are reasonable, there is considerably more doubt that the area estimated as being available for commercial exploitation (based on the criteria used to define this) is as large as implied by official estimates. Some data and analyses cited in Chapter II of this review suggest

that the area which qualifies under the criteria as normal production forest might be one third smaller than is put forward in official figures.

xvii. Estimates of log volumes extracted from the forest are equally unreliable, and there is some conflict even among official sources as to what current levels of log extraction are: numbers ranging from 21-28 million cubic meters p.a. for recent years appear in annual figures, but other sources estimate average levels of extraction in excess of 30 million cum p.a. for recent years. Based on estimates of log input required for recorded forest product output, this review concludes that at least 36 million cum p.a. would need to be extracted to satisfy recorded output and, since it is known that significant processed output is not recorded, that probably more than 40 million cum p.a. are currently being taken from the forest.

xviii. Whether this output is beyond the capability of the forest to sustain on a long term basis is difficult to comment upon at the aggregate level: in the absence of reliable inventory and growth and yield data (some of which will be forthcoming from work in hand in the Ministry of Forestry and elsewhere), the aggregate capability of the productive forest estate to regenerate log volume is unknown. Moreover, as is elaborated upon at various places in this review, the unit recovery of log volume from a given area, and the unit output of processed output from that volume, are not fixed, but vary (largely, it is argued, on the basis of log pricing and other policy instruments which impact upon forest operations). The underlying message put forward in the review, in this respect, is that of all the inputs needed in forest processing, logs are most likely to become in short supply: in the short to medium term, measures to encourage greater efficiency of log usage are most likely to pay off.

#### THE MAIN POLICY ISSUES AND INSTRUMENTS

xix. The approach taken to policy analysis in this study is fairly standard: deficiencies and shortfalls from broad objectives are identified; the roles of major players and interest groups are analyzed; and instruments to move the sector closer to the government's overall goals for it are discussed.

#### The Interest Groups

xx. **Forest dwelling and adjacent communities: a neglected interest group.** The Government's overall target for forest area implies an annual conversion rate of forest of about 500,000 ha, up to the year 2030. Some estimates of deforestation in Indonesia put current rates of deforestation at more than double this amount, but this is disputed by more recent analysis. This review accepts a deforestation estimate in the range of 600,000 to 800,000 ha p.a. at present. However, it also argues that unless more is done to effectively engage forest dwelling and adjacent communities in management of the permanent forest estate, future conversion is unlikely to occur where it is intended to occur, and degradation of forest areas - even if not to the point of deforestation - will compromise the resource outlook significantly.

xxi. This leads to a central tenet of this review: at present, a significant level of displacement of forest dwelling or adjacent communities is arising as a result of the implementation of large scale extraction and plantation projects in Indonesia. The evidence for this is compelling, but anecdotal. The scale of the problem - or indeed of the population falling into the category of directly dependent on the forest - is not known. However, it can be argued that neither the programs of the Ministry of Social Affairs, nor those introduced by logging and HTI operators under Ministry of Forestry guidelines, are currently adequate to deal with the problem. However, some improvements could be made within the framework of current laws and policies. Proposed forestry developments could be made subject to adequate notification of communities likely to be affected, and measures taken to elicit a response from those communities. Where they have long-standing occupancy or use of a given area, they should be offered some meaningful role in its development: in some cases, tenure or rights of usage over designated areas will be most appropriate; in others, investment in communities specifically to encourage their participation in long term resource management (or, in some cases, to build viable alternatives to encroachment) will be more effective.

xxii. Where investment in participation is indicated, the matters of funding and disbursement arise. This review proposes a funding mechanism to promote alternative income generating investments for forest communities. Since offering affected communities a share in concession (or plantation) operations also involves funding (albeit via a different route), it would be logical to combine the role of consultation with communities with that of determining the most appropriate solution in one initiative, based around a community development fund, to be financed from natural forest revenue collection.

xxiii. **The role of the private sector: a potentially powerful ally.** The other major interest group in forestry is the private sector. It is involved in extraction and processing of the resource, and corporate linkages between these two phases are very strong. It is also heavily involved in the plantation sector, and in this review the plantation sector is considered together with the natural forest management sector, because, again, corporate linkages between natural forest concession operations and plantation investments are strong, and there is also a common locational link.

xxiv. **The challenge for Indonesia is to harness the considerable energies and financial power of the private sector to the task of sustainable forest management, without reducing the vigor of the sector.** The two largest chapters in this review examine the areas where Government and the private sector interact most intensively: operations in the natural forest, plantation investment, and processing.

xxv. **The other levels of government.** It is apparent that at present, regional and provincial governments receive relatively little from the proceeds of forest operations, and even less where conservation or preservation of forest areas is concerned. Some local governments in areas where the adverse impacts from earlier deforestation are apparent are willing to take action on their own behalf to ameliorate such impacts. However, others do not yet perceive this problem in their areas, and included in this group will be those with large areas (up to 60 or 70 percent of total land area) of forest remaining. Unless such governments are given some incentive to assist in the process of sustainable management of the resource, they can be expected to use all means at their disposal to promote conversion of forest areas. It will be argued extensively in this report that more revenue could, and should be raised from natural forestry production in Indonesia. Obviously, this has important implications for diverting greater funds towards local and provincial governments in pursuit of better implementation of sustainability objectives.

xxvi. **Broadening the use of the Reforestation Fund.** One means of financing improved arrangements for both forest dwelling and adjacent communities, and provincial and local governments, would be to utilize large surpluses which are building up in the Reforestation Fund. Recent newspaper articles in Indonesia suggest that this Fund, which is formed from levies on logging concessionaires (the Dana Reboisasi) now contains some \$900 million in accumulated funds. If current levels of output from Indonesia's forests are maintained (for some time, at least) then this fund will grow at around \$400 million per annum. It is most unlikely that this amount of money could be spent effectively on plantation activities alone (its ostensible purpose) and, if it were disbursed to plantations alone, oversupply will be the probable result. This report expresses the view that the Fund should either be returned to the management of the Ministry of Finance (i.e., to become part of regular budget outlays - some of which may well be to subsidize plantation operations, if the Government assesses this as a high priority objective) - or at least should be disbursed against a much wider range of purposes in the forestry sector, including community development and local government support for sustainable management.

#### Establishing a fully functioning log market

xxvii. The overriding objective of sustainability in natural forestry, and that of development of competitiveness and efficiency in processing, converge in the functioning of the Indonesian log market. Presently, large domestic processors receive three types of protection in the domestic log market:

- High export taxes on logs cause all log supply to be directed to local processors;

- High export taxes on sawn timber restrict log supply to exporters of plywood and secondary processed materials (this issue is dealt with under the section entitled The Choices in Trade and Processing below);
- Linkage of award of concessions to investors with large processing capacity constrains the development of smaller processors, and limits the development of an efficient internal log market.

xxviii. Some analysis presented in this review shows that the current average fee paid for standing timber in Indonesia - around \$22 per cubic meter - is well below the international parity stumpage for raw material of this type: this is the expected result from application of the policies described above. Undervaluing the resource encourages waste of the raw material, at a time when limits to its availability are becoming more apparent, and removes a potent efficiency mechanism from the processing sector: processors are not required, for the most part, to compete on a price basis for their raw material supply. The government has a major role to play in ensuring that the log price mechanism is allowed to play its full part in determining efficient and sustainable allocation of the forest resource in Indonesia. There are several mechanisms (not necessarily mutually exclusive) which could be applied to this task:

- In purely economic terms, the first best approach would be to re-open the log market to international purchasers. While this approach would probably not be introduced immediately in Indonesia, for largely political reasons, it should not be discounted as a possibility in the longer term: if, by some specified target year (year 2000 may be a logical choice, since this is the year by which Indonesia intends to achieve sustainable management of its production forest resource) progress with raising price competition in the domestic log market is judged unsatisfactory, then a partial or complete re-opening of the log export market could be implemented;
- Much of Indonesia's forest production resource is already under concession allocation. However, some concessions are approaching renewal date, and presumably some areas currently under concession will be canceled for reasons of breaches of sustainability guidelines. Also, some new concession areas (in Irian, particularly) remain unallocated. These resources could be offered for sale under the auction or tender process, where sufficient regional competition is judged to exist. It should not be assumed, a priori, that an auction system will necessarily produce better price and allocation outcomes than administered pricing. In this case, careful analysis of vertical integration and corporate concentration would be needed before committing to the system;
- The policy instrument most immediately applicable to most of the production forest resource is administratively based standing timber fee rises. Many of the price efficiency effects of opening the log market to export, or auctioning the resource, could be emulated by a systematic series of fee rises, calculated to achieve international parity stumpage (or a level reasonably close to it) by a given target year (again, year 2000 would be logical).

xxix. The above options could be applied jointly or separately. The final option, as suggested, is probably the most applicable immediately, since it is within the reach of existing policy and practices. This review argues that the Government of Indonesia should announce its intention to collect standing timber fees according to a schedule which will bring fees to 75% of international parity stumpage by year 2000. The other options could be applied in special cases, or on a more extended time frame basis, depending on the success of administered fee rises.

xxx. There are two reasons for suggesting a phased, rather than an immediate rise in log prices to parity levels:



(xii)

- (i) some analysis made in the report suggests that much of the excess rent is presently absorbed in inefficiencies in logging and processing, not in windfall profits. Under such circumstances, it would probably not be politically feasible to adjust prices up to international parity in one step - some time for adjustment will be needed;
- (ii) if prices were raised precipitously in advance of establishment of effective systems to track log movements and gather revenue, increased log theft and probably increased carelessness in logging operations as concessionaires seek to maintain profit levels, would result. Since full establishment of improved systems will take some years to introduce, a phased rise in prices is preferable.

### The Choices in the Forest

xxx. Managing the natural forest resource sustainably, according to guidelines established by the International Tropical Timber Organization will represent a major departure from what has occurred in Indonesia in practice in recent times: much logged over forest has been converted to other uses in the past twenty years, but this would no longer be possible. Therefore, major institutional and policy changes will be needed.

xxxii. The concession system. Indonesia presently operates its natural forestry program on the concession system, whereby a license to extract logs over a given area is given to a private sector operator, for a fixed period of 20 years under current rules in Indonesia.

xxxiii. This system is highly human resource intensive: all logs must be marked for felling, measured and graded for revenue purposes. Logging operations are managed under a heavy load of regulation, with few effective incentives for good practice, or disincentives for poor practice on the part of concessionaires or forestry field officers.

xxxiv. Introduction of the auctioning or tendering system, discussed earlier, would automatically reduce the load on the regulatory system. Under the tender system an assessment of standing volume is made, and standards for the regenerating stand are established; the intermediate supervision required is lessened considerably.

xxxv. Even if auctioning per se proves infeasible, alternative methods of pricing and sale of logs can still be applied. Sale of standing timber volume by area can achieve similar objectives: essentially, an assessment of volume on a given area (either the whole concession, or smaller areas) can be made, and area parcels equivalent to annual log volume requirements then defined. Once an allocation is made, the operator is free to extract as much volume as possible, within the sustainability and regeneration standards applied: the regulatory agency is not required to measure output, since the charge is levied on assessed volume.

xxxvi. This study proposes that, even within the existing volume based concession management system, a number of major improvements could be made in Indonesia:

- The polycyclic logging system (the norm in Indonesia, which stipulates logging of trees from an area down to a fixed girth limit with the intention that trees below this limit will form a second crop in 35 years) may be inferior to a monocyclic system (which calls for removal of all commercial logs from the stand - but retaining shelter and seed trees - and no further logging for 70 years, at which time seedling-based regeneration should be mature). The monocyclic system reduces areas logged, raises yields from such areas, and demands something less in the way of control over logging operations. This study does not advocate wholesale transfer to the

monocyclic system, but recommends greater flexibility in silvicultural approach, with more authority being devolved to local officers to decide upon the best regeneration strategy.

- This study suggests a number of technical and policy changes in concession management for consideration: license periods (currently 20 years) should be made indefinite, with rolling renewal every 5 years - so that concessionaires have an incentive to commit to an area for the long term; the present plethora of concession rules and regulations should be streamlined; and lines of accountability and responsibility for administering these among provincial and regionalized central government officials should be clarified. Given the current confusing state of definition of forest boundaries and (as noted earlier) of resource information, a re-drawing of concession boundaries and agreements, under an initiative already being explored in Indonesia, is necessary. Some improvements in the management of logs after felling - particularly in control systems and royalty assessment and collection, are necessary.
- Although Indonesia is working on improving compliance with sustainability conditions in forest operations, and has recently levied heavy fines and license cancellation on some operators, current field capacity to make major improvements in this area is very limited. In the long term, this requires major institutional and human resource developments, as discussed the final section of this summary. But this review suggests that, given the importance of improving sustainability in forest usage, an interim measure should be taken. Establishment of a highly qualified, mobile, and independent inspection service is suggested. This service would randomly inspect field forestry operations throughout Indonesia, for compliance with sustainability guidelines. The performance of both logging operators, and forestry agency field staff, would be under review. Although primarily educational in nature, the service would need to be given various powers to exact penalties, or at least report to some entity capable of doing so. Its ultimate purpose is to promote needed attitudinal changes on the part of concessionaires, and forestry field personnel.
- One further instrument suggested in the review (for use by an inspection service, or more generally in forestry regulatory agencies) is the introduction of a performance bond premium into log prices, whereby concessionaires would pay an additional amount for logs, which would be rebated on evidence of good logging operations and post logging treatment.

xxxvii. The study cites some figures which show that, apart from the environmental and non-wood product benefits to be gained from better natural forest management, there are also significant potential gains in log yield from given areas to be had, if operators are given the incentive to follow better management practices.

xxxviii. The plantation subsector. Indonesia is pursuing an ambitious plantation program, both in degraded and denuded areas out of the forest zone (the Regreening and Critical Watersheds programs), and inside the forest line (the HTI program). These programs are financed through the reforestation fund, which is formed from a levy of \$15 per cubic meter (recently raised from \$10 per cum) of natural forest logs extracted. By far the largest proportion of this money is committed to concessional financing of private sector pulpwood investments under the HTI program.

- Some basic economic analysis of plantation options in Indonesia in this review shows that, from the national and global viewpoints, plantations in denuded or degraded areas will return greater benefits than replacement of logged over forest capable of regeneration, because of large differences in the quantifiable environmental benefits.
- The calculations show that, in theory, the private sector would be indifferent as to a choice between these locations. In reality, establishing plantations in logged over areas is preferred,

partly because of proximity to existing concession operations but, much more significantly, because of rights conferred on the concessionaire under the HTI program to acquire remnant logs from the natural sites as interim supply for pulp operations, at a very low resource price. This, combined with Government planting subsidies (via interest-free loans), makes the HTI an extremely attractive option for the private sector.

- There are some technical problems associated with the HTI scheme as presently practised. The selection of sites (which seems to include at least some areas potentially regenerable to effective natural forest cover), and the processes for environmental and technical clearance, are in need of review.

xxxix. In this study, it is argued that concessional financing under the HTI scheme should no longer be necessary to attract pulpwood investors. There are potential environmental hazards involved in leasing large areas of hinterland natural forest area to pulpwood HTI concessionaires as an interim supply base and this practice should cease. If financial inducement is necessary and justifiable at all in the plantation sector, it would only be so for encouragement of plantations on open sites (or sites which will respond to rehabilitation under plantation) where the gain in environmental benefits, from the national point of view, exceeds the cost of subsidy. Such inducements should only be considered after more standard government assistance in the areas of research, guarantee of tenure and so on, is provided.

xl. Whether the HTI scheme as presently designed will lead to oversupply is moot at this stage: most pulpwood investors are connected to large pulp manufacturing developments, and the viability of these will clearly be dependent on developments in the international pulp and paper market. This is discussed in the next section.

#### The Choices in Trade and Processing

xli. Indonesia has followed a deliberate policy of raising local value added in forestry output since the early 1980's: a ban on log export (subsequently replaced by high export taxes); direction of logging rights to concessionaires with strong connections to processing (particularly in the plywood sub-sector); a ban (subsequently replaced by high export taxes) on export of sawn timber (intended to encourage further processing of sawn material); tariff exemptions on imports of certain capital equipment in the proceeding sector; tariff protection on some paper products. Assistance to the private plantation sector (discussed above) also comes into the category, since the intention is to provide a low cost resource for local processors from the package of measures adopted.

xlii. These measures have had strong impacts on both resource usage and the industries that have developed. This form of intervention has involved the government in some second-guessing of the international forest products market, since the product mix emanating from the Indonesian sector has to a significant extent been defined by the policies applied.

- Whatever the merit of the original arguments advanced in favour of promoting value added (and some of the trade and market assumptions inherent in these arguments are discussed in this review), it is argued here that the priorities for Indonesian processing are now development of competitiveness and efficiency, probably through increasing diversification of output, rather than rapid capacity growth and pursuit of market share in existing markets. Because of the relative ease of substitution in those existing markets, they are unlikely to produce above-normal returns to suppliers in the long term.
- One important new development in international markets is growing consumer resistance to products based on non-sustainable use of natural resources. Whether this is codified through

specific consumer country bans or restrictions, or left to market forces, the outcome will be similar: suppliers who can convincingly demonstrate sustainability will be increasingly favored in international markets, while those who cannot will risk significant loss of market share.

- This observation emphasizes an important argument which is implicit in this review: there is a strong connection between sustainability and efficiency in resource usage. Policies which promote output growth at the expense of resource efficiency, or which simply fail to give sufficient emphasis to resource efficiency, run a high risk of unsustainability in a context where the resource base is limited.

xliii. **The Indonesian plywood sector: a need for efficiency and diversification.** Of all subsectors in the forest products sector, plywood manufacturing is the one most favored by government policy. This subsector is the principal beneficiary of government policy to direct log supplies to processors, rather than encourage them to compete for such supply. The market base of the sector, although very large in size, is narrow in scope: the great bulk of output is exported as commodity grade plywood, much of which is used for concrete forming and similar purposes. Margins in this trade although relatively high at the time of writing, will tend in the longer term to be low, and it is suggested in this review that most industry profit comes from rents transferred from logging. The market is, by its nature, vulnerable to substitution by other wood products (including softwood), and also to replacement by technological change. Achievement of large market share may therefore be of lower benefit than for other products.

xliv. The industry has taken measures to reduce creation of new capacity to very low levels, and thereby control the flow of supply onto the international market. However, this measure will need to be augmented by development of higher rates of technical and economic efficiency, and more diversification into market-grade decorative plys and other products.

xlv. **The sawn timber subsector: has Government policy gone too far?** The sawmilling sector, even prior to export restrictions, had major efficiency problems. It is also apparent that prior to imposition of the export taxes, a significant amount of sawn timber in very large sizes was exported: in effect, this amounted to very low value added exporting that could avoid the log export ban - allowing processors to capture much of the large rent available due to low resource prices and high international prices for logs and semi-processed material. However, the tax policy as applied may have had an unintended effect: across the board taxes effectively prevent export of relatively highly processed sawn material (i.e. material with as much value added as plywood) as well as low value added product. Moreover, although the purpose of driving more resources into secondary wood processing was initially achieved, the expansion of investment in that sector has now slowed considerably, and it has been suggested that in fact some secondary processing relies on the existence of an efficient sawmilling sector - something Indonesia does not have. Although by no means a first-best solution, replacement of the currently broad based prohibitive taxes with a tax scaled to size of sawn material, or its world price, so that better quality or more highly processed material could still be exported, may achieve a better result.

xlvi. **Secondary processing: what limits growth?** Indonesia appears to have some natural advantages in the area of furniture making, moldings, and woodworking: a basically high quality resource, and a strong base of woodworking craftsmen. But, at this point in time, some of these industries have not developed, while, as noted above, others underwent initial rapid expansion under the impetus of the sawn export tax policy for a period, and then slowed. Some of this effect may be due to the coincidental deterioration of the international economy since the late 1980's, or to the sawmill sector effect discussed above. But it also appears that at least some of the problem is lack of access for these industries (and potential entrants) to raw material supply: certainly, this is a view encountered frequently in the industry in Indonesia. Much of the resource remains under the control of concessions linked to plymill operations. Much of the sawmilling capacity that prior to 1989 had supplied the export market is linked in integrated operations to plymills, and

it appears that a significant proportion of log supply from these has been retained in those operations, not released to independent secondary processors.

xlvii. **Pulp and paper: a high growth prospect?** Projections of growth for Indonesia's pulp and paper sector in general suggest rapid expansion: the domestic market is growing quickly and, except for newsprint and some paperboard products, Indonesian suppliers of this market are pricing competitively at present. Winding down of present tariff levels on paper products is therefore in prospect. In theory, Indonesia can also be highly competitive as a supplier in the international pulp market, and one projection indicates Indonesia may have a 20% share of the global market for short fibre kraft pulp by the year 2005. How profitable this will be to investors will depend upon price movements in this notoriously unstable market. After the year 2000, it is expected that the Indonesian pulp and paper sector will be almost entirely reliant on plantation resources, and it is planned that such resources will come from existing plantation areas under rotation, or from plantings on areas unrelated to existing natural forest sites. It can be expected, therefore, that the impact of the pulp and paper sector on the natural resource will decline over time.

#### Institutional Reform and Human Resources Development: The Key to Implementing Change

xlviii. Even if Indonesia chose, at a political level, to introduce the challenging policy reform package embodied in the observations and analyses presented in this review, little would result unless the agencies and interest groups involved in the sector accept such change, and are equipped to deal with it.

xlix. The final chapter of this review therefore deals in some detail with the practicalities of implementing change. These involve: redefining the mission of forestry agencies and interest groups, in light of Government's broad aims and specific policy changes (when these are determined), establishing linkages between interest groups; and keying human resource development investments to the needs, and structure, that emerge from this process.

1. The basis of change in this area must be improved management of human resources in the sector. Without major improvements in such management, the impacts of policy reform, training inputs, and technological and research developments will be marginal.

li. The review provides an analysis of how one of the major agencies in this sector - the Ministry of Forestry - requires radical changes in its approach to managing human resources. It is argued in the review that the conventional approach to institutional strengthening - essentially adding technical assistance, training inputs and some additional tasks or goals to the existing structure - will not work. Strong agency and individual task redefinition is needed, and this will imply structural re-organization, including re-deployment of staff at all levels (central, provincial and districts). Devolution of some functions and responsibilities currently held in the center - a perennial issue in Indonesia, especially in the forestry sector - will also be required. To solve some of the chronic problems of lack of incentives, rewards and a meaningful career structure which adversely affect performance in the Ministry, as well as to improve flexibility and the skill-mix applied to specific tasks, certain technical tasks should be contracted out of the Ministry: so that interested Ministry staff, in combination with private sector, academic and other interested parties, could combine to bid for, and then perform such tasks, thus creating a more effective consultancy market. The implementation of an inspection service, discussed earlier, could be achieved using this mechanism.

lii. Consulting with communities affected by forestry developments is, as suggested above, an increasingly important task in Indonesia. It is also one which requires a broad mix of skills, and ultimately an ability to deliver solutions and investments where they are needed. Forestry bureaucracies have, throughout Asia, proved to be poorly suited to this task. It is suggested, in this review that the solution will have to involve community representatives, or communities themselves, in some functional way and it will also need to operate fairly independently of line Ministry control. It is also suggested that since a funding

(xvii)

base to finance involvement by communities in forest management (or alternatives) will be required, some initial measures to accumulate some proceeds from enhanced forest revenue collection, and to commence their disbursement, should be taken.

**CHAPTER I**  
**INDONESIA'S ECONOMY AND THE ROLE OF THE FORESTRY SECTOR**

**The Indonesian Economy: History and Prospects**

1.1. **Recent Economic Developments.** In 1967 Indonesian per capita income was \$50 per capita: by 1991, this figure had reached \$610, and the number of people in absolute poverty has fallen from more than 70 million, to about 27 million, over the same period. Table 1.1 presents changes in key macroeconomic variables since 1975, and gives Bank projections for these variables to 2000 AD.

**Table 1.1: KEY MACROECONOMIC VARIABLES  
FOR INDONESIA /a**

	Actual				Projected /d		
	1975-83	1983-89	1990	1991	1992	1992-95	1995-2000
<b>Average Real Growth Rates (% p.a.)</b>							
Gross domestic product (GDP)	6.5	6.0	7.3	6.8	5.2	5.6	5.9
Non-oil GDP	7.0	6.5	7.8	6.5	6.2	6.5	7.0
Non-oil exports	10.5	16.9	2.8	24.3	19.1	9.3	7.6
Fixed Investment	10.7	1.3	19.7	10.7	7.1	5.9	7.5
<b>Structure of the Economy (%) /b</b>							
Non-oil manufacturing/GDP	9.9	14.1	14.9	15.5	16.2	18.4	22.8
Non-oil exports/non-oil imports	37.4	87.9	71.2	77.5	86.5	93.5	97.1
National Savings/GDP	21.0	21.7	22.1	22.2	22.9	24.4	25.6
Fixed Investment/GDP	25.1	21.2	23.5	24.7	25.4	24.9	26.1
<b>Macroeconomic Balances (%) /b</b>							
Current account/GNP	-7.8 /c	-1.7	-3.8	-4.3	-4.0	-2.0	-2.0
Overall public balance/GDP	-4.3 /c	-2.1	-0.2	-0.7	0.0	-0.2	-0.3
MLT debt service/export	17.0	32.3	27.8	30.1	31.9	25.8	19.9

/a Balance of payments and fiscal data are for fiscal years (starting April 1).

/b For the last year of multi-year period.

/c For 1982/83.

/d Indonesia: Growth, Infrastructure and Human Resources (No.10470-IND), May 25, 1992.

Source: Table 1, Memorandum of the President to Executive Directors for a Third Community Health and Nutrition Project, World Bank, December 1992.

1.2. These results place Indonesia among the ten fastest growing developing economies in the world. They reflect Indonesia's strong emphasis on macroeconomic stability and diversification through the 1980's in particular, when fluctuating oil prices threatened considerable dislocation. Indonesia has introduced far-reaching reforms in trade, investment, taxation and finance; and these have enhanced the flexibility of factor markets.

1.3. In trade, a shift away from import licensing to tariffs was enacted in the mid 1980s, and the level of tariffs has then been drawn down, from an average rate of 37% in 1985, to about 20% in 1991.

1.4. As a result of these measures, Indonesia has become more strongly integrated with the global economy through its trade and capital accounts, and has become less vulnerable to external shocks than in the past. Nevertheless, some vulnerability remains, in oil pricing, relatively sluggish demand for Indonesia's non-oil exports, the downward pressure on the US dollar, and high debt levels.

1.5. **Future Goals and Prospects.** For Indonesia to continue to pursue its long standing development goals of growth, stability and equity two factors have emerged as being critical: quality; and sustainability.

1.6. Quality issues surround the delivery of public and private services in Indonesia, particularly in the area of education and training, construction and management in the transport telecommunications and power sectors. These issues will be addressed by the Bank in the forthcoming Country Economic Memorandum, and the Environmental Management Review.

1.7. It is clear that growth has in the past been pursued through heavy reliance on natural resources - some of which are now showing signs of stress and shortage. It is also a fact that environmental sustainability in particular will impact upon equity: poor people are more vulnerable to the negative impacts of environmental degradation than other groups. They also contribute to environmental degradation because, lacking capital, skills and (often) security of tenure over resources, they frequently have little alternative to inefficient and unsustainable use of resources.

1.8. The relative share of primary commodities in total GDP in Indonesia has declined from 60% in 1970, to 39% now, and is projected to decline further to 17% by 2010. The contribution of such commodities to export income has similarly declined from 94% in 1970 to around 60% now. However, in absolute terms, the value added by primary commodities has doubled over this period, and it can be expected that their value added will grow by a further 50% by 2010.

#### The Role of the Forestry Sector

1.9. The forestry sector represents a case study of the sustainability issue, raised above, for Indonesia. Forest products have become an important building block for development in Indonesia, and output has grown rapidly (see Table 1.2): total production from the forestry and forest products sector is about \$8 billion,<sup>1</sup> or around 7% of GDP. The value of exports from the sector in 1991 was \$4.2 billion (see Table 1.3): about 20% of non-oil sector income for that year. The sector has added importance in that it offers one of the more obvious routes to development of the outer islands of Indonesia: a Government priority, which recognizes limits to growth and development on the already heavily populated island of Java. This possibility arises because the natural forest resource is located on the outer islands (as will be much future plantation forest). It is evident that some large scale industries - especially the new investments in pulp and paper - are already locating on the outer islands, and it is at least feasible for more smaller scale forest processing industries such as moulding and furniture makers to locate there as well, given their relatively low technical and infrastructure demands.

1.10. The formal forestry sector employs about 680,000 directly in Indonesia: about 1 percent of the total workforce. About 426,000 are in the processing sector; the remainder in the resource management and extraction sector. Forestry is generally thought to have fairly high employment multipliers, but the main reasons why the above figures may understate the importance of the sector as an employer are:

- Many people in Indonesia (actual numbers are not available: see paras 3.112 to 3.113) are dependent on some aspect of forest output -especially non-timber extracts - for some, or all of their livelihood. The numbers involved in this informal sector are likely to dwarf formal employment figures.

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<sup>1</sup> This is an estimate formed from output figures for the various sectors in recent years, with some adjustment for likely underquoting of output in some sectors.



As noted in para 1.9, there is a certain premium on regional industry employment in Indonesia, given the Government's priorities to develop the outer islands, and forestry is one means of providing this type of employment.

**Table 1.2: CONSUMPTION AND TRADE FLOW OF SAWNWOOD, PLYWOOD, PULP, PAPER & PAPERBOARD IN INDONESIA 1976-1992, '000 TONS OR '000 M<sup>3</sup>**

Product	1976	1980	1990	1992 est
Pulp Consumption	20	164	737	1169
- production	1	46	701	900
- exports	-	-	181	101
- imports	19	118	217	370
Paper & Paperboard Consumption	304	512	1371	1754
- production	62	231	1438	2199
- exports	-	7	190	544
- imports	242	287	123	99
Plywood Consumption	204	728	1262	1350
- production	214	1011	9503	10850
- exports	13	245	8241	8900
- imports	5	-	-	-
Sawnwood Consumption	2356	3579	7180	7500
- production	3000	5327	7796	8600
- exports	643	1203	616	1100
- imports	-	-	-	-

Source: World Bank/ITTO Marketing and Deforestation Study (see op cit pg.54).

**Table 1.3: EXPORTS OF WOOD BASED PRODUCTS BY YEAR, 1985-1991 /a**

Product	ISIC Code	1985	1986	1987	1988	1989	(in US\$ million)	
							1990	1991
Sawnwood	33111	226	269	398	576	665	100	82
Building materials /b	33112	126	137	165	193	344	399	586
Plywood	33113	797	957	1,682	1,994	2,352	2,726	2,871
Boxes, containers	33120	2	4	2	13	24	25	33
Rattan	33130	8	9	12	18	48	69	78
Furniture	33210	7	9	27	70	144	236	313
Paper	34111	26	29	90	109	152	178	239
Total		1,192	1,414	2,376	2,973	3,729	3,733	4,202

/a Covers only large (100 or more employees) and medium (20-99) scale establishments.

/b Includes parquet, joinery and carpentry of wood, doors, window frames, sleepers, etc.

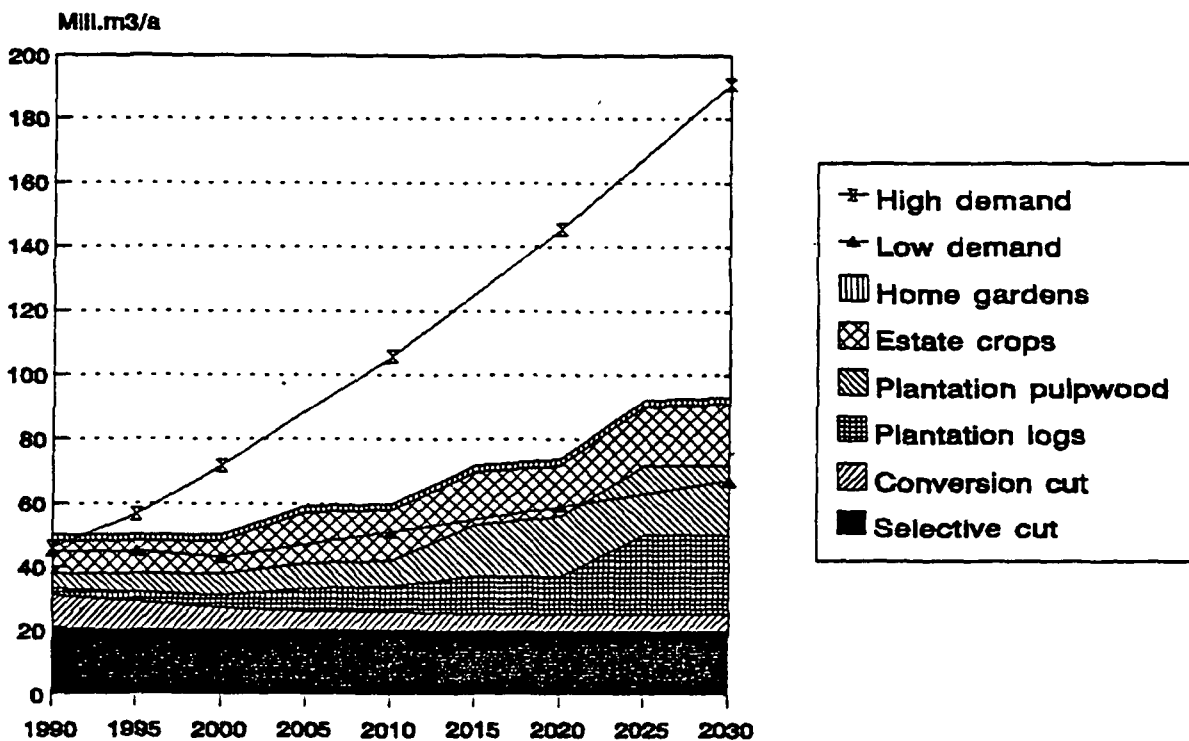
Source: Central Bureau of Statistics.

1.11. While forest use is important to economic growth, and may have a significant role in government objectives to decentralize and further diversify the economy, the natural forest is a finite resource, and there are also natural and economic barriers to expansion of plantation resources. In addition to pressures being placed on the forest resource through official government programs of conversion, there are pressures from forest dwelling and adjacent populations, who, under certain population and income conditions, use the forested areas in an unsustainable manner.

1.12. Eventually, the cumulative effects of pressure on the resource will compromise the ability of the ecosystem as a whole to maintain its balance. Once certain thresholds of depletion or degradation are exceeded, the sustainability of the ecosystem is lost. In the case of forest, which covers most of the land area of Indonesia, the costs of such losses will probably be greater than the direct economic activities based on the resource: very large watershed and soil quality functions are performed by the forests of Indonesia and these are of vital concern to the enormous rural population - and, in the case of water values, also to the rapidly increasing urban population of the country. In recent years, the global values of the forests - their ability to store carbon; their major (and as yet not fully evaluated) role as harbours of biodiversity - have also gained considerable force and recognition. A detailed discussion of these issues will appear in the Bank's forthcoming Environment Review.

1.13. Supply and demand projection. An initial quantification of what may be possible, in terms of supply of wood resources, has been attempted in recent years, and is displayed in Figure 1 below. A range of projected demand is overlaid on this figure.

Figure 1.



Sources: ITFAP (see op cit pg 7)  
World Bank/ITTO Study (see op cit pg 54)

1.14. These figures suggest that, if the low demand estimate made in the ITFAP study eventuates, then the supply of wood forthcoming (assuming both estate crop and tree plantation developments as forecast eventuate) would exceed demand: balance would be attained if demand is 10 - 20% higher. It is difficult to be any more precise than this: in the international market, the behavior of other suppliers (Malaysia, but also suppliers of potential substitute materials such as softwood - i.e. Pacific rim suppliers, and potentially Russia) is unpredictable. So too is the behavior of international consumers: see paras 4.14 to 4.21 for a particular environmental issue in market development. As another example: even though tariffs on finished forest products in Indonesia's main market countries are relatively low, their complete elimination would allow f.o.b. Indonesia prices to rise significantly, and pressure for a new demand equilibrium would arise.

1.15. On the supply side, sources of uncertainty are, if anything, even greater: the real capability of the natural forest to produce log volume in the long run is not precisely known, both because areas of forest actually accessible and suitable for production cannot be precisely estimated (see chapter II), and because the growth rates of commercial trees (itself a variable group of species through time) in Indonesian natural forests is also not yet known with any precision, and will not be until inventory and yield data currently being compiled are available. Moreover, as will be examined in greater depth in Chapter III of this review, the options for greater unit efficiency in use of available resources, and the economics of plantations as a supplement to natural resources, are both areas of considerable uncertainty at present.

1.16. The most common view on future demand supply balances from the South East Asia region in general, is that some price rises for forest products will result primarily from developing shortages of high grade tropical logs from traditional suppliers (Malaysia and the Philippines), but that these rises will be tempered by temperate zone substitutes (hardwood and softwood).

1.17. Assuming that Indonesia wishes to remain a significant forestry nation in the long term (see para 1.18), its success in so doing will be determined by its ability to produce the required raw material resources on a continuous basis, and to efficiently transform and market that material as forest products.

1.18. Indonesia's commitment on sustainability. The Government of Indonesia is committed to sustaining large areas of its forested area under forest cover, either for preservation or long term production purposes. Clearly defined target areas for conservation, protection, limited production, production and conversion forests are set out in various government planning documents. In the Government's forestry Action Plan<sup>2</sup>, it is projected that by 2030 AD 84 million hectares of natural forest will remain in Indonesia (compared to an estimate of 107.5 million ha for 1990 in the same publication): the residual 23 million hectares is intended to be converted to agricultural and plantation uses. Of the total forest area, some 53.4 million ha is expected to remain as conservation, protection or unclassified forest, while the remaining 30.6 million hectares is intended for sustained production use - i.e. it is expected that by that date, no further natural forest conversion will be taking place. A much larger role for plantations in total wood supply is foreseen (see para 3.80).

1.19. If Indonesia is able to retain such an area under natural forest by 2030 AD, and to manage a significant proportion of that resource under genuinely sustainable production management, this would represent a very significant achievement economically and environmentally, unmatched in recent decades in other tropical forest countries with large resources. Certainly, it would in the eyes of most reasonable observers amount to fulfillment in the forest area of Indonesia's commitment to manage its environmental resources for the benefit of mankind, as expressed by President Soeharto:

"Together with our long seashore and the rich contents of our equatorial seas, our forests also constitute a source of biological diversity important for all life on Earth. The position of

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<sup>2</sup> Ministry of Forestry, 1991, Action Plan for Forest Sector Development in Indonesia

Indonesia, situated between two continents and two oceans, provides us with environmental riches which are very significant for the survival of mankind. That is why we have a responsibility for the global environment".

1.20. The Government of Indonesia recognizes that the country's success in sustainably managing the natural forest resource will also be crucial to development of market strength and industrialization. In his address of state delivered in Jakarta on 15 August 1992, President Soeharto stated:

"Our industrialization is one that does not destroy natural resources but preserves the quality of the environment ..... We have to encourage and develop industries which are capable of producing better quality goods with higher value added, which are not wasting natural and energy resources".

1.21. The Government of Indonesia has codified its approach to sustainable forest management incorporating both the productive and protection goals, by getting forth the goal to implement guidelines issued by the International Tropical Timber Organization (see Box.1.1) by the year 2000. The ITTO guidelines provide a framework for introduction of genuine sustainable management, albeit that there are widely differing opinions in the economic and environmental communities as to what should be sustained, and how this should be done. Some discussion of forest sustainability, extracted from a forthcoming World Bank publication on forest management, is given in Annex 7. The problem, in essence, is that some interest groups argue that sustainability can only be achieved by preserving the full range of ecological assets across the broad base of the remaining resource. Clearly, this precludes any significant form of timber extraction, and in fact would preclude extraction of some other forest products as well. Whilst it is a reasonable criterion for areas selected for preservation, it is inapplicable where significant wood and other production is intended, as is the case for the resources of central interest in this review. Even if a less demanding definition, which allows for timber and other products extraction, is allowed, there remain differences between those who argue that annual output should not ever exceed the capacity of the forest to regenerate in that year, and those who suggest that, particularly where 'overmature' forest which is not growing is present, 'pulse' harvesting of much higher amounts may be acceptable: in effect, they argue, the objective over the long term is to have effectively regenerating forest over the designated forest area.

1.22. This review takes the view that the latter, 'economic' view of sustainability would be acceptable for production forest areas, so long as the realities of long term resource management are borne in mind. It must be recognized that if the result of 'pulse' harvesting at some point in time were to be a very large area of immature regeneration and little available mature resource, then the resource would be most unlikely to survive to a second cut. Neither the processing industry (which would, at that point, cease to exist and presumably would have factored such an outcome into its final years of operation) nor the government (which faces a sustained period of zero revenue from the resource) could be expected to take much interest in its protection, and spontaneous conversion would be the result. Thus, some continuity in actual, as opposed to potential, resource flow from the forest will be necessary to give the natural vested interests reason to take a sufficient part in its survival. Thus, whilst "annual allowable cut" may need to vary to some extent to allow for both resource and market variability, some concept of a continuous resource flow should remain in management prescriptions. The ITTO guidelines serve this purpose.

1.23. The ITTO guidelines have the added advantage of being supported by the powerful private sector in Indonesia. The Concession Owners Association of Indonesia (APHI) is supporting the operation of a recently instituted steering committee, which has been charged with the responsibility for converting the ITTO guidelines into specific criteria for evaluation of sustainability in forest operations.

1.24. Even when guidelines are available, however, there will clearly remain difficult decisions as to where the lines between production, protection and conversion forest should be drawn. In Chapter II, some of the difficulties and uncertainties involved in this are discussed. Then, it will be argued in Chapter III of this review that setting this balance will remain largely a political decision in Indonesia albeit that economic, social and environmental analyses can assist.

### Box 1.1: SUSTAINABLE MANAGEMENT, AND THE ITTO GUIDELINES

An expert panel appointed in 1991 by the International Tropical Timber Organization (ITTO) defined sustainability as the production of a continuous flow of desired forest products and services without undue reduction of its inherent values and future productivity and without undue undesirable effects on the physical and social environment". The ITTO guidelines for the sustainable management of natural forests by the year 2000 includes 41 principles, among them the following:

- \* A strong political commitment to sustainable management, supported by appropriate legislation and in harmony with other sectors, is needed.
- \* Some categories of land need to be kept under permanent forest to secure their optimal contribution to national development. These include protection forest, lands for nature conservation and for production of timber. Production forests should fulfill other important objectives, such as environmental protection and conservation, ecosystems, and be subjected to a detailed inventory.
- \* Proper planning at the national, forest management unit, and operation levels is an essential component of sustainable forest management.
- \* The choice of silvicultural practices should be aimed at sustained yield at minimum cost. A reliable method (such as the annual allowable cut) should be adopted for controlling timber yield.
- \* An environmental impact assessment should be done prior to harvesting. Care should be taken to minimize logging damage to the residual stand.
- \* Concessionaires should be assured of the long-term viability of their concessions; local populations should benefit from forest management; and governments should receive sufficient revenue to continue their operations.
- \* The success of forest management for sustained timber production depends on its compatibility with the interests of local populations. Local people should be consulted before planning any forestry operation.
- \* The management of timber production can only be sustained in the long-term if it is economically viable.

In enunciating these principles, it has been recognized that in many countries, logging practices, timber pricing policies, and wood processing incentives have encouraged rapid depletion of the natural resource and contributed to "unsustainable development".

Source: Emmanuel D'Silva and others, 1993; Forestry Management for sustainable Development; An EDI Seminar Report; World Bank, Washington (forthcoming).

1.25. The Government acknowledges that serious problems exist in sustainable management of the natural forest at present<sup>3</sup>:

"At the projected annual average production of 31.4 million cubic meters during Repelita V, some of the natural timber stock could survive well beyond 2050. But deforestation, wasteful logging, the practice of high grading, fire and other factors will affect the growing stock adversely. Due to population and industrial growth, the projections suggest that the raw material situation will become critical in about a decade if Indonesia continues to maintain its

<sup>3</sup> Indonesia Tropical Forestry Action Programme (1992), Country Brief; Ministry of Forestry of Republic of Indonesia.

market dominance and industrial pace, and its forest resource management and utilization efficiency do not significantly improve".

### A Comprehensive Approach to Indonesian Forest Sector Strategy

1.26. Before considering the building blocks of a new strategy for forestry, some consideration needs to be given to the choices Indonesia has made in the past, and those it faces in the future, in the forestry sector.

1.27. It is reasonable to divide policy initiatives over the recent decade in the sector into two groups:

- Policies aimed at promoting industrial development based on the resource, via directed concession grants, and trade policy.
- Policies aimed at conversion of some forest areas in favor of agriculture and tree crop development - much of this being associated with the relocation of people from Java to the Outer Islands.

1.28. There were compelling reasons for Government's use of these directive, interventionist policies at the time of their introduction: a shortage of entrepreneurial talent in the country; a shortage of risk capital in the private financial market; an underdeveloped land market. The first two of these problems are very much on the wane in Indonesia; the matter of land remains a vexed question, but certainly not one beyond the capacity of Government to resolve by implementation of some major policy changes, and investment in a major titling exercise.

1.29. At this point, as Indonesia enters its second 25 year planning period, it faces some of the more sophisticated and difficult issues of an economy which has made many of the primary gains of development, and now must consolidate and deliberate upon directions to follow from here on. In the context of the forestry sector, some major questions arise in this context:

- Are the developments in progress on forest land - still the major land base in Indonesia - economically and environmentally sustainable? That is, are the realized demands being made upon this land base - by log extraction operations; official conversion programs; unofficial (but, under the circumstances, inevitable) conversion - reasonable, and compatible with broad environmental caution?
- Are the procedures and mechanisms under which the sector now operates compatible with Government's primary objectives on poverty alleviation and equity - given that large numbers of Indonesia's poor live in, or near forests, and depend on them to some extent?

1.30. Were Indonesia able to fully answer these questions, and to produce, and implement, comprehensive and consistent policies in response, then answers to subsidiary questions (such as: who should own the forest? what should the price of the resource be? how much investment should occur in plantation and natural forest management? how should the process of resource usage be made more transparent and responsive to public demand?) would arise as a matter of course. They would be the consequences, not the elements, of rational strategy.

1.31. This review takes the view that, whilst a comprehensive strategy to deal with these issues could be articulated in Indonesia, implementation will require more focus and prioritization, even in the longer term. The following paragraphs set out some short and long term objectives which would, if pursued, set the basis for a sustainable and equitable approach to use of Indonesia's forest resource. The remainder of the review details an analysis of the existing situation in the sector, and refines the focus further to some immediate policy and institutional changes which are required, as building blocks for a long term strategy.

1.32. **Establishing a fully functioning log market.** In terms of revenues flowing to resource owners (as represented by the Government of Indonesia), it will be made clear in subsequent chapters that the natural forest resource in Indonesia is significantly undervalued in the log market. Prohibitively high log export taxes reduce effective demand for logs, and strong linkages between logging concessions and processing firms further inhibit the entrance of new potential log purchasers into the sector. Various defenses and rationales for such policies have been advanced in Indonesia (and elsewhere) and these are examined in subsequent chapters. Certainly, such policies did lead to creation of a large domestic processing sector. In the long run, however, it is evident that the resource should be allocated (within the biological limits set by sustainability objectives) according to price, so that what is extracted goes to the highest and best use. The objective now must be to promote competitiveness and efficiency in processing. It would be a reasonable objective for GOI to target collection of all available economic rent from the resource by year 2000, as determined by international parity prices for the raw material. This would impose some structural change on existing processors, and would open the market to new entrants, including small scale, localized entrepreneurs presently prevented from access to raw material resources.

1.33. In the short to medium term, there are some structural and political reasons for believing that a re-opening of all or part of the Indonesian log market to foreign purchasers may not be feasible. In the longer term, however, this must be retained as an option by Government. It would in fact be logical for the sustainability year of 2000 to be also used as a date by which to review the export taxes on logs, so that if domestic processing has not by that time made the necessary efficiency adjustments to be able to purchase logs at (or near) international parity prices, then sales to external purchasers could resume. Such an approach would form a reasonable compromise: between the one extreme of introducing international log parity prices immediately (which, apart from the obvious political and social consequences this would have may eliminate the value of significant sunk capital in operations which are, potentially competitive and efficient); and the other extreme of doing so little in introducing market signals into the sector as to institutionalize rent-seeking at the expense of development of competitiveness and efficiency.

1.34. Higher log prices could be achieved via auctioning of timber rights, in cases where existing concessions are expiring, and an effective and competitive market for the resource exists. In other cases, where long term concession rights are in place, or an insufficient number of effective bidders exists in a given region to ensure genuinely competitive auction prices, the Government could set log prices according to residual-appraisal formulae calculated from international f.o.b. price levels. By phasing in the transition to such pricing strategies over a time period, following firm policy announcements, Government would allow existing industries time to restructure, and would encourage potential new investors to begin seeking log supply sources prior to investing in new processing capacity.

1.35. This would set the groundwork for an efficient, competitive log market, which in turn will produce the optimal concession system for Indonesian natural forests. Elimination of excessive rent-seeking in the concession licensing system will allow for more flexibility in allocation of ownership or leasing rights over forests, and in the introduction of multiple uses -including the full range of biodiversity conservation, eco-tourism and other global considerations - into forest management agreements. The resulting system of forest management would in all probability blend auctioning (or other forms of sale) of timber extraction rights to interested purchasers, and rights and/or contracts of management to other interest groups (which might include local communities (with the rights or otherwise) and provincial governments) - all in the context of a firm government policy on the broad parameters of natural forest conservation.

1.36. By firmly establishing such principles for use and conservation of the resource, many inefficiencies and inflexibilities in the current forestry sector will be eliminated: new forms of processing, and new markets will be pursued where these show promise of higher gain; and the debilitating aspects of the nexus between logging and processing operations would be broken: partnerships would still be possible, but only on the basis of efficiency and profitability. As normal profits replace windfall levels in the logging sector, practices such as cross-subsidizing relatively inefficient processing from proceeds of the logging operation would become untenable. An appreciation in policy formulation of the real underlying values of the forest - and a more equitable distribution of these values - would become a more routine matter.

1.37. **Involving regional governments.** One aspect of distribution of revenues which needs review in Indonesia is the share of forest revenues received by provincial and local governments. Presently, these entities receive a minority share of the IHH (royalty) component of total fee collections: and the IHH is itself a minority proportion of total fee collection - about \$7 per cum, out of an average fee of around \$22 per cum at present.

1.38. In the past, this division may have been more appropriate since it is evident that much of the forest area logged over has in fact been converted to other uses, in which regional governments participate more fully. Now, the priority has changed: the great majority of forested area remaining is intended for retention as forest - either for sustainable production or various conservation purposes. Local and regional governments, however, can only be expected to support this approach if they receive a reasonable proportion of the proceeds from sustainable use. Nor should this allocation be made on a production basis, since it is as much a goal of policy to retain and protect conservation areas, as sustainable production areas. The allocation from revenue to local and regional governments should therefore be made on the basis of permanent forest area (regardless of its use category) - weighted to some extent by population levels, to account for the fact that jurisdictions with high population levels in a near forests will need to invest more in programs devised to offer realistic alternatives to encroachment. Local and regional governments would then be expected to support sustainability: to refrain from pressuring for conversion of areas designated as permanent forest, and to work with central government on program to encourage forest dwelling and adjacent communities to participate in sustainable management.

1.39. It is suggested here that a much higher proportion of forest revenues should go to local and regional government. If fee collections rise according to recommendations made in this report, then allocation of 40-50% of the total to local and regional government would be feasible, without prejudicing amounts going to central revenue and reasonable allocations to plantation purposes, and community participation (some of which, as suggested above, would naturally be funded from local government sources).

1.40. **Managing for sustainability.** The main task for government forestry agencies, under the strategy outlined above, would become one of ensuring that acceptable environmental and utilization standards apply in field forest operations. This is already an objective and, as will be examined at some length in subsequent chapters of this report, there are already major technical and institutional problems in this area; both in the definition of acceptable standards of sustainable forest management, and in the enforcement of those standards. These will be accentuated, because as natural forest stands become more inherently valuable, incentives to avoid revenue payment (by illegal removals), or to raise returns to logging via lowering operational standards in various ways will increase.

1.41. Two important and related policy implications arise from this. First, the matter of independent audit of forest operations, to ensure that both operator and forestry agency field staff performance remains satisfactory, becomes of primary importance: government must be prepared politically not only to invest significantly in establishment of such processes, but also to pursue the application of disincentives and penalties vigorously. It will be in the interests of government and the private sector alike to ensure that such processes are linked to developing international initiatives on certification of sustainably extracted timber.

1.42. The second issue is the nature of forest extraction agreements (whether in the form of concessions, auctioned timber rights or other mechanisms). There is already considerable activity underway in Indonesia on the re-definition of production forest boundaries, and the quality of management plans for use of such areas. Considerable policy development work remains to be done, however, to ensure that all parties involved agree on boundary definition and take sufficient action to implement this, and on broad implementation and enforcement of forest management plans. The relevant issues on this matter are discussed in Chapters II and III.

1.43. **A plantation policy to enhance sustainability.** It will be argued later in this review that in practice, GOI plantation policy and incentives may have led to destruction of regenerating natural forest areas. If plantations are to genuinely reduce pressure on the natural forest resource, then implementation of stronger



policies will be necessary. In the short term, GOI should announce that the practice of allocating large areas of natural forest to a pulpwood plantation concession (so that an interim supply of natural forest pulpwood is available) will cease: from now on, any prospective pulp and paper manufacturing project should be required to generate pulpwood supplies from plantation on genuinely open areas. The lead time for planning, construction and commissioning of a large scale pulp and paper making operation should be sufficient for a plantation resource to be grown to pulpwood size.

1.44. In the longer term, consideration should be given to elimination of subsidies to plantations in Indonesia, specially in the case of fast growing pulpwood plantations by large industrial concerns. One important element in this will be price developments in the natural resource, as discussed in paras 1.32 - 1.36 above. If neither high grade (sawlog and veneer log) nor lower grade (pulpwood) material is available from the natural forest area at prices below real market value, then the value of plantations will also rise, and the need for subsidization to attract investors will be reduced.

1.45. **Equity, poverty alleviation and participation.** The policy measures discussed above relate primarily to the role of government in efficiency and technical aspects of managing the natural resource for sustainability. It is unlikely that such policies will succeed, in Indonesia, without corresponding changes in policies and attitudes towards the people who live in, or near, forested areas, and who derive some significant part of their livelihood from such areas.

1.46. Both GOI and the Bank now have poverty alleviation in primary place among their objectives. In the forestry sector, it is evident that a large number of people currently dependent on forest areas for a significant part of their livelihood, are living near, or below, the poverty line. Certainly, these communities are among the most remote and poorly serviced by existing public institutions in Indonesia. Such people can be (and frequently are) made worse off by official forestry developments in which they rarely are offered any share, and through which they may lose access to benefits of forest use (whether of an historical and traditional nature, or of more recent origin).

1.47. Although some recent legislation and policy changes in Indonesia formally improve recognition of some traditional community rights in forestry, in practice such communities are usually regarded by forestry agencies and industry as a problem, rather than as part of the solution. Some exceptions exist: there are experiments current in Indonesia on community management on forest concession areas; and some concessionaires have made genuine attempts to initiate long term development project on behalf of affected communities. However, these are non-systemic, ad hoc events.

1.48. There is more than equity involved here: although no precise estimates exist, the numbers of people directly dependent to some extent on forests, and affected by forestry developments, is large. They remain in such areas when logging activities have closed, and they area a potent force for destruction of regenerating areas, if offered no alternative.

1.49. Eventually, Government in Indonesia will need to give due recognition to title and rights of local communities in forest areas, and on that basis to establish formal and effective processes of consultation, prior to initiation of forest operations. A necessary first step towards this objective would be to promulgate regulations giving implementation to recent legislation which recognizes some community rights in forest areas, and sets up administrative appeal processes. Design of such regulations should be done in consultation with community groups, local and regional government and the private sector. However, a firm time frame for adoption of regulations (3 to 5 years would seem appropriate) should be stipulated in the process.

1.50. In the medium term, GOI will need to commit a significant level of resources to implementation of community development initiatives in forestry areas. An accumulation of funds via a mechanism similar to that currently used for the reforestation fund (or even a specific allocation from within that fund) would be one alternative; regular allocations from the general budget would be another. No calculation has been attempted in this study of the amount of funding this initiative would require. While it would be difficult to disburse large amounts initially, in advance of specifically designed programs and projects being available,

it is nonetheless recommended here that a substantial commitment of revenue to this purpose be made. It would be appropriate to think in terms of eventual allocations in the order of \$50-\$100 million per annum from revenue, for this purpose. To this would be added whatever contributions the private sector, international donor agencies and other source may be willing to make. Such a commitment would send an appropriate signal from Government that it is serious about participation - to the international community, and to national interest groups. This will in turn stimulate greater involvement by such groups in the task of developing realistic proposals and programs. In keeping with the emphasis in this report on implementation, a substantial allocation of funds will focus attention on investment possibilities, rather than primarily on further study of the problem.

1.51. For this to proceed effectively, it will be necessary to develop an effective mechanism for channeling such investments to affected communities: there are already many experiments and studies current (or completed) on community participation in forestry in Indonesia - some of which have developed successful approaches. What is lacking is adequate investment and institutional capability to follow these up with field scale activities. The best approach to rectifying this would be establishment of a foundation which would be empowered (and funded) to identify and negotiate with groups likely to be affected by forestry prior to initiation of field activities, and to support investments. These might include financial participation in forest operations or in follow-up management of regeneration (possibly including allocation of concessions to communities for this purpose), and in plantation schemes: all of which could be supported by the community development fund. In essence: it is necessary for Indonesia to break away from the historical relationship which has developed between forest dwelling and adjacent communities, and government agencies; and also to deliver meaningful financial backing to development for such communities. The principle underlying this suggestion is a simple one: involving forest dwelling and adjacent communities in managing the forest resource - rather than encroaching upon it - will cost money. If Government wishes to pursue sustainability, then investment of substantial funds in participation must be regarded as a pre requisite, and the commitment should be made clearly.

1.52. **Institutional change.** The preceding paragraphs already imply considerable institutional change in Indonesia: a greater role for communities and possibly local governments in the management (and ownership) of the resource; a lessening of institutionalized support in government regulations for the existing processing sector, in favor of more market oriented outcomes; independent (private sector based) audit of forest operations; possible alteration in the mechanisms under which logs are sold.

1.53. Even more change than this will be required. The Government of Indonesia has recognized in its general development policy a need to decentralize decision to the field - to the level where consequences and impacts are fact. This is a particularly important measure where natural resource and land decisions are involved, and yet the Ministry of Forestry remains one of the most highly centralized of all Government departments.

1.54. Not only is devolution to regional authority indicated, but so also is devolution to the private sector of tasks which are not directly related to government - i.e. the formulation of policy and regulations, and accountability for their observance. Indonesia already has a successful example of privatization of a public task, in the contracting out to a private consultancy group of the management of significant areas of the customs and excise function in Indonesia. One possibility in forestry example be would be use of the private sector for the independent audit discussed in para 1.41. above. There are other functions in forestry which could also be considered for this approach: inventory and related data gathering and management; aspects of research; large sections of what is currently done in field control of forest operations, including log management and marketing; and implementation of plantation policy.

### Focus, Organization and Objectives of this Review

1.55. This review should be considered in the context of the broader concerns of the Bank<sup>4</sup>, and other donors, in relation to the use of forest land in Indonesia. In particular, it should be seen as a companion to the recent broad based Bank review of environmental issues in Indonesia, entitled Environment and Development: Challenges for the Future. That review deals with issues such as: land resources management; management of ecosystems and protected areas; and water resources - in addition to major pollution issues. The objective of this natural forest management report is to focus on that very significant part of Indonesia's natural forest area which is subject to forest operations and wood extraction. At present, a very large area - some 700 000 hectares - of forest in Indonesia is logged annually. To date, much of this logged over forest has been subsequently converted to other uses (see Chapter II) - much of it on the basis of official conversion programs.

1.56. To treat future logging in natural forest areas as part of sustainable forest management will require very different approaches, on the part of both government and the private sector, than have applied in the past. Even if significant areas of forest in Indonesia can be set aside in large blocks for purposes of biodiversity conservation (and this is by no means certain), the very size of the logging program suggests that considerable identification and preservation of specific biodiversity and other assets will still need to be done in the context of forest management. How the sustainable management question is approached in the near future in Indonesia therefore has strong implications for biodiversity and other conservation values. The capacity to manage such areas at a field level, and to integrate both environmental and social concerns into management, is crucial to the overall forest land outcome in Indonesia. There is no option, in Indonesia, to close down forest operations or even significantly curtail them: this is neither economically nor politically feasible. Further discussion of the natural and global economic aspects of sustainable forest management in Indonesia is given in Chapter III of this study.

1.57. A major determinant of outcomes for sustainability will be developments in trade in forest products, in this high export sector. It will be argued in this report that Indonesia must draw the right messages from historical and current international trade developments in forestry and forest products and, in this area, it is particularly important to ask the right questions: Is a lack of sustainability in tropical forestry attributable to exploitive and discriminatory trading practices on the part of major consumer nations, or does it relate more to domestic policies which equate overall gains in value added to improvements in efficiency and competitiveness of the forest products sector? How important is the 'green' factor in international trade: the development of market resistance to forest products not demonstrably produced from sustainably managed resources? What policy options and instruments are available to Indonesia to draw sustainability, efficiency and competitiveness together in the forestry sector?

1.58. This review approaches these questions according to the following analytical structure:

- The existing status of the forest resource (Chapter II)
- Chapter III discusses the implementation of forest management in Indonesia and options for improvement. This subject includes analysis of the economics and environmental aspects of the plantation sector in Indonesia, because it is, on current practices, inseparable both locationally

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<sup>4</sup> See Indonesia: Sustainable Development of Forests, Land and Water (World Bank 1990); Biodiversity Conservation in Indonesia (World Bank, 1992); and the Bank's environmental review Environment and Development: Challenges for the Future (World Bank 1993). The Bank is investing in forest and mangrove conservation activities under current forestry loans (Forest Institutions and Conservation Projects I and II), and is preparing major investments in forest conservation under Global Environment Fund financing in the Kerinci Seblat National Parks, and in a forthcoming watershed conservation project.

and in a corporate sense from natural forest operations. It also includes the present status of forest dependent communities in Indonesia, because, in addition to the important objectives the Government of Indonesia has for these communities (as discussed in the preceding section), it is clear that no genuinely sustainable forest management is possible without their involvement.

- The present and potential role of the forest processing industries in Indonesia. This subject opens with consideration of some important market and trade questions, and proceeds with a sub-sectoral analysis of the Indonesia forest products industry (Chapter IV).

1.59. These elements will lead to a series of observations on policies and institutional aspects of the sector in Indonesia:

- The role of log prices in allocation of the resource is a crucial factor: drawing together the efficiency of usage of the forest resource and the processing sector, and the broader aspects of the sustainable management of the resource. This is discussed in Chapter V.
- Chapter VI closes the report, by recapitulating the policy issues which arise from the foregoing chapters, analyzing the institutional implications of policy reforms for implementation of sustainability, and proposing some immediate measures which might be taken.

## CHAPTER II FOREST RESOURCES

### Introduction

2.1. The basic set of data upon which a policy of sustainable forest management is implemented is the area, and condition, of the natural forest resource. In Indonesia, there is considerable uncertainty on this matter at present: the Government recognizes this, and is presently involved in an extensive national forest inventory program<sup>1</sup>, which will provide improved estimates of forest area and type.

2.2. In the meantime, the best approach to gaining some insight into the resource is to review existing official estimates and then to examine some recent analyses of the existing zonation of forest areas, and of deforestation and illegal removals from the forest. In sum, this process indicates that, even if current official estimates of forested area are accurate now, the area available for commercial exploitation may be less than the figure given, and the rate of removal from that area may be well above the sustainable removal figure implied in Figure 1 above. On the other hand, recent estimates of deforestation in Indonesia are lower than earlier ones, and the deforestation which is occurring may be more controllable through official Government action than previously thought.

### Forest Area and Resource Availability Projections

2.3. The Action Plan for Forestry Sector Development in Indonesia (op cit pg.6) projects total forested land areas for Indonesia to 2030 AD as follows:

Table 2.1: PROJECTED TOTAL FOREST LAND IN THE OUTER ISLANDS  
(IN MILLION HECTARES)

Region	1990 Forestry Studies	1995	2000	2005	2010	2015	2020	2025	2030
Sumatra	20,382	19,380	18,662	17,987	17,506	16,922	16,559	16,084	15,664
Nusa Tenggara	2,536	2,308	2,271	2,237	2,212	2,186	2,165	2,141	2,120
Kalimantan	34,732	33,129	31,866	30,661	29,682	28,676	27,867	26,912	26,114
Sulawesi	10,330	9,978	9,7076	9,448	9,267	9,069	8,920	8,716	8,550
Maluku	6,029	5,687	5,415	5,159	4,951	4,740	4,568	4,370	4,203
Irian Jaya	33,649	32,539	31,642	30,773	30,055	29,306	28,710	27,990	27,392
Outer Islands	107,478	103,021	99,562	96,264	93,672	90,969	88,830	86,212	84,044

Source: Table 2, Action Plan for Forestry Sector Development in Indonesia, Ministry of Forestry, 1991.

2.4. Projections of supply from natural and plantation forests, are discussed at some length in chapter 5 of the Indonesia Tropical Forestry Action Programme<sup>2</sup>, produced for the TFAP Roundtable III conference held in Yogyakarta in February 1992. Volume available from natural forest utilization shown in those projections decline from 29.8 million cum p.a. in 1995, to 21.5 million cum p.a. by 2030. As of 1990

<sup>1</sup> The National Forest Inventory Project, financed in cooperation with the World Bank under the First Forest Institutions and Conservation Project loan (FICP I).

<sup>2</sup> Ministry of Forestry, 1992, Indonesia Tropical Forestry Action Plan, Country Brief.

approximately 11 million ha of production forest had been logged, of which about 5 million ha appears to have been heavily logged. About 30 million hectares of production forest remains unlogged.

#### Factors Influencing Resource Estimates

2.5. Uncertainties as to the extent and nature of the natural forest resource arise, firstly, from data difficulties implicit in initial growing stock and yield estimates, and secondly, from imprecise information on the dynamics of change in the status of the resource from that point on. The first category includes issues related to inventory, and also the matter of zoning: the extent to which use categories of forest areas are correctly identified. This matter is examined below. In the second category, deforestation losses, and the dimensions of illegal removals from forested areas are two important factors in the dynamics of forest cover, and these are briefly reviewed, following observations on zoning.

2.6. **Inventory and forest land use zoning.** A major inventory exercise is currently under implementation in Indonesia, in a joint GOI-FAO-World Bank project being supported under the Bank - GOI Second Forestry Institutions and Conservation Project. Preliminary results can be expected from this by early 1994, and more comprehensive results by 1995-96. In the meantime, estimates of standing volume and increment will continue to be based on crude, generalized growth and yield figures. The possibility of major errors and misconceptions about the true volume available is large, under these circumstances, although hopefully not as large in general as illustrated in the case described in Box 2.1.

#### Box 2.1: REVISING ESTIMATES OF CONCESSION OUTPUT

A recent environmental audit of a forest concession in East Kalimantan carried out by the Environmental Impact Management Agency (BAPEDAL) revealed that the company operating the area has extracted an average of 140 000 m<sup>3</sup> p.a. from the site - and the annual harvest has declined in recent years. Original estimates of the annual allowable cut from this concession ranged from 382 000 - 612 000 m<sup>3</sup> p.a. It is in fact not uncommon for actual output to differ from original standing volume estimates, but it is important that such differences be minimized by adequate concession level inventory work, and that discrepancies are factored into national inventory estimates as they arise.

2.7. Some revision of available volume arises from re-zoning of forest land. Under the Basic Law of 1967, the Ministry of Forestry has jurisdiction over all land designated for forestry use. At present, about 70% of all land in Indonesia is designated as forest area. This distribution resulted from a Consensus Land Use Plan (Tata Guna Hutan Kesepakatan - TGHK), which was signed off by 8 Ministries and Provincial Governors in 1984/85. The process of formulation was coordinated by regional planning boards (BAPPEDAS), and the Ministry of Forestry was involved via its regional representatives (Kanwil Kehutanan).

2.8. The TGHK maps and zoning are the basis for the current Ministry of Forestry categorization of forest land:

<u>Category</u>	<u>'000 ha</u>
Protection forest	30.319
Park & Conservation forest	18.752
Limited Production forest	30.526
Production forest	33.867
Conversion forest	<u>30.517</u>
	<u>143.981</u>

2.9. The distinction between protection, limited production and production forest is based on an erosion index, which is calculated from soil type, slope and rainfall figures. In terms of use, constraint on operations in protection and limited production forest is limited to the timber harvesting system: criteria on road location and construction - potentially the most damaging aspect of operations - are not specified. The division between production and conversion forest is made by and large on a consensus basis, rather than according to firm criteria. The overall total of 144 m ha denotes area officially designated as forest: since virtually all of this area of officially designated forest land is on the outer islands (i.e. excluding Java), the figure may be compared directly to the total estimate of actually forested area given in Table 2.1. (107.5 m ha).

2.10. A number of problems have been identified with the TGHK system:

- Categories of forest area were identified on very large scale maps, and resulting divisions are inadequate for operational level planning. Occasionally, category boundaries do not match on adjacent map sheets.
- Inadequate information existed at the time of the classification to objectively decide upon categories, in many cases.
- No identification is made of land currently being used by rural populations for subsistence and cash farming. This fails to recognize often long-standing residency by some groups.
- Although allocations of land to HTI Schemes and other uses are supposed to be based on existing vegetative cover, and to make exclusions for environmental reasons, neither characteristic is recorded on the TGHK maps.

2.11. In the case of concession operations in particular, there are examples of concession areas overlapping each other when located on a single map. Subsequent revisions (see paras 2.12 to 2.14 below) to land use maps indicate that many concessions include substantial areas of non-forest land, and also of land which, for reasons of slope, fragility or other criteria should not be subject to forest operations.

2.12. An attempt has been made to identify the scale of this problem, utilizing the Re PPProT data. This is the information contained in the Regional Physical Planning Program for Transmigration, prepared in the Ministry of Transmigration over the period 1984-1989, based on photography and other data spanning a period 1972-1986; updated with LANDSAT imagery in the case of earlier material. The Re PPProT study identified 19 separate forest types for the Outer Islands, and using a base year of 1982, determined a forest cover estimate of 120 million hectares for that year. Dick<sup>3</sup> reports results from a reclassification within the TGHK designations, using Re PPProT data and a subsequent revision of TGHK definitions, to more accurately reflect present land uses and condition, better ecological consistency between zones, and improved information on soils, topography and rainfall. Results of these two approaches to reclassification of forest areas are given in Table 2.2 below.

2.13. As can be seen from comparison of TGHK and RePPProT, the most significant result from this exercise is that the limited production and production forest categories are reduced by 45%; increases are recorded in protection forest and reserves. Based on Ministry of Forestry criteria, under the new classification, a significant proportion of land currently under concession is too susceptible to erosion to be logged. The reclassification of the RePPProT data reduces production forest considerably: the result can also

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<sup>3</sup> Dick, J 1991, Forest Land Use, Forest Zoning and Deforestation in Indonesia, Background paper prepared for State Ministry for Population and Environment (KLH), and the Environmental Impact Management Agency (BAPEDAL), for UN Conference on Environment and Development.

Table 2.2: RE CLASSIFICATION OF FOREST FUNCTION AREAS

Area in 100 Ha = Km<sup>2</sup>

Agreed Forest Function	Reclassification Approach	Sumatra		Kalimantan		Sulawesi		Nusa Tenggara		Maluku		Irian Jaya		TOTAL	
		Km <sup>2</sup>	%	Km <sup>2</sup>	%	Km <sup>2</sup>	%	Km <sup>2</sup>	%	Km <sup>2</sup>	%	Km <sup>2</sup>	%	Km <sup>2</sup>	%
Nature Reserve (PPA/HSA)	TGHK <sup>1</sup> Adjusted	11,111	9	36,386	7	14,126	8	3,199	1	1,531	6	73,700	18	173,659	10
	RePPPProT <sup>2</sup> reclassified	13,781	9	63,128	12	27,625	15	23,713	15	na	6	86,300	21	211,550	14
Protection Forest (HL/HB)	TGHK <sup>1</sup> Adjusted	64,121	14	65,471	12	43,202	24	16,372	20	13,309	17	105,000	25	307,475	17
	RePPPProT <sup>2</sup> reclassified	115,202	21	88,933	17	100,295	51	88,633	56	na		156,000	38	519,063	31
Limited Production Forest (WPT)	TGHK <sup>1</sup> Adjusted	66,579	14	118,266	22	45,877	25	7,913	10	16,426	21	46,300	11	301,358	17
	RePPPProT <sup>2</sup> reclassified	17,529	1	77,600	11	2,073	1	8,283	5	na		20,100	5	125,858	7
Normal Production Forest (ADB/HP)	TGHK <sup>1</sup> Adjusted	69,319	14	132,246	25	14,222	8	5,527	7	8,624	11	80,300	19	310,238	18
	RePPPProT <sup>2</sup> reclassified	53,755	11	88,992	17	1,535	1	1,691	3	na		60,000	11	208,776	12
Conversion Forest (HPK/HK)	TGHK <sup>1</sup> Adjusted	86,760	18	115,316	22	16,241	8	17,144	21	31,638	44	97,600	24	367,699	21
	RePPPProT <sup>2</sup> reclassified	233,290	19	206,291	38	51,631	29	32,682	21	na		83,000	20	609,897	31
State Free Forest (HNB)	TGHK <sup>1</sup> Adjusted	5,617	1											5,617	1
	RePPPProT <sup>2</sup> reclassified	1,511	<1	--	--	--	--	--	--	--	--	--	--	1,511	<1
Un-classified (UNL/NPD)	TGHK <sup>1</sup> Adjusted	141,312	30	68,591	12	52,177	27	30,315	38	504	1	11,900	3	301,799	17
	RePPPProT <sup>2</sup> reclassified	9,791	2	11,172	2	0	27	800	21	na		9,100	2	31,163	2
TOTAL TGHK Adjusted		171,819	100	536,276	100	186,145	100	80,770	100	78,035	100	111,800	100	1,770,845	100
TOTAL RePPPProT		171,862	100	536,219	100	186,159	100	158,805	100	na		111,800	100	1,770,815	100

<sup>1</sup> Tata Guna Hutan Kesepakatan<sup>2</sup> RePPPProT reclassification of forest function areas

Source: Tables 4 and 5, J.Dick *Forest Land Use, Forest Zonation and Deforestation in Indonesia* Background Paper to UN conference on Environment and Development, prepared for State Ministry for Population and Environment (KLH); and the Environmental Impact Management Agency (BAPEDAL), 1991.



be compared to official estimates of production forest area as given in the Indonesia Tropical Forestry Action Program document (see Table 2.3).

**Table 2.3: ESTIMATED AREA OF EFFECTIVE NATURAL FOREST COVER IN INDONESIA BY REGIONS, 1990**

Region	Mixed Hardwood		Tidal forest with Mgt. Potential	Forest within nature reserves	Other Forest	Total Forest	Forest as Percentage of land area
	Production Forest	Other Forest with Mgt. Potential					
Sumatra	8.37	3.60	0.39	3.47	4.55	20.38	43
Kalimantan	16.74	5.97	0.89	3.04	8.09	34.73	63
Sulawesi	3.62	1.33	0.14	1.20	4.04	10.33	52
Maluku	2.06	1.96	0.20	0.41	1.40	6.03	70
Irian Jaya	9.68	6.09	0.53	6.17	11.18	33.65	82
Nusa Tenggara	0.17	0.35	0.91	0.13	1.70	2.36	29
Outer Islands	40.64	19.30	2.16	14.42	30.96	107.48	60
Bali	-	-	-	0.12	0.01	0.13	23
Jawa	0.18	-	-	0.12	0.76	0.76	7
<b>TOTAL</b>	<b>40.82</b>	<b>19.30</b>	<b>2.16</b>	<b>14.56</b>	<b>31.73</b>	<b>108.57</b>	<b>56</b>

Source: Table 3.1 Indonesian Tropical Forestry Action Plan, (op cit, see pg.8).

2.14. If nothing else, the disparities evident indicate the highly uncertain nature of existing classifications. There is awareness within the Ministry of Forestry and other agencies that the quality of information used to allocate concession areas, HTI sites, and to manage such areas, is poor. Some improvement can be expected upon completion of the national forest inventory, due in 1996, but alone, this will not provide sufficient concession level information. It is clear that considerable improvement at least in the location of existing concessions, and zoning of the forest according to the existing categories, could be carried out utilizing RePPPProT and some subsequent imagery data, and also the extensive aerial photography which has been prepared by APHI - the concessionaires association - which now covers some 60% of concession areas.

2.15. An opportunity may exist to implement zoning changes under the new KPHP system, under consideration in the Ministry of Forestry at the present time. The essential idea of this system is to regroup production forest areas into Management Units, administered at the Provincial level. New boundaries would be drawn for each unit, based on the latest information, and consensus between interest groups. Although some large single existing concessions might be formed into a KPHP without addition of more areas, more often groups of existing concession areas will be merged into KPHP.

2.16. Obviously, implementation of this system will require some difficult decision-making in two respects: Firstly, the new boundaries to be agreed upon and introduced will, in many (perhaps most) cases, reduce effective production areas for concessionaires in a given area. Whether the remaining resource should be auctioned; or partitioned amongst concessionaires on a pro rata basis (calculated from remaining resources in old concession areas); or allocated in various other ways; remains a matter for consultation and decision. The role of provincial and local authorities, will also need to be given consideration. The central argument which will, one way or another, eventually enforce some form of reallocation and reclassification of the forest resource, has been summarized by Dr. Alistair Fraser:

"Now that the whole forest area is committed, and has also declined in extent due to various forms of forest clearance, while industrial demand probably exceeds the remaining supply, there could now be competition between users or user groups to secure access to continued supplies".

Alistair Fraser (ODA - Indonesia Tropical Forest Management Project Coordinator), The Role of the Private Sector in Management of KPHPs (unpublished discussion paper).

2.17. Second, the decision-making process will in many instances be further complicated by the existence of community counter-claims over some forested areas (see paras 3.110 to 3.127 for an overview of the community issue in forestry in Indonesia). At present, the proportion of forest land occupied and/or claimed by local communities in Indonesia cannot be determined with any accuracy: recent estimates range from 10% to 60% of total forest area. Some recent exercises in mapping of community-claimed or managed areas have demonstrated that it is possible to accurately determine boundaries of community areas (see Box 2.2).

**Box 2.2: MAPPING A COMMUNITY MANAGED TERRITORY IN INDONESIA'S FORESTS**

In 1992, the inhabitants of a single village in East Kalimantan, (Long Uli), in collaboration with the Forestry Department (Directorate General of Forestry Production and Directorate General of Natural Forest Protection and Preservation), the East West Centre (Environment Program), WALHI (Institute of Dyakology Research & Development Division), World Wildlife Fund (Kayang Mentarang Project), mapped the areal extent of lands under village control and management and the interrelationships between village territorial boundaries and forest department maps.

The project is highly significant because it demonstrates that historic village management areas can be mapped with precision and that the overlapping areas between village managed territories and MOF designated forest zones including production and protected areas, can be specified. It showed that a collaborative, inter-institutional methodology, involving villagers, non-governmental organizations, governmental institutions and international environmental institutes can be designed and implemented in the service of sustainable forest management and in the rational clarification of territorial property rights and boundary dispute resolution.

When forest land use (TGHK) maps were superimposed over the mapped village lands, it was revealed that the village is divided in the middle by two land users, a forest concession and a nature reserve. Together, these two external land users cover a total of 51 percent of Long Uli land. 31.1 percent of Long Uli land (5,661 ha) overlapped with the Kayang Mentarang Nature Reserve and 19.6 percent (3,576 ha) of Long Uli land is covered by a forest concession. When the forest concession and nature reserve overlaps are combined, they cover all of the village cultivation land. In addition, conversion forest covers 36.2 percent of Long Uli land and Limited Production Forest cover 13.7 percent of village land.

A number of options have been proposed in this particular case: one would involve altering the status of the nature reserve to allow villagers access for traditional purposes to part of it. Another would involve relocation of concession boundaries to exclude the area used by villagers for fuel and construction materials extraction. A more integrative approach would be to renegotiate land use management for the whole area, involving all parties - the community, the Ministry of Forestry, and the concessionaire - with the intention of reaching a consensus suitable to all.

The technical challenges in producing maps of the type described above are lessening as more sophisticated data imagery technology becomes available. However, there would be little point in introducing such technology, until firm decisions on the legal and institutional changes needed are made. These are discussed in paras 3.110 to 3.127, and 6.13 to 6.18.

Source: This example is drawn from information provided in a working paper for this review entitled Indigenous Forest Dwelling Communities in Indonesia's Outer Islands, by Charles Zerner (1993).

2.18. **Deforestation.** Deforestation can, according to the perceptions of the user of the term, mean anything from total removal of tree cover, to relatively small alterations in the ecological composition of a forested area. Most available analyses of deforestation in Indonesia clearly mean something closer to the former, although few actually specify a definition.

2.19. The two most commonly cited estimates of deforestation in Indonesia are by FAO (1991) - which gives a figure of 1.3 million hectares per annum - and the World Bank (1990), which estimates a rate of 900 000 ha per annum. These sources are cited in Table 2.4 below. These estimates place Indonesia second only to Brazil, in annual areas deforested.

2.20. Table 2.4 summarizes these and some other recent estimates of deforestation in Indonesia.

Table 2.4: ESTIMATES OF DEFORESTATION IN INDONESIA

Source of Estimate	A G E N T							TOTAL
	Trans Dev't	Estate Crops	Swamp Dev't	Swakarsa Transmig	Trad'd Ag.	Forest Harvest	Fires	
WB 1990 <sup>1/</sup>	250			500		80	70	900
FAO 1991 <sup>2/</sup>	300	274	85	461		80	113	1315
TAG 1991 <sup>3/</sup>	65	11.4	30.4	156.5		NE	NE	262.9
MoFr 1992 <sup>4/</sup>	300	160		300		77	478	1315 <sup>a/</sup>
Dick 1991 <sup>5/</sup>	78.4	11.4	30.4	178.5	135.5	120	70	623
MoFr 1993 <sup>6/</sup>								840

a/ Fire damage averaged excluding major Kalimantan fire loss.

Sources:

- 1/ World Bank Indonesia: Sustainable Development of Forests, Land and Water, 1990
- 2/ Food and Agriculture Organization (FAO) Situation and Outlook of the Forestry Sector in Indonesia, 1990.
- 3/ Transmigration Advisory Group (TAG), Forest Clearance Study. Ministry of Transmigration, 1991
- 4/ Ministry of Forestry (MoFr) Indonesia Tropical Forestry Action Program, 1992.
- 5/ Dick, J. Forest Land Use, Forest Use Zonation, and Deforestation in Indonesia, Background paper for UN conference on Environment and Development, prepared for KLH and BAPEDAL, GOI, 1991.
- 6/ Ministry of Forestry Preliminary Study on the Rate of Forest Cover loss in Indonesia National Forest Inventory Project, INTAG and FAO, 1993.

2.21. Dick (op cit, on pg.17) argues that both the 1990 World Bank and 1991 FAO estimates are too high, because they: assume official tenure change is equivalent to actual conversion; assume that all causes or agents of deforestation are additive, whereas in fact smallholders, for example, will usually occupy lands already disturbed (by logging, fire or etc.); and appear to assume that all area presently under shifting cultivation has been deforested in the last 10 or 15 years, whereas in fact shifting cultivators occupy much land which has never been forested (or has been cleared for many years).

2.22. Dick suggests that the Transmigration Advisory Group figures based on the RePPPProT data with some upward adjustment to correct for an increasing rate of clearing towards the end of the observation period, should be accepted for regular transmigration, estate crop and swampland development clearing. Dick derives unofficial transmigration figures from Ministry of Transmigration figures, and adjusts FAO figures for losses to harvesting upwards, to account for some observed forest disturbance in montane areas not accounted for.

2.23. Overall, Dick's analysis of deforestation seems reasonable although, as he points out, the data available are so poor that the reliability of any current estimate is low. Preliminary results from the Ministry of Forestry/FAO National Forest Inventory Project, being undertaken under the World Bank Second Forest Institutions and Conservation project, indicate an annual forest loss figure for Indonesia of 840 000 hectares (but there is a wide confidence margin for this estimate at this stage).

2.24. One of the most interesting implications from Dick's analysis is that programs either sponsored or encouraged by Government account for 67% of all deforestation. Even the 21% attributed to traditional agriculture may be an overestimate, given the likelihood that much of this is occurring on secondary forest which regenerates as part of a shifting cultivation cycle.

2.25. While this interpretation may challenge the conventional wisdom, which holds that shifting agriculture is the main (or a main) agent of deforestation, in one sense it would be an encouraging finding. It is fairly widely accepted that a certain amount of forest land in Indonesia - especially forest of less quality and biodiversity value - should be converted to more productive uses. Dick's estimates would confirm that most deforestation occurring is potentially part of this process: if inappropriate decisions as to what should be cleared are presently occurring, it is at least within the reach of Government agencies to rectify such mistakes via administrative fiat. One major case in point, which has been raised previously by the Bank<sup>4</sup>, is the system of land regulations in Indonesia, which cause public lands - including forest lands - to be sold at prices far below market rates. This practice in effect subsidizes the conversion of forests to other uses, in addition to causing inefficient land use throughout and reducing government revenues to well below potential.

2.26. It is important to recognize that the projections of forest output given in Figure 1 are predicated upon a fairly low rate of deforestation in the future: around 500 000 ha per annum to year 2030. If the reasoning in para 2.25 above is valid, then this is possible, providing Government sanctioned clearance of forest areas stays within limits defined, and forest dwelling or adjacent communities can be more effectively engaged in the process of long term management of the resources.

2.27. Illegal removals. Quantification of illegal removals, virtually by definition, is difficult. In the case of Indonesia, there is added complication in that the level of legal, or officially recorded removals is in some doubt. In the Indonesia Tropical Forestry Action Plan Executive Summary (op cit, on pg. 8) it is stated that log production in 1988 reached 32 million cum, whereas Forestry Statistics of Indonesia gives figures of 27.6m, 26.4m and 21.9m cum for 1987/88, 1988/89 and 1989/90 respectively. As noted in ITFAP, the consensus allowable cut figure from the Indonesian resource at the present time seems to be 31.4m cum pa, declining to 25m cum pa by year 2000.

2.28. It is evident that most logs taken by local people for basic, local use, will not be recorded and might in some senses be regarded as illegal removals. No estimate can be attempted here as to what the figure for such removals might be. Of more direct interest to GOI will be discrepancies between official removal figures and volumes apparently consumed in processing operations; volume for which fees should have been paid. It is also difficult to obtain a consistent data set for these figures. Table 2.5 summarizes some recent figures on log production and processed output in Indonesia.

2.29. Log conversion factor estimates for plywood manufacture vary, but in Indonesia seem to range between 50% and 55%. A rate of 55% will be assumed here. Sawn timber conversion factor estimates are lower: as suggested in para 4.54, a study by Atlanta Consultants<sup>5</sup> estimated a figure of 43% for 1988: a rate of 45% is assumed here. Assuming (conservatively) that current production of sawn timber is on the order

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<sup>4</sup> Indonesia: Land Resources Management and Planning, World Bank, 1991.

<sup>5</sup> Atlanta Consultants/Improma (1987) Wood Processing Industry Sector Study (7 volumes).

of 8 m cum, and plywood 10 m cum, and applying the conversion factors, leads to a total log consumption estimate of about 36 million cum, in these forms of processing in Indonesia. If anything, this will be an underestimate of total log consumption in Indonesia: as noted earlier, use of logs in the informal sector will not be included at all in these figures. Moreover, production figures from registered mills may be understated, for obvious reasons, and some mill production may not be included at all in these figures. It is by no means unlikely that total log removals in Indonesia exceed 40 million cum per annum.

**Table 2.5: RECENT ESTIMATES OF LOG, SAWN AND PLYWOOD PRODUCTION (millions CUM)**

ITEM	Source of Estimate	1992	1991	1990	1989	1988	1987
Log Removals	ITFAP (1992) . Ministry Forestry /a FAO Forest Products Yearbook					32	
					21.9	26.4	27.6
				27.5	28.5	26.9	
Sawn Production	Ministry Industry /a FAO Forest Products Yearbook	10.48					
				9.15	10.49	10.29	
Plywood Production	APKINDO /a FAO Forest Products Yearbook		9.06				
				9.25	8.78	7.7	

/a Data supplied to Bank Review Mission.

2.30. **Logged over areas.** Although no formal estimates of the area of Indonesia's forests covered by logging operations each year are available, it can be inferred from volumes being removed that something in the order of 700 000 ha per annum of forest area is covered by logging. This is similar to recent estimates of deforestation. This does not imply that logged over areas are immediately subjected to encroachment and deforestation in Indonesia. It can be argued, however, that most areas which are deforested will have been logged previously. Taking these observations together, they do imply that most areas of forest in Indonesia which have been logged over have probably been deforested fairly soon afterwards: before regeneration has matured.

2.31. If this is so, then silvicultural and other management practices applied to regenerating areas will have had little opportunity to take effect so far in Indonesia. However, this situation should not persist in Indonesia: if sustainability objectives are to be attained, then most forest presently in existence will have to be retained as forest. This means that effective management of regeneration, restriction of deforestation to only low value forest areas, and effective involvement of local populations in sustainable management will all become priority tasks from now on.

## CHAPTER III FOREST MANAGEMENT

### Introduction: Analyzing Options for Natural Forest Management

3.1. Controversy surrounds the management and use of forested land, because it is not possible to quantify the range of environmental, economic costs and benefits that apply under the various options for use. Nor, in many cases, is there agreement as to how the benefits which arise should be apportioned amongst interest groups in society.

3.2. Even when it is possible to envision reasonable consensus on areas of natural forest to be preserved for biodiversity and related purposes, the larger question of what should be done with remaining forest area remains unanswered. Answers will emerge, as better information on sites of most interest are identified, soil types and slope categories which preclude intensive use are demarcated, and the status and aspirations of communities living in or near forest areas are studied. It is likely that, as better information emerges, and as Indonesia's technical capabilities to manage and utilize forested areas more effectively grow, forest categories will alter size and location (see discussion in paras 2.12 to 2.14). However, it is unlikely that quantitative analysis will ever take a larger role in decision making in this area, than qualitative judgement.

3.3. In Indonesia, as discussed in Chapter I, there is broad acceptance of the notion that most existing natural forest cover should remain as forest, and also that an appreciable part of this permanent forest estate must be used for commercial production. Preservation of the whole resource without commercial exploitation is not regarded as an acceptable option, and some analysis introduced in this chapter will bear out this view. Nor is it likely that transfers from the global community in pursuit of preservation have potential to alter this outlook significantly in Indonesia: the losses of forest production implied (see Chapter V for an estimate of what Government revenues alone might amount to) would simply be too large. More leverage of such compensatory funding might apply under debt relief arrangements, as have occasionally been tried in pursuit of conservation of forests. Even so, it seems unlikely that Indonesian external debt could be purchased at a sufficiently low price to allow such a measure to purchase significant preservation. As will be demonstrated in some calculations in this chapter, the economics of sustainable management of Indonesia's natural forests are reasonably attractive, and sustainability generates considerable environmental benefits: it could be made more attractive by international transfers, and in such a case - typified by the carbon offset programs now being pursued elsewhere by North America power companies - the leverage of limited funding could be extended considerably further.

3.4. It is important, to recognize the limitations on standard static economic analytical techniques in this area. As is well known to natural resource economists, natural forest management which involves very long rotation periods will, because of discounting, rarely compare favorably to short rotation crops, on an "average" hectare basis, but this may have more to do with the assumptions implicit in defining the average, than with reality. The result may reveal little about how much of a given forested area should be converted for other use, (because too many uncertainties exist to allow such a result to be generalized to any significant extent), or can be converted, given reasonable limits on the investment capital required: it is clear that, with some 100 million ha of forest area remaining in Indonesia, the real choice for most of it will be continued management under forestry cover, or largely uncontrolled conversion to shifting agriculture. Relative prices change, both in response to external factors and, if large output changes are generated within the project of interest, internal factors as well; the costs and benefits of environmental factors and non-monetary services are usually not known with any precision, and are also likely to be non-linear. This will especially be the case for biodiversity: once a sufficient area of forest is reserved to protect a given species or group of species, than the margin value of additional reservations for the same purpose is very small. Further complication is added by the fact that much of the biodiversity conservation initiative is based on option value: preserving hitherto unknown species, or species of hitherto unknown importance. It is clearly impossible, under such

circumstances, to assign specific monetary values to the biodiversity assets of given forest areas. Instead, this analysis will treat biodiversity as a residual: it will show that what biodiversity values would need to be attributed to forest areas, to justify foregoing the benefits of utilization from them. The question of whether such values will be attributed and, if so, who will pay for them, must remain a matter for political and ethical judgement.

3.5. Economic analysis - particularly when extended to incorporate as many environmental and non-monetary factors as possible - can be of more assistance for deciding upon second-order questions: if natural forest management is to be practiced on the permanent forest estate, what options within this form are best? If plantation is to be done over a given area, what sort of plantation is best? This chapter of the review will therefore open with an analysis of some of these options, from an economic perspective.

3.6. In forestry - particularly natural forest management - the technical possibilities are frequently well beyond current practice, and this has strong environmental as well as economic implications. The Ministry of Forestry is strongly of the view that better utilization in the forest, and more efficient use of the resource in processing, are both possible, and vital to the future of the sector (this view is made clear in the Ministry of Forestry Action Plan (1991)). It will be suggested in this chapter that considerable efficiency gains are possible on the basis of known, implementable technology.

3.7. In the case of plantation forestry, it can also be argued that a great deal can be achieved in a technical sense, given the sites available in Indonesia. In this chapter, however, most attention is given to the policy issues involved in plantation in Indonesia. Large scale plantation in Indonesia should be, and is, of primary concern to the private sector (including, however, local communities in this instance). The argument made in this review is that the incentives created for plantation by the existing policy arrangements are sub-optimal. In particular, plantations to support the large and fast growing pulp and paper sector of Indonesia may not require the level of subsidies presently being paid to large scale private investors, and may compromise potentially regenerable natural forest areas to a greater extent than need be the case, under different policy prescriptions.

3.8. A fundamental issue which underlies the achievement of natural forest and plantation goals in Indonesia, is the role and right of communities living in, or near forests - especially those groups who are significantly affected by major forest developments. It will be suggested in this chapter that, on paper at least, such communities do have rights to participate in forest use; and that these rights have been strengthened under recent Indonesian legislation. The implications are that, in future, there will have to be improved communication and understanding between communities, the Government and the private sector, when large forest operations are at issue, if the sustainability objectives are to be achieved in practice; and that existing government initiatives to improve community participation in forest management need improvement.

### Economic Analysis of Sustainable Management Alternatives

3.9. The objective here is to compare some alternatives for natural forest management from the viewpoints of: the private investor (which involves financial analysis using the conventional measure of forest value - timber returns); the nation as a whole (which will take into account non-timber forest products, and environmental externalities); and the global community (which will include valuation of the carbon sequestering capacity of forests, since this is the one global concern which can be valued economically on the basis of reasonably accessible data). Biodiversity can only be valued on an area specific, case by case basis, and even then, valuation of many aspects is difficult. There are, therefore, no biodiversity value estimates for Indonesia's forests as a whole.

3.10. **The INFORMAN Model.** The INFORMAN (INdonesia FOrEst MANagement) model was developed to explore the conditions under which sustainable management of Indonesia's forests would be economically justified. Initially it was planned to use growth and yield data from production forests in

Indonesia. However, such data were not available. Therefore, the biological parameters of the model are based on a growth and yield study of mixed Dipterocarp forest in Malaysia.<sup>1</sup>

3.11. This particular study was selected from among similar ones primarily because it incorporates a relatively long measurement period (fourteen years) on the performance of the forest following logging (in 1974), and plausible projections in sufficient detail over a longer period (60 years).

3.12. The model consists of a spreadsheet divided into three main parts which provide information on the forest management alternatives being subjected to comparative analysis:

- (a) Simulation of forest growth and yield data through a series of harvest/regrowth cycles. This part of the model generates quantitative estimates of wood, biomass and carbon at strategic points in the cycle. It also develops estimates of commercial timber volume harvested by species and size classes.
- (b) Valuation of timber and non-timber products/services of the forest at strategic points in the harvest - regrowth cycle.
- (c) Financial and economic analyses to determine net present value of forest land from financial (Private); social (National) and global (International) perspectives, to permit comparisons of forest management alternatives.

3.13. A short description of forest management alternatives analyzed using the INFORMAN model is given in the following paragraphs. Further details of assumptions upon which the model inputs are based are included in Annex 1.

3.14. **Forest Management Alternatives.** The alternatives analyzed were based on the following forest management options:

- (a) Polycyclic versus Monocyclic Harvesting Systems. The Indonesian Selective Cutting and Planting System (TPTI) is the standard natural forest management approach in Indonesia. It is based on polycyclic harvests at intervals of 35 years and is designed for management of mixed dipterocarp forests which have an even distribution of tree sizes. It assumes that following removal of all commercial trees down to a specified diameter limit (53 cm dbh is assumed), the residual stand will contain an adequate stocking of sound, undamaged pole-sized trees (20 cm dbh and larger) which will grow into economically harvestable timber within 35 years. At least 25 of these trees is considered as a minimum residual requirement. The most obvious alternative to the polycyclic system is Monocyclic Harvesting, in which regeneration of subsequent crops comes from seedlings which must grow through a full rotation period (70 years) before logging.
- (b) Minimum Cutting Diameter Limit - Present - 53 cm vs. Market - 38 cm In the INFORMAN analysis, two monocyclic options are tested: in one, a minimum diameter limit of 53cm is used. In the second, a lower diameter limit is allowed (ie more volume can be removed in the initial logging) on the theory that smaller logs are merchantable, and there should be no need to retain them on the stand (except to the extent where shelter or shade trees are required for some period

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<sup>1</sup> The growth and yield study, in draft form, was undertaken by Mr. Yong Teng Koon, an officer of the Malaysian Forestry Department, under the auspices of a fellowship granted by the ASEAN Institute of Forest Management.



to ensure regeneration of seedlings) under a system where seedlings are being relied upon for regeneration.

- (c) Current Practice versus Improved Forest Management. For each of the three harvesting cycle alternatives, two logging and post-logging stand treatment options are examined: **current practice** - minimal planning, little or no post-harvest treatment; and **improved practice** - which combines carefully planned and executed logging at no net cost - reducing damage on the stand by 30 percent - with post-harvest protection and tending (up to year 10) at modest cost.
- (d) Low Intensity, Helicopter Logging. An additional alternative analyzed is polycyclic harvesting at relatively short, 15 year intervals, removing small volumes of high value timber with minimal damage to the residual forest relative to conventional, ground-based logging.

### Results of INFORMAN Analyses

3.15. The results of analyzing the preceding forest management alternatives are discussed in the following paragraphs. The discussion of the results is divided into two parts - firstly, the sustained timber yield implications of the various forest management alternatives; and secondly, their relative financial and economic performance.

3.16. **Sustained yield forest management.** The results of the INFORMAN analyses do not support the underlying basis of the TPTI system - that following initial logging, regrowth of the residual forest will sustain timber harvests at 35 year intervals. The analyses indicate following an initial harvest of 56 m<sup>3</sup> per ha, subsequent polycyclic harvests decline to about one-quarter of this level - probably too low to support a commercial harvesting operation. This is due to the fact that a large number of pole sized trees destined for subsequent harvest are damaged or destroyed during logging. Yong's study showed that there is no net increase in volume per ha during the first 7 years following logging, as mortality of trees damaged or disturbed by logging continues to exceed regrowth. Improved forest management raises subsequent polycyclic harvests to about one-half of the original harvest. Short-interval, polycyclic helicopter logging provides (small volume) sustainable timber harvests at about two-thirds of the original volume, due to minimal damage to the residual forest.

3.17. A monocyclic harvest at 70 years based on current practice results in sustainable timber yields of between 50 and 60 m cum per ha. Improved logging and post-logging stand treatment increases sustainable yield to 70 m cum per ha.

3.18. Discussions with a number of people with field experience in Indonesia combined with personal observations of regenerating forests in the region tend to support the INFORMAN analyses results which suggest that typical logged-over forests will take longer than 35 years to provide sustainable harvests of commercial timber. Biological and operational impediments to achieving sustained timber yields under monocyclic harvesting regimes are discussed in Annex 2 which concludes that since the basic assumptions related to the residual stand after logging are often not fulfilled, a 35 year cutting cycle is not likely not to sustain adequate volumes of commercial timber. A longer cutting cycle is believed to give a more realistic estimate of the sustained yield of Indonesia's natural forests. Since the polycyclic system makes high demands on both loggers and the forestry agencies who monitoring and controlling their operations, because of the need to maintain an adequate stock of young trees in the forest during logging, (a matter of less importance in monocyclic systems), these results offer a prima facie case for reconsideration of the present TPTI system.

3.19. **Financial and Economic Performance of Forest Management Alternatives.** The results of financial and economic analysis of forest management alternatives provide answers to many of the basic questions facing Indonesia's forest resource managers. These are discussed in the following paragraphs.

3.20. Is Management of Forest for Timber Production Financially and Economically Justified? In Table 3.1, forest management alternatives are compared on the bases of: financial returns (line 1) - from timber revenues; social returns (line 2) - timber revenue less the value of diminished non-timber forest products (NTFP) yields and erosion protection services, attributable to logging; and global returns (line 3) - timber revenue less: NTFP, erosion protection and carbon storage values diminished by logging.

3.21. As illustrated in Table 3.1, all alternatives produce positive financial returns (NPVs Year 0-70) at 10 percent discount rate. However, there are significant environmental and NTFP values lost in logging, as shown by the differences between: Financial Returns (line 1); Social Returns (line 2) and Global Returns (line 3) which take these "external" costs into account.

**Table 3.1: COMPARATIVE NPVs (US\$/Ha) OF NATURAL FOREST MANAGEMENT ALTERNATIVES FOR UNDISTURBED FOREST LAND (YEAR 0-70)**  
Indonesian Log Prices - 10% Discount Rate

Present Logging & Forest Management				Improved Logging & Forest Management			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Polycyc 35 yr 53 cm	Monocyc 70 yr 53 cm	Monocyc 70 yr 38 cm	Polycyc 35 yr 53 cm	Monocyc 70 yr 53 cm	Monocyc 70 yr 38 cm	Heli 15 yr 53 cm
(1) Fin NPV	1914	1901	2598	2143	2115	2901	668
(2) Soc NPV	1380	1371	1879	1751	1729	2296	625
(3) Glob NPV	950	946	1380	1442	1426	1911	568

3.22. The fact that NPV of undisturbed forests to be managed for timber production is **positive** in all three cases, could be taken as an indication that selective logging is economically justifiable, even from a society point of view. Production forest management provides significant financial returns. Furthermore, timber revenues are sufficient to offset the (quantifiable) negative effects of timber harvesting on non-timber forest products and environmental services. This would confirm that complete preservation of the forest so as to retain only these values would be economic only if other, as-yet-unquantified values such as biodiversity, ecotourism, etc. were high enough to reduce NPVs to zero.

3.23. The differences between the Financial NPV and the Social NPV (\$400 to \$600 per ha) can be taken as an indication of the level of compensation which private sector timber companies owe resource owners (Indonesia) for non-timber values lost in logging. The differences between Social NPV and Global NPV (\$300-\$500 per ha) is the net value of carbon lost by managing the land for timber production rather than preserving it in a natural state. This can be taken as indication of transfer payments (based on current green-house gas mitigation technologies) which the international community, or other parties seeking to offset their carbon emissions, might be willing to pay to Indonesia for forest land maintained in an undisturbed, natural state.

3.24. The figures in line 3 of Table 3.1 can be taken as a measure of the biodiversity and other unquantified assets value loss that would need to be attributed to each hectare harvested, to justify complete preservation of such forests. Since biodiversity is essentially a global value, this figure would stand as a measure of the transfers needed from the global economy to Indonesia, to compensate the resource owner for each hectare of forest withdrawn from logging. When multiplied by some substantial proportion of the half

million hectares or so subjected to logging each year in Indonesia, very large transfers would result - higher, certainly, than is likely to be forthcoming from any international source. This would be even more the case if higher standing timber fees - as are recommended in this report - are used as the basis for calculation of transfers.

3.25. Once Logged, Is Long-term Management of Residual Forest Justified ? To answer this question, INFORMAN was used to compute the NPV of timber and non-timber benefits which would accumulate on a logged-over forest during a 70 year period following logging. The effects of the initial timber harvest were excluded from the analysis in order to isolate subsequent financial and economic returns to regenerating forest under alternative forest management regimes and treatments. The results, which summarized in Table 3.2, generally support the hypothesis that long-term management of logged-over forests is justified, although this conclusion varies considerably between alternatives.

3.26. Financial NPVs at 10% (line 1) are either negligible or negative, for all cases based on conventional, ground-based logging. The fact that NPV at 10% is near zero indicates an inflation free internal rate of return of 10%. Although this would meet the Bank's criterion for an acceptable investment, it is considerably lower than Indonesian entrepreneurs are accustomed to and therefore can be taken as confirmation that private timber companies have relatively little interest in long-term forest management of logged over forests, under present conditions. It is particularly interesting to note that improved logging, combined with modest investments in improved post-harvest stand tending, produce lower financial returns (columns 4,5,6) than present practice (columns 1,2,3), indicating that, the treatments are not financially justified. Heli-logging, with short harvest cycles producing small volumes of high value timber, results in higher NPVs than conventional ground-based logging systems.

**Table 3.2: COMPARATIVE NPVs (US\$/Ha) OF NATURAL FOREST MANAGEMENT ALTERNATIVES FOR LOGGED-OVER FOREST LAND (UEAR 1 - 70)**  
Indonesian Log Prices - 10% Discount Rate

Present Logging & Forest Management				Improved Logging & Forest Management			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Polycyc 35 yr 53 cm	Monocyc 70 yr 53 cm	Monocyc 70 yr 38 cm	Polycyc 35 yr 53 cm	Monocyc 70 yr 53 cm	Monocyc 70 yr 38 cm	Heli 15 yr 53 cm
(1) Fin NPV	15	3	2	7	(20)	(19)	144
(2) Soc NPV	590	584	413	713	692	494	1108
(3) Glob NPV	622	620	456	749	733	536	1136

3.27. When viewed from the National or International viewpoint the outcome of the analysis is different. The fact that the Social (line 2) and Global (line 3) economic returns are positive for all cases indicates that additional benefits accruing from carbon accumulation, non-timber forest products yields and recovering environmental services are sufficient to justify maintaining logged-over forests.

3.28. The fact that the NPV of the "improved" alternatives (columns 4,5,6) is higher than that of their "present practice" equivalents (columns 1,2,3) strengthen the argument for improved logging and forest management, from the national and international viewpoint, since they have a significant mitigating effect on the negative impacts of logging. It can be concluded that improved logging and modest investments in post-harvest management are economically justified. The results of the preceding paragraphs also support the case

for managing forests for their combined timber and non-timber values. This subject is discussed in paras. 3.33 through 3.35.

3.29. Would Changes in Discount Rates<sup>2</sup> Effect the Long-term Financial and Economic Performance of Natural Forest Management? The financial and economic analyses of Table 3.2 were recalculated substituting a 5 percent and 20 percent discount rates for the 10 percent discount rate. The 5 percent discount rate results in positive financial returns in all cases and favours improved forest management, as illustrated in Table 3.3. The social and global returns to managing logged-over forests are approximately double those at 10 percent discount rate used in Table 3.2. As shown in Table 3.4, the 20 percent discount rate lowers NPV's, resulting in a less favorable outcome for the improved management cases.

**Table 3.3: COMPARATIVE NPVs (US\$/Ha) OF NATURAL FOREST MANAGEMENT ALTERNATIVES FOR LOGGED-OVER FOREST LAND (YEAR 1 - 70)**  
Indonesian Log Prices - 5 % Discount Rate

Present Logging & Forest Management				Improved Logging & Forest Management			
	Polycyc 35 yr 53 cm	Monocyc 70 yr 53 cm	Monocyc 70 yr 38 cm	Polycyc 35 yr 53 cm	Monocyc 70 yr 53 cm	Monocyc 70 yr 38 cm	Heli 15 yr 53 cm
Fin NPV	90	68	62	144	48	71	388
Soc NPV	1227	1262	948	1551	1507	1155	2254
Glob NPV	1270	1325	1021	1599	1577	1226	2290

3.30. Table 3.4 shows the returns to managing logged over forest at a 20 percent annual discount rate. At this rate, the private sector would not have a strong interest in managing the forest in this way. Although 20 percent is probably an overestimate of the real (inflation and exchange rate adjusted) rate of return to investment a private investor might now expect in Indonesia, it is closer to what investors have become accustomed to in the recent past, and this suggests that, without some additional inducement, private sector investors probable would not exhibit much interest in this type of investment in Indonesia. On the other hand, 20 percent is well above a social discount rate for Indonesia, and on this basis, the economic attractiveness of investment in this form of management from the global and social points of view in Indonesia can be judged a robust result.

3.31. Would Higher Log Prices<sup>3</sup> Enhance the Long-term Financial and Economic Performance of Natural Forest Management ? INFORMAN analyses from Table 3.2 were recalculated, substituting international log prices for Indonesian domestic log prices. As illustrated in Table 3.5, financial NPV's at 10 % discount rate increase in all cases although they still remain relatively small. International prices result in only modest increases in social and global NPV's which tend to strengthen the case for maintenance and improved management of logged-over forest. The positive effect of higher log prices on long-term financial

<sup>2</sup> The use of "social" discount rates, in the range of 5 %, for forestry projects has been advocated by many economists. Although the prime lending rate in Indonesia's (Rupiah) capital markets is 20 %, the Rupiah is subject to inflation and devaluation and therefore the real, (inflation free) rate is lower.

<sup>3</sup> In the region, Sabah and Sarawak sell their logs to Japan, Taiwan and South Korea, at prices of about double those in the Indonesian domestic markets. In conducting this analysis, the Indonesian price for large diameter dipterocarp logs - \$85/m<sup>3</sup> was increased to 200/m<sup>3</sup>. The price for small diameter, non-dipterocarp logs (\$50/m<sup>3</sup>) was increased to \$100/m<sup>3</sup>, etc.

and economic performance of forest management is not as great as might be expected. This is due to the fact that the portion of large sized dipterocarp logs, which command premium prices in international markets, decreases in the second and subsequent harvests - the large, old growth trees having been removed in the initial harvest. The impact of higher log prices in future harvests is also diminished by discounting.

**Table 3.4: COMPARATIVE NPVs (US\$/Ha) OF NATURAL FOREST MANAGEMENT ALTERNATIVES FOR LOGGED-OVER FOREST LAND (YEAR 1 - 70)**  
Indonesian Log Prices - 20 % Discount Rate

Present Logging & Forest Management				Improved Logging & Forest Management			
	Polycyc 35 yr 53 cm	Monocyc 70 yr 53 cm	Monocyc 70 yr 38 cm	Polycyc 35 yr 53 cm	Monocyc 70 yr 53 cm	Monocyc 70 yr 38 cm	Heli 15 yr 53 cm
Fin NPV	1	0	0	(11)	(12)	(12)	32
Soc NPV	281	280	189	331	330	230	515
Glob NPV	299	299	211	351	350	251	535

**Table 3.5: COMPARATIVE NPVs (US\$/Ha) OF NATURAL FOREST MANAGEMENT ALTERNATIVES FOR LOGGED-OVER FOREST LAND (YEAR 1 - 70)**  
International Log Prices - 10% Discount Rate

Present Logging & Forest Management				Improved Logging & Forest Management			
	Polycyc35 yr 53 cm	Monocyc 70 yr 53 cm	Monocyc 70 yr 38 cm	Polycyc 35 yr 53 cm	Monocyc 70 yr 53 cm	Monocyc 70 yr 38 cm	Heli 15 yr 53 cm
Fin NPV	61	10	10	100	(11)	(9)	469
Soc NPV	635	591	420	806	701	504	1433
Glob NPV	667	628	463	841	742	546	1461

3.32. The results of the forgoing financial and economic analyses serve to show that leaving forest land in a regenerating condition, although it produces modest financial returns from timber production, produces significant economic returns from the national and global point of view. Improved logging and post-harvest stand treatment increase financial and economic returns. The impact on the economic return being more pronounced due to increases in potential non-timber forest products yields, environmental services and the rate at which carbon is sequestered on regenerating forests. These conclusions remain valid over a range of discount rates and log prices.

3.33. The results do not suggest, in themselves, that natural forest management is always necessarily the highest and best use of all presently forested land. The limitations to this form of analysis raised in para 3.4 should be recalled here. In national aggregate terms, they can be taken to show that leaving forest land in a regenerating condition is a viable low intensity investment for the very large areas of land involved. They also show, very clearly, that when comparing natural forest management to other land uses, combining timber and non-timber values and including the gains from improved logging and other technologies, are critical elements in the analysis (although these matters are usually not considered in practice when such decisions are made). The foregoing analysis serves to show that such decisions should be made with care, (removal

of a regenerating natural forest is essentially irreversible), and in full awareness that, in this area public and private valuation of alternatives diverge considerably.

### Multiple Use Forest Management

3.34. The results of the preceding section support the case for multiple use forest management (managing forests for the optimal combination of timber and non-timber values), since the results show the value of non-wood products and services is high.

3.35. On the later subject, Panayotou and Ashton<sup>4</sup> state:

"When managed at all, tropical forests are almost always managed for timber, and other values are rarely considered. However, seldom is economic justification presented for focusing exclusively on one forest use. The concept of multiple use forestry is based on the recognition that a variety of goods and services can be produced from the same land, either serially or simultaneously and that such management can greatly increase the net value of the forest. In fact, this approach can help ensure conditions for the sustainable production of timber. This does not imply that all possible forest uses should occur in the same place at the same time. Integrated forest management involves encouraging some uses while discouraging conflicting ones....There is little doubt that as the values of non-timber goods and services of tropical forest become fully apparent, optimal management will require division of forest landscapes into blocks that will be managed to meet different objectives using a variety of silvicultural protocols."

3.36. This concept of managing forest to optimized benefits from timber and non-timber products and services is illustrated by an example in Annex 3. The example illustrates how integrated management of forests for timber and non-timber products and services results in 50 percent higher benefits (NPV @ 10%) than management exclusively for timber or NTFP and environmental services.

### The Concession System

3.37. Large scale timber harvesting began in Indonesia, in the late 1960s. Most of the early operations were joint ventures involving both domestic and foreign firms. From the start, cutting rights to forest areas were allocated to the private sector under the natural forest concession system, which apportions a specific area of forest to a concessionaire, for operation over the fixed period (currently 20 years in Indonesia) under an agreement drawn up with Government.

3.38. Initially, the bulk of concessions were awarded to foreign companies, but these have now been replaced by locally owned entities. Most concessions are now owned by (or at least have strong corporate linkages to) wood processing companies (primarily plywood manufacturers): this is the result of deliberate policy decisions by Government, to bring most of the resource under operation by processors who will presumably have an interest in long term usage of the resource. This situation has also probably led to increased concentration in the sector: although around 580 concessions exist in Indonesia, more than 30% of the resource area is under effective control of 20 companies; and in fact it appears that five or six corporate groups dominate the sector. This situation suggests that, if major changes in forest resource policy are to be implemented in Indonesia, these groups will need to be recruited as major agents of such change. It seem unlikely that change will, in the Indonesian case, extend to replacement of the concession system in toto - with, for example, an auction system for sale of logs, or timber rights, or a contract logging system administered by Government but selling into private log markets.

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<sup>4</sup> Panayotou and Ashton 1993 Not by Timber Alone in Economics and Ecology for Sustaining Tropical Forests, Island Press, Washington, D.C.

3.39. As was argued in paras 1.32 to 1.36 above, a primary objective for Indonesia's forestry sector must be the encouragement of an efficient log market; it was suggested there that use of auctioning or other competitive bidding systems for new timber rights, or rights over concessions which have expired or been withdrawn, would improve the operation of the log market. Such systems should only be considered, however, where there is prospect of a genuinely competitive outcome. In Indonesia at present, there is a high degree of concentration in the extractive sector, and strong vertical integration with the processing sector: a deliberate result of previous policy in awarding concessions. Considerable regional monopsony or oligopsony is therefore present, and in such cases measures to administratively adjust fees for standing timber toward those which would prevail at international parity log prices and competitive conditions, would be more effective in the short term in transforming the log market.

3.40. It has not been possible to obtain precise data on the status of concession leases in Indonesia, but it is known that many concessions are currently approaching the end of their current twenty year lease periods: a large part of the forest resource will be coming up for consideration of renewal of concession licenses over the next several years, and this will be both a burden, and an opportunity, for both the private sector and GOI agencies responsible for forestry: It will be a burden in the sense that new concession agreements are time consuming and expensive for both concessionaires and forestry agencies to prepare; it will represent an opportunity in the sense that new information on the resource, and new policy objectives for its use, can be more easily incorporated into future agreements, than superimposed on current ones.

3.41. Logging operations are carried out under three basic mechanisms in Indonesia:

- Contract logging: the concessionaire provides equipment and routine spares, and a contractor engages labor, and provides some spares and repair facilities;
- Logging on a royalty basis: the concessionaire assigns the rights to a contractor, who provides all inputs.
- Owner operations: the concessionaire directly controls the logging operation, and employs labor (usually on a bonus incentive system).

3.42. It is not possible to comment directly on the efficiency of these different systems in the field in Indonesia: no assessment has been made. In principle, however, it would seem preferable for a concessionaire to be directly responsible for his logging operations: in other countries where contract logging is prevalent, the situation frequently arises where competition for such contracts becomes so intense that the winning operator can be forced to operate on very narrow profit margins with little to spare for innovations, or improvement of standards: the result - particularly when a government is interested in introducing new operational procedures such as more careful logging - can be highly unsatisfactory. In general terms, the Ministry of Forestry prefers concessionaires to be in direct control of their logging operations.

#### Potential Improvement of Natural Forest Wood Availability

3.43. The Ministry of Forestry is strongly of the view that better utilization in the forest, and more efficient and effective use of the resource in processing, are both essential to GOI's strategy for sustainable forest use in Indonesia (MoFr Action Plan (1991)). This view is borne out by the resource data reviewed in Chapter II: clearly, some downward revision of sustainable forest output is inevitable in Indonesia, unless improved utilization and regeneration are implemented.

3.44. At present, most estimates of future wood availability in Indonesia are based on an overall regeneration estimate of commercial volume of about 1 cum per hectare of production forest per annum. It is known that increment varies significantly across different sites, and the growth and yield data supporting this overall figure are by no means comprehensive.

3.45. These are matters for research and inventory concern, but they also serve to emphasize the importance of improving both the growth yield of the natural forests, and the ability of logging and processing operations to utilize standing volume more effectively.

3.46. The FAO forestry studies<sup>5</sup> estimate that current logging operations leave unutilized in the forest volumes of 23 million cum p.a. (of which 8 million cum p.a. is estimated to be sawlog or plylog quality). Moreover, the report claims that damage to trees left standing in the selective logging operations amounts to a further 13 million cum p.a. Jaakko Poyry consultants, in a forthcoming study of forest products trade in South East Asia (see op cit on pg. 56), estimate that, with proper management and control of logging operations, and some relatively minor inputs from there on into post-logging silviculture, regeneration on natural forest areas might grow at 2.0 - 2.5 cum/ha/annum, as opposed to the 1.0 cum currently assumed. In the analysis of management alternatives shown in paras 3.13 to 3.33 of this review, it was suggested that improved logging obtainable at virtually no additional cost could alone raise the level of regeneration after logging by around 30% in Indonesia.

3.47. The conclusion is that substantial wood availability increases would be possible from the natural forests in Indonesia, through application of known technologies for improvement of logging, and realistic improvement in utilization of standing volumes. Given the doubts about the current condition of the resource raised in chapter II, and the continuing dependence of Indonesia on forestry production, the payoff to investment in improved management and utilization will be high.

3.48. Two mechanisms by which such improvements might be pursued -- raising the value of standing timber (the economic rent argument); and altering basic silviculture for regenerating stands - are controversial in Indonesia and are taken up in chapter V, and paras 3.60 to 3.73 respectively, below. The third mechanism, improving operations through better monitoring and enforcement of existing prescriptions, is less contentious in principle, but raises many difficult questions in implementation:

#### Improving Management of Forest Operations

3.49. The Ministry of Forestry has extensive research, development and pilot programs on all aspects of forest management in progress, both in its own right, and jointly with virtually all international development assistance agencies which have any involvement with the forestry sector. It would require a major report simply to summarize objectives and findings from these projects, and this cannot be attempted here.

3.50. Instead, this review will attempt to: present an overview of what the current major issues and problems in natural forest management in Indonesia are; identify whether the solutions are technical, policy based or institutional in nature; and present some options which might be applied.

3.51. Before entering upon this exercise, in the interests of balance and perspective it should be made clear that considerable improvements have been and are being made in the administration and management of field forestry operations in Indonesia. In the area of enforcement, in recent years the Ministry of Forestry has increased the costs of non-compliance with concession obligations significantly. The present procedure is that, if breaches of conditions are identified, a concessionaire is given a warning, which is repeated once. If reglignce continues, the allowable cut for the concession is reduced by 40%. If this does not remedy the situation, the concession license is canceled. According to the Ministry, up to June 1992, \$20.5 million in fines had been imposed (although not all seem to have been collected), and 29 concessionaire licenses had been revoked. Although, as will be argued in this review, the means and the motivation to implement enforcement procedures are more limited than they should be, the fact remains the penalties are there, and

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<sup>5</sup> Food and Agriculture Organization, 1988-91, (various volumes) UTF/INS/065/INS: Forestry Studies.



several well-publicized applications in recent years will have had some impact on concessionaires' awareness of their responsibilities.

3.52. As noted above, the Ministry is also encouraging considerable field experimentation in new systems of forest management, and most major donor agencies involved in the forestry sector in Indonesia are participating in this. The Bank is currently supporting, under its Second Forestry Institutions and Conservation Project (FICP II) with GOI, a major concession management component. Under this project, improved procedures for forest management, log movement management and tracking, and revenue collection, will be implemented in three forestry regions. At the time of writing of this review, a detailed proposal for an improved system, jointly prepared by consultants and the Directorate General of Forest Utilization in the Ministry of Forestry had been presented to GOI, and, by and large, the principles of that proposal had been accepted by the Ministry. The identification of problems in field management, and proposals to improve matters given below, draws heavily on this proposal, with some additions or variations based on the Bank's sector review mission findings, and information or analyses obtained from other sources in Indonesia.

3.53. **The private sector.** There is the somewhat unusual situation in Indonesia whereby the private sector, in the form of the Plywood Manufacturers Associates (APKINDO), has a major role in deciding upon issue of export licenses for plywood. This is potentially a powerful instrument for improving responsibility in the logging sector. The private sector has the resources to collect information and monitor field operations in its own right, and, provided it has, at industry association level, a strong commitment to long term use of the natural forest resource, its ability to exact censure on recalcitrant field operations through export license cancellation, is significant. It has even been suggested that the private sector could effectively manage the production forests of Indonesia (see Box 3.2), and while a decision to do so would require very careful consideration, the considerable capacity of the private sector to positively engage in the regulatory process should not be ignored.

3.54. **The regulatory base.** A very extensive body of law and regulation exists to cover natural forest operations in Indonesia. Following issue of the Basic Forestry Law in 1967, and Presidential Decree No. 20 outlining the policy for granting of concessions, there have been more than 20 major decrees from the Ministry of Forestry on issues dealing with the many aspects of renewal, planning and operations of forest concessions; with additional decrees and regulations relating to forest land use from other Ministries, with at least a further 15 decrees and laws (including Presidential Decree No. 32 on protected forest management; and GOI law No. 5 on natural resource conservation) dealing with forest silviculture, conservation, environment and social issues.

3.55. Obviously, with such a large body of regulation in place, it is impossible to summarize its overall direction or intent - indeed, it is by no means a simple matter even to accumulate and absorb the full measure of this material. There are significant numbers of Ministry of Forestry staff at the central level involved in many aspects of preparation and promulgation of regulations and, presumably, a significant investment of the time of officers at the Kanwil and Dinas level of operation is made in interpreting such regulations. At some point, in any administrative system, the burden of regulation becomes overwhelming: individuals responsible for field implementation of policy either become engrossed in acquiring knowledge of and interpreting regulations, or resort to selective application of what they know: a form of behavior which is usually accompanied by a strong tendency to pass responsibility for as much decision-making as possible to higher level officers, so as to avoid the risk of misapplication of regulation, or of making decisions without sufficient knowledge of what is intended under current regulation applying to the area in question.

3.56. There is evidence, of an *ad hoc* and anecdotal nature, that this point may have been reached in the administration of forest policy in Indonesia. This situation is complicated by the uncertainties that arise from the division of responsibilities between Kanwil, Dinas and lower levels of administration in the field: for example, there appears to be no clear allocation of all policy and regulatory development and promulgation to Kanwil, and field operation responsibility to Dinas - or some other such division of functions. The result

**Box 3.2: ONE VIEW OF THE ROLE OF THE PRIVATE SECTOR  
IN INDONESIA'S FORESTRY MANAGEMENT**

"A total of 143 million hectares of forest area, or 74 percent of Indonesia's total land area, is under the jurisdiction of the Ministry of Forestry. This is an enormous area to survey and administer. One solution to lighten the government's burden would be to turn the administration of the production forest areas over to the people who would benefit most: the timber companies.

Two decades ago, such a proposal would have been unthinkable. But as timber products develop into Indonesia's second largest export, and with scores of multi-million dollar plywood factories and pulp mills on the books, the bottom line on the balance sheet is clear. The very forest leaseholds we are harvesting today must be harvested again in 35 years to ensure a constant supply of raw materials. The continued profitability of Indonesia's timber companies is now directly dependent on the continued viability of our rainforests.

The private sector can complement the government's efforts-and in Indonesia it has done so-in at least six areas:

**1. Forest Administration and Maintenance.** The timber companies through their associations are willing and able to assume many of the forest maintenance and administrative functions which are currently the responsibility of the government. At least the 64 million hectares designated as commercial production forest could be managed by the private sector.

**2. National Forestry Inventory.** One important function would be to survey the 64 million hectares of Indonesia's production forests. Much of this vast expanse of rainforest remains uncharted. The private sector has through the Association of Forest Concessionaires sponsored nationwide aerial photography surveys, satellite image processing, and ground verification to determine the precise area of forested land and species distribution. With this comprehensive data base, in the form of aerial photomaps, supplemented with uncontrolled mosaic maps, contour and vegetation interpretation, the government will be in a better position to update and refine the general policy regarding the archipelago's forests.

**3. Research.** The forest industry can sponsor much of the basic forestry research itself, as this will translate into profit somewhere down the line. In Indonesia, the research efforts of timber industry are coordinated by the Indonesian Forestry Community to increase efficiency and eliminate expensive duplication of effort. The Indonesian Forestry Community is also instrumental in cementing research cooperation with foreign institutions and agencies. Research programs being implemented include investigation of lesser-known species, increasing yields through effective forest management, improving log transport to reduce wastage, propagation of dipterocarps, commercial production of micorrhiza, and determining the right species for certain timber estates areas.

**4. Human Resources Development.** Private industry can play a role by setting up in-house training programs, technical studies institutes, and scholarship programs for overseas study. The Indonesia Forestry Community provides scholarships to forestry students at several national universities: this is combined with on-the-job training for final-year students to familiarize them with their future employment.

**5. Timber Estates Transmigration.** The Indonesian transmigration program is designed to shift farmers from overcrowded Java to the relatively underpopulated outer islands like Kalimantan. This is a massive and expensive undertaking. The private sector's timber estate development programs take some of this burden off the government. The timber companies build accommodations and other community facilities for arriving transmigrants, who then work on the timber estates for a specified period. Their families are given a piece of land to work on. An additional one hectare is planted by the timber company with rubber trees. While the latex is for the transmigrant, the harvested rubber logs are for the company.

**6. Public Information.** To keep the environmental issue concerning the tropical forest in perspective, public information activities are necessary. Although the government determines how Indonesia's rainforests are used, the Indonesian Forestry Community feels obliged to provide the right information and to explain and justify the government's rainforest policies to the world community. This is one area where the private sector has assumed the public education role.

The potential wealth locked in our tropical rainforests is immense, so are the difficulties in releasing those riches in a sustainable manner. Only through cooperation between the government, private industry and the scientific community, can the rainforest help support the nation's development effort." Mohammad Hasan, Chairman, APKINDO.

is that responsibility and accountability for some important functions are not clearly allocated, but are diffused among different agencies. There may be some agency funding implications involved here: indications were given to the Bank sector review mission suggesting that Dinas offices, while appearing to be fully staffed, do not have the means to train and fully mobilize staff. Since it is the Dinas offices which have primary responsibility for field implementation of compliance, the implications of this (if true) are serious.

3.57. Although there is general awareness of this problem throughout the various agencies involved, there appears as yet to be no real consensus, at an operational level, as to location of specific responsibilities and accountability. It may be that, before such an allocation (and whatever human resource restructuring is implied by it) can be made, some attempt to simplify regulations - or at least to codify a central core of priority regulations to be applied vigorously - will need to be made.

3.58. **Forest Management and Planning Issues.** The issues of current importance in forest management and planning are:

- The data bases for planning are weak: although inventories and cruising are called for at various stages of the management planning process, implementation of this requirement at field level is poor: the FICP II concession management draft proposal cites a comparison of results from: 5 year working block inventories; 100% cruise of annual working blocks; and residual stand inventories; for common sites on several concessions, which clearly indicates that the data compiled are in each case extremely unreliable. This weakness also applies to estimates of nucleus trees on regenerating stands, leading to uncertainty about the level of stocking available for subsequent cutting cycles.
- The use of square working compartments, instead of boundaries defined by natural features, makes control difficult. This is exacerbated by the lack of adequate information on what might realistically be expected in the way of increment from logged over stands, thus further compromising calculation of annual allowable cut. Further, the problem noted in para 2.10 above, that TGHK maps do not include identification of environmentally sensitive areas, is relevant here.
- Problems of incentives and motivation of concessionaires to manage operations according to genuinely sustainable criteria are exacerbated by insecurity of the concession land base (this matter arose in the discussion of the KPHP option in paras 2.15 to 2.17) - including the lack of guarantee that any part of the concession will be available to the incumbent concessionaire at the time of the subsequent logging cycle. It is not possible to estimate with any accuracy the extent to which concessionaires currently comply with their agreements, but some survey work on this matter by the Ministry of Forestry suggests that in fact a majority do not.

3.59. Although precise data cannot be obtained, some post-logging surveys indicate that damage and mortality to residual growing stock is in the order of 35% - 50%. On hilly sites (where much logging now occurs) as much as 50% of area is seriously disturbed, and only 20% remains undisturbed.

3.60. **Silviculture.** In theory, updating of original decrees on management and silviculture now provide for three possibilities for silvicultural management of natural production forest areas in Indonesia:

- (i) The Indonesian Selective Cutting and Planting System.
- (ii) Clear felling with natural regeneration.
- (iii) Clear felling with replanting.

3.61. In practice, only the Indonesian Selective Cutting and Planting System is applied widely. This system, now known as the TPTI (Tebang Pilih Tanam Indonesia), which replaced an earlier system (the TPI) in 1989, is based on the assumption that a residual stand after logging will contain an adequate stocking of sound, commercial species trees of 20 cm diameter at breast height (dbh) or more, which will grow into economically harvestable timber in 35 years from the original logging date. The TPTI system prescribes: logging down to a prescribed sized limit (50 cm dbh in Indonesia at present); liberation thinning to release nucleus trees for re-seeding) and commercially valuable regeneration; inventory of residual stands; plantation of seedlings to enrich the stand if necessary; and subsequent tending and liberation thinning.

3.62. A great deal has been written, at operational, research and academic levels, about the selective logging approach designed to produce harvestable regeneration in 35 years or so, from sapling and pole sized material left on the residual stand.

3.63. Academic or research results which contend the basic assumptions of the selective logging system usually question the vigor, or even the existence, of the growing stock which is supposed to become mature in 35 years. Dr. Sutisna of Mulawarman University in Samarinda has suggested that in Indonesia (specifically Kalimantan, where his research has been located) it is not always the case that the 25 nucleus trees of commercial species per hectare which are to form the basis of the harvest in 35 years time are available, or, if available, will necessarily survive: many have small crowns (because of their previously sub-dominant position on the stand), and are thin and susceptible to breakage. Field observations and discussions held by the sector review mission indicated that in some cases there would not be sufficient effective regeneration of sufficient size on selectively logged stands to guarantee a crop in 35 years, even if logging were carried out carefully (see Annex 2).

3.64. Putz and Ashton<sup>6</sup> argue that it is almost never the case that a single silvicultural system can sensibly be mandated for a resource as broad and diverse as a tropical moist forest. They caution that the selective logging or polycyclic system will only succeed with intensive and skilled operational control and management, and only then in suitable stands. In some stands, they suggest:

".. the intermediate size classes are composed almost entirely of species that do not provide commercial timber. Harvesting stands poorly stocked with advanced residuals is tantamount to high-grading, results in stand deterioration (from a silvicultural perspective) and should be avoided."

3.65. At an operational level, reservations about the TPTI system per se center on the complexity of the system: especially, the difficulty inherent in controlling logging operations sufficiently closely to minimize damage to small trees which are to be the next 35 year crop. Observation in the field suggests that in practice, most logging operation damage residual stands to the extent where 35-50% of trees die (eventually): mortality is higher than this on hilly sites (where much current logging is taking place).

3.66. Another major drawback of the system is that it increases the temptation to re-log a regenerating stand prematurely: incomplete initial operations, or changes in acceptability of species or size limits, may justify early re-entry on commercial grounds, albeit that these are illegal, and are highly destructive of the residual stand.

3.67. Both of the above problems emphasize the fact that the TPTI system - inclusive of the follow-up monitoring requirement it imposes - is highly demanding of both concessionaire and forest agency human resources, and yet it is these resources which are currently in shortest supply.

3.68. There are some more implementational problems relating to the TPTI which would be overcome with changes in procedure:

- (i) Application of liberation thinning more or less automatically one year after logging should be replaced with a more flexible approach, determined by when weed infestation and seeding actually occurs on individual sites;
- (ii) Current requirements for inventory of the residual stand (to determine enrichment planting needs) are extremely time and resource consuming. This means that in practice few concessionaires carry out this work properly. Dinas and Kanwil resources in the field to inspect

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<sup>6</sup> Putz F.E and M.S. Ashton, 1992, The Ecology and Silviculture of a Mixed Dipterocarp Forest in South-east Asia. Unpublished paper commissioned by World Bank and the International Tropical Timber Organization.

and check such inventory are limited. It would seem that some less resource intensive inventory or sampling procedure will have to be applied.

3.69. If in fact the TPTI system is in general not leading to regenerating stands in good condition for re-logging in 35 years, then this - combined with doubts raised in Chapter II about the status of the remaining forest resource in Indonesia - raises serious likelihood of a shortfall, or resource gap, emerging at some point, unless production levels are reduced, so that supply can be spread over a longer period.

3.70. One way to achieve this would be to move to a 60 or 70 year regeneration cycle, based on seedling regeneration, rather than reliance on small trees. A variant of this is the shelterwood system, which prescribes establishment of a new, even-aged seedling based crop, under a phased removal of the old stand - the final phase being removal of the shelter trees needed to provide the seed and shelter for the new crop. Of this system, Putz and Ashton (op cit, see pg.39) state:

"Apart from being compatible with the natural regeneration processes of canopy tree species that are relatively light-remanding, shelterwoods can be more economically cost effective than selection methods. Several entries into the stand to extract commercial timbers are done over a relatively short period at the end of the rotation. If harvesting is controlled, there is little damage to the growth and development of the new stand, and costs are less over the long term for the administration and set-up of a timber harvesting infrastructure."

3.71. The Ministry of Forestry has acknowledged that such a monocyclic prescription may be feasible for Indonesia. The ITFAP (op cit, on pg. 7) document calculated (on the basis of then current assumptions on growing stock) that a move to the longer cutting cycle would move the sustainable annual cut from 38 million cum pa, to 31 million cum pa - and the latter figure is the one adopted as the current sustainable cut in the ITFAP document. In that document, the Ministry of Forestry states:

"There is a strong view that a 35 year cycle may be only about half the length of time required to support a sustainable harvest in the long term ..... Taking these views into consideration, TPTI will be continuously monitored and evaluated for its effectiveness in achieving sustainable management". (ITFAP page 55)

3.72. As shown in Table 3.1 and surrounding discussion, even at the higher 53 cm minimum diameter felling limit, the monocyclic alternative is comparable economically to the polycyclic system. Since a monocyclic system is based on seedling based regeneration, no silviculturally based girth limit on logs taken at the first harvest is necessary: the only limit on what is taken from the forest is what can be marketed. So, it can safely be assumed that, these days, logs of commercial species down to 35 cm dbh can be marketed. This, combined with improved logging utilization, will lead to a reduction of only about 8% of volume overall from the current resource under the monocyclic system, compared to allowable cut under the polycyclic system. One immediate management benefit from such a change would be that areas needed under logging at any given time would be greatly reduced (since per area volume off-takes will rise greatly) - thus reducing working areas to be inspected and controlled.

3.73. In addition to the obvious issue of managing the TPTI system, and the risks of insufficient regeneration to allow logging 35 years after the initial cut, there are the larger economic and environmental issues involved in this question: the impact of national and global environmental concerns on the calculations. These were dealt with in paras 3.16 to 3.27 and on those grounds also, the monocyclic system, with reduced minimum felling size appears to have some advantages. Further discussion is included in Annex 2.

3.74. **Log management.** The systems which monitor and control log production and revenue calculation and collection are as vital to the sustainability of the forest resource, as are field management and silviculture issues. Already, in paras 2.27 to 2.29, the issue of illegal removals has been raised: clearly,

unrecorded and uncontrolled extraction at this level has serious implications for the condition of the resource. Equally important to sustainability is that the proper value be assigned to logs - a matter not only of overall economic rent recovery (see Chapter V) but also of the means by which logs are scaled, graded, classified, and their movements documented.

3.75. Some of the major issues which emerge for log management are:

- The responsibility for payment of royalty and reforestation charges depend on whether the concessionaire is integrated with a processing plant: if so, the plant pays, if not, the concession pays. Charges are assessed at two locations. This system appears to create unnecessary complexity.
- Although control systems are in place, significant illegal log traffic takes place. Because in some cases log charges are not levied until material reaches a designated mill there is opportunity for leakage of volume to illegal processors before that point. A comprehensive system of log records and management reports exists and should minimize this, but reports are not always submitted on time in practice, and an integrating data base to allow a consistent data set from one office and location to another does not exist.
- Since July 1992, industry has had the responsibility to "self-assess" - concessionaires and converting mills provide a monthly report to the sub-district forestry office, showing volumes shipped, and fees paid into bank accounts. Justification given for this somewhat unusual system is that it minimizes contact and opportunities for collusion between forestry officials and industry: officials inspect and check invoices, but do not compile them. Some early field indications apparently suggest that overall revenues have in fact risen somewhat since introduction of the system, and it should perhaps be monitored for a longer period before judgement on its effectiveness is made. In the long run, it will place a heavy onus on GOI to reconcile any discrepancies which emerge, and prima facie, seems no less open to abuse than the previous system.
- It is in the area of log control and management where most opportunity for malfeasance arises. The officers most directly responsible for checking log measurement and revenue calculation are relatively junior, poorly paid (and with inadequate travel and other allowances), and (often) ill - equipped in terms of training and means of transport to perform their function. Relatively little cross-checking of initial records appears to be done, although the procedures and mandates exist for this to happen. Staff of the Inspector General of the Ministry of Forestry perform audits of Dinas, Kanwil and Ministry operations, but this procedure seems mainly confined to audit of expenditure, rather than of field performance of log management and movement monitoring procedures.

3.76. A great many suggested changes in the detail of how log management is done in Indonesia are put forward in the proposals presently being considered for implementation under FICP II, and an opportunity to refine these will exist in the three Province field implementation of the proposals. One overriding issue which will clearly emerge is that of inspection. There is little doubt that, with the refinements and changes proposed, the existing system of inspection at Dinas and sub-Dinas level could work. It is equally evident, however, that this will require implementation of very strong policy imperatives for reform of the system. It may be that, to bridge the period between the presently poorly functioning system, and field implementation of the new system, a centrally based and powerfully mandated inspection service may be required: one capable of random inspection of all aspects of forest and log management, with access to sanctions on concessionaires and performance of Kanwil and Dinas officers as well. Initially, such a system should concentrate upon certification of sustainability criteria (see paras 6.67 to 6.73 below), with a strong advisory role insofar as correction of procedures and performance is concerned. Ultimately, however, one of its purposes should be

to apply disincentives for inappropriate behavior, in addition to providing certification for operators who are in compliance with guidelines.

### The Plantation Sector and the HTI Scheme

3.77. Government plays a strong role in the plantation sector, and this role is financed under the Reforestation Fund (Dana Reboisasi). This fund is formed by a fixed levy of \$15.00/m<sup>3</sup> (raised from \$10.00/m<sup>3</sup> in early 1993) for ply and sawlogs, and \$1.50/m<sup>3</sup> for pulpwood material. No precise estimate of the current size of the Fund is available: some \$900 million appears to be in the Fund now; some \$125 million has been allocated so far to companies, in equity or loans. Under the terms of Presidential Decree 29/1990, the fund may be used to finance:

- reforestation outside concession areas (known as the Regreening Program);
- plantation establishment on unproductive forest lands (the HTI program);
- rehabilitation of land (the Critical Watersheds Program).

3.78. **The HTI program.** Of most direct policy interest in this review is the HTI scheme: the means by which Government finances private sector planting in Indonesia. In REPELITA IV (1984/85 - 1988/89), the Government introduced the HTI scheme, to encourage the establishment of a large, private sector based industrial forest estate. The Scheme has the stated objective of utilization for plantation forest land in the outer islands no longer capable of carrying commercially sustainable natural forest.

3.79. Official targets for the HTI in the 1989-1994 (REPELITA V) period sum to 1.5m ha. Figures released by the Ministry of Forestry reveal that some 574 000 ha had actually been established under the scheme, by June 1992.

3.80. According to the ITFAP (op cit, on pg. 7) document, the Government intends to have 2.3m ha of plantation established under the HTI scheme by 2000 AD, and 10.5m ha by 2030 AD. The latter figure tallies with the current estimate given (see para 2.4) of logged over forest in Indonesia although only half of this is said to be in a heavily logged over state. The ITFAP document notes that the intention of Government is to have some 60% of total planted area under longer rotation timber species by 2000 AD, and 80% by 2030 AD. To date, however, the bulk of investment has gone into short rotation pulpwood species. So far, some 33 pulpwood HTIs, each of 300,000 ha have been identified. Although a pulpwood concession over 300 000 ha is issued, the intention is to plant only some 60 - 80,000 ha of this area. The remainder of the area is to be logged (usually this is re-logging, since the areas concerned are logged - over sites) for pulpwood, to supply the designated mill operation until the pulpwood supply from plantations comes on stream. The subsequent status of this hinterland area, and what is to be done with it, is unclear. It appears that most of the decision as to where plantation will be located in the HTI concession is left to the concession holder to make. These questions do not seem to arise for sawlog HTIs, which are issued for 60,000 ha blocks, all of which is intended to be planted.

3.81. Prior to 1989, the HTI scheme required natural forest concession holders to implement plantation activity on behalf of the Government, as part of the concession agreement. This approach failed: only small areas of plantation were established, and stand quality was low.

3.82. In 1989, a new approach was introduced, whereby a land use right, in the form of a HTI concession is granted, with an undertaking that the developer will have the rights to the wood produced. The length of the concession granted is 35 years plus the time taken for one rotation of whatever species are planted: this tenure is at variance with the more limited time frame of natural forest concession, of 20 years. Official policy designates that forest areas of low productivity (generally interpreted as less than 20 cum standing volume per hectare) are to be used. A concession over such an area is issued by the Ministry of Forestry, on the recommendation of the Provincial Governor and following submission of an application and

a satisfactory feasibility study (including trial plantings). A HTI concession does not transfer ownership of the land, is not transferable (except under specific approval of the Minister) and cannot be used as collateral.

3.83. In 1992 the Government introduced a variant of the scheme: the HTI - Transmigration scheme. This allows a clear-felling license over 3000 - 15,000 ha on a HPH site, provided that 10% of the area is reserved for transmigration purposes. The joint venturing and other arrangements are more or less as defined in the regular HTI. Some 630 000 ha of land has been allocated under this scheme, as of October 1992.

3.84. There is as yet no umbrella organization representing HTI holders, although most are associated with the Concession Holders Association (APHI), and many also with APKINDO (the Wood Panel Association) and/or ISA (the Sawmiller's Association).

### The Economics of the HTI Scheme

3.85. Two major questions arise out of current practices in the HTI scheme in Indonesia:

- (i) Is subsidization necessary to create large private sector pulpwood resources in Indonesia?
- (ii) What are the options for use of HTI hinterland - ie those areas currently included under HTI pulpwood concessions which will not be planted, but will - after logging for pulpwood - also be in relatively poor condition so far as prospects for natural regeneration are concerned?

3.86. **Financing the HTI.** The package offered under the HTI scheme, to qualified private investors, is a joint venture with Government, financed as follows:

- Government finances and takes equity of 14% (held by one of the state owned forestry companies (INHUTANI));
- The investor provides 21% of direct equity;
- An interest free loan to the investor of 32.5% of the cost of the project is provided;
- A commercial loan to the investor of 32.5% of project cost is underwritten by Government.

3.87. Cooperatives in Indonesia are eligible to apply for HTI loans. The Inhutanis which take equity on behalf of GOI are able to finance that equity from interest free loans from the DR fund.

3.88. At current high real market interest rates in Indonesia, the subsidies provided for under the HTI are generous. Recipients are entitled to 60% equity in the plantations established. With some manipulation of costs below threshold levels, it would be possible for investors to finance their equity at relatively little cost.

3.89. **The economics of Pulpwood Supply.** A review of the economics of plantation in Indonesia given in the FAO Studies (1991) indicates that on average, pulpwood regimes in Indonesia can be expected to generate real returns in the order of 15% p.a.; while longer rotation sawlog/plylog regimes are expected to generate returns in the order of 10% per annum, provided intermediate thinnings can be sold as pulpwood. The pulpwood returns are borne out by the NPV calculations discussed in paras 3.93 to 3.97. However, it appears from these calculations that sawlog/plylog plantation produce returns superior to the FAO estimates. A return of 15% p.a. would in most circumstances be regarded in Indonesia as unacceptably low - especially in a relatively new venture with some risk attached. This rate is based on at-mill pulpwood prices in the order of \$16-\$20 per cum, and the question arises whether these are realistic.



3.90. Pulpwood plantations in Indonesia are a small proportion (around 10 -15%) of investments in the pulp and paper sector as a whole. This means that the economics of pulpwood planting will be heavily dependent on the economics of the manufacturing investment. Hone<sup>7</sup> has noted that:

"A combination of 15 percent lower prices for market pulp and weak demand giving only 85-90 percent capacity working would reduce a mill's internal rate of return by 4-5 percent, and severely impact on financial viability, even if very low wood costs were achieved." (emphasis added).

3.91. Hone cites a calculation which shows that a 10 percent escalation in mill capital costs, or a 10 percent fall in receipts per ton of pulp each reduce the internal rate of return by approximately 1 percent. On the otherhand, a \$5/cum rise in the delivered cost of pulpwood to a pulpmill (and, from the viewpoint of the growing sector this would be a substantial rise) would reduce its overall rate of return by only 0.1 - 0.15 percent. This raises the question of pulpwood exports, as a possibility. It would seem, at the delivered pulpwood cost estimates current in Indonesia, that some of the material could be sold to export - probably (although not necessarily) from additional chipping capacity which could be established at pulp and paper mill sites, so as to take advantage of existing handling and sea transport infrastructure. Presumably, existing Indonesia log export tax policy would preclude such a development, but it would be relatively simple to make an exception for pulpwood or chipped material, thus giving both plantation investors and pulp manufacturers expanded options.

3.92. Provided that the pulp and paper sector is economically viable and efficient at the size projected, then the mills constructed should be capable of paying prices for pulpwood sufficient to allow well-located and efficient plantation of pulpwood to generate reasonable returns. Some figures cited in Chapter IV (see para 4.88) suggest that Indonesian world scale mills being planned will be highly competitive internationally, and should be capable of paying unsubsidised costs for their pulpwood. While there may initially have been some justification for subsidization of pulpwood plantations to attract investors into the sector - largely on the basis of underwriting the risk of this relatively new venture - investment in major paper-making capacity in Indonesia would now seem sufficiently advanced<sup>8</sup> for such subsidies to be neither necessary nor particularly effective. Where relatively good sites, chosen by investors themselves, are under consideration, it may be that all Government needs to offer large pulp and paper sector investors is security of tenure over sites - either for their own development, or allocation to other groups under some form of guaranteed supply arrangement.

3.93. Plantation options for the HTI hinterland. The question of what should be done with the large areas surrounding pulpwood plantations on HTI concessions is a complex one: there will be a range of sites involved, from effectively recovering natural forest to completely open areas. The following analysis is intended to show differences between different plantation options on open sites, and then to show the implications of planting over areas that may be recovering to naturally forested condition.

3.94. As in the case of the natural forest management options examined earlier, outcomes are analyzed here from the private, national and global viewpoints. Three generic possibilities are examined (again, the details of assumptions and data used to formulate these are given in Annex 1):

- (i) pulpwood plantations of fast-growing species on an 8 year rotation;

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<sup>7</sup> A. Hone, 1992, unpublished working paper.

<sup>8</sup> Four or five large pulpmill projects have already reached site preparation stage in Indonesia. Six or seven world scale mills could well be built by 2010 AD.

- (ii) utility sawlog plantation of fast growing exotic species on a 10 year rotation:
- (iii) integrated plantation of native Dipterocarp species under fast growing exotic shade trees; shade tree harvest at 8 years, and Dipterocarp harvest at 25 years.

3.95. The results of the financial assessment of industrial forest plantations are presented in Table 3.6. The estimated financial returns to the various types of forest plantations are quite favorable, generating NPVs of from approximately \$500 to \$1900 per hectare. High returns to short rotation sawlog plantations arise because sawlogs are worth \$25 to \$40 per cum, compared to \$20 - \$25 per cum for pulplogs - but cost only about the same to grow: profits are thus much higher. Even if the sawlog rotation length is extended to 15 years, the financial NPV for sawlogs drops only to \$1300 per ha - still much higher than the pulpwood regimes. As noted earlier, the financial viability of plantations is highly dependent upon their location, which can provide low-cost access to markets. The lower value of plantation wood suggests it can support only modest transport costs. A pulp plantation is not financially viable without ready access to a pulpmill. Similarly, plantations producing relatively low value sawlogs must have markets (pulpwood or fuelwood) for its thinnings and ready access at low transport cost to markets for both the sawlogs and thinnings. Hence, in general, locational considerations will be even more important for plantation wood than for higher-value natural timbers.

3.96. As shown in Table 3.6, the total returns (NPV) to plantation forests increase as the social and global returns are added to the financial. This is because, starting from an assumed highly degraded site, the forests provide local and global environmental services as they grow, as well as increased financial values.

**Table 3.6: SUMMARY OF FINANCIAL, SOCIAL & GLOBAL RETURNS:  
INDUSTRIAL FOREST PLANTATIONS  
(ON ABANDONED AGRICULTURAL LAND OR ALANG-ALANG GRASSLAND)  
(NPV AT 10% US\$/HA)**

Criteria	Regime		
	Pulpwood, 8 Yr.	Sawlog, 10 Yr.	Saw/Veneer, 27Yr.
Net Present Value of Years 1 to 70			
Financial NPV	\$476	\$1950	\$1088
Social NPV	476	1951	1095
Global NPV	702	2153	1367

This contrasts with the natural forest situation examined earlier, where the initial harvest itself creates negative social and global values even as it is generating financial values. It is interesting to compare NPVs of the forest plantation options (Tables 3.6, 3.7) with those of regenerating logged-over forest (Table 3.2), which many plantations replace. Although the financial returns of plantations are superior to those of natural forest management in all cases, when social and global values are included, the economic returns of natural forest management exceed those of pulpwood plantations. The returns to investments in sawlog plantation exceed those of natural forest management from both the financial and social perspectives. However, from the global perspective, natural forest management of logged-over forest is superior to plantations of native dipterocarp plantations for production of veneer logs.

3.97. If native forests (including regenerating logged-over forest) are removed to make way for forest plantations, the net effects would be vastly different - the social and global environment values lost by clearing will be significant. Table 3.7 presents estimates of returns to plantations for three alternative plantation cases on logged-over forest land. Although financial returns (line 1) increase due to revenue from pulpwood salvaged during clearing of the residual forest, social and global returns (lines 2 & 3) to forest plantation on

logged over forest capable of regeneration are significantly lower than those for plantation of abandoned or along-alang land, where no environmental values are lost in plantation.

**Table 3.7: SUMMARY OF FINANCIAL, SOCIAL & GLOBAL RETURNS:  
INDUSTRIAL FOREST PLANTATIONS  
(REPLACING LOGGED-OVER FOREST)  
(NPV AT 10% US\$/HA)**

<u>Criteria</u>	<u>Regimes</u>		
	Pulpwood, 8 yr.	Sawlog, 10 Yr.	Saw/Veneer, 27 Yr.
Net Present Value of Years 1 to 70			
Financial NPV	\$626	\$2100	\$1238
Social NPV	\$370	1845	988
Global NPV	(324)	1127	341

#### HTI Scheme Implementation and Observations

3.98. **Environmental and technical clearance.** The technical processes of approval of a HTI scheme is comprehensive: applicants for pulpwood plantings are required to undertake a pre-feasibility study. This study is submitted to a Ministry of Forestry team and to the Kanwil Kehutanan offices, which then make recommendations on the application to the Provincial Governor, who in turn makes recommendations on the project to the Minister of Forestry. The applicant must then undertake a feasibility study (which requires clearance by the Director General of Reforestation and Land Rehabilitation in the Ministry of Forestry), and trial plantings.

3.99. One potential shortcoming of the process as currently designed is that the trial planting stage can be implemented before full consideration - by the investor and the Ministry - is given to the results of the feasibility study. Issue of the trial planting permit involves considerable work for the Ministry of Forestry and, obviously, trial plantings represent a considerable financial commitment for the investor. It is therefore a stage which should only proceed once the financial, environmental and social implications of the project are fully considered in a feasibility study.

3.100. Environmental assessment is a particular case in point, in this respect: in general a full environmental assessment under the Environmental Impact Assessment (AMDAL) procedures issued by the Ministry of Population and Environment, will be indicated for a HTI. However, there are some unresolved issues in this area: First, although guidelines for assessing the impact of a HTI have been issued by the Ministry of Forestry (DG Forest Protection and Nature Conservation), these guidelines are somewhat general: few specific technical standards or criteria are provided. Second, although a full assessment is generally warranted under the AMDAL guidelines, it appears that in practice in some cases only preliminary assessment is done. Third, the timing and commitment problem referred in para 3.99 above applies, in that environmental assessment results may not be submitted (as part of the feasibility study) until after trial plantings have been initiated. This is too late in the process: it is difficult and expensive for permission to proceed to be withdrawn once substantive field investments are made.

3.101. The HTI scheme as presently designed appears not to restrict potential investors from converting land under forest plantation to other uses, after a rotation or two. In itself, this may not be an undesirable outcome, but the Government may wish to have a larger role in this decision, or at least to ensure that the terms of the HTI do not simply offer potential investors in other forms of land use a lower cost access to the land than would apply otherwise. The downside risk in this situation is that such investors will minimize

commitment to forest plantations (including investment in necessary research, development and quality improvement), seeking only to qualify themselves for access to the land under long lease, financing the plantation primarily from the concessional terms offered under the scheme, and then proceeding to conversion as soon as possible.

3.102. There is no systematic evidence one way or another that the HTI scheme may contribute to poor natural forest operations but, again, the scheme as presently conceived could allow this possibility. In the first place, it is not clear whether the criteria used to determine forest land which is unproductive (and therefore qualified for HTI conversion) infer anything in particular about the capability of the site to regenerate natural forest cover (possibly with some intervention at initial logging, if justified), even if the residual stand is currently of low density. Secondly, the very existence of the HTI scheme in its current form as a follow-up activity after logging could discourage supervision of standards on some sites being logged, in effect making the subsequent classification of those sites as 'unproductive' a self - fulfilling prophecy.

3.103. It is also not entirely clear what will happen to the hinterland areas in a HTI: that part of the 300 000 ha or so concession which is re-logged (assuming it to be a residual low density natural stand) for pulpwood as an interim measure until the plantation pulpwood stands mature. Clearly, after logging for pulpwood, little prospect of natural regeneration will exist, and most of the site will not be planted to pulpwood (since only 60 000 - 80 000 ha is intended to be planted). Unless a comprehensive plan to develop the whole site is an integral component in a HTI scheme, it would be preferable to award smaller plantation areas to investors not dependent on utilizing the surrounding resource.

3.104. However, in terms of aggregate forest impacts, some perspective on the implications of natural forest pulpwood use is necessary. The volume of natural forest pulpwood needed to provide start up volume will depend upon the rate at which new capacity comes on stream. Hone (op cit on pg.44) estimates that if all scheduled mills come on stream, then 25-30 million cum of natural forest hardwood pulpwood would be required from 1992-2000: after 2000, it is presumed no further use will be made of natural forest for pulpwood. Depending on the types of forest area used, and the nature of operations this would imply pulpwood extraction from 150,000 - 300,000 ha in total over this period.

3.105. It seems unlikely, therefore, that all areas of natural forest allocated for pulpwood extraction as interim supply under the HTI scheme will be needed for this purpose. This estimate also raises a question as to whether a Ministerial Decree (442/1992), which provides that all production forest, regardless of conditions, within 100 km of a planned pulp site may be used for HTI development, is either necessary or desirable.

3.106. **The level of future supply.** It is difficult to predict whether, under current implementation of the HTI scheme, oversupply of pulpwood will result in Indonesia. Some insight can be gained from a review of the projected size of the pulp and paper sector (see paras 4.88 to 4.93). Pulp and paper making capacity in Indonesia is projected to rise from 1 million air dry tons pulp p.a. and 2 million metric tons of paper making p.a. in 1992, to 5.5 million ADT and 7 million Mt respectively by 2020 AD. Using a standard conversion factor (1 ton of air dry pulp requires 4.5 cum of pulpwood) this implies pulpwood requirements for pulp and paper making will rise from 4.5 m cum to 25 m cum over the some period. Assuming fairly conservative plantation mean annual increments of 20-25 cum/ha/annum, Indonesia could supply its hardwood fibre requirements for its pulp and paper sector from about 800 000 hectares of plantation by 2010, and 1.0 - 1.2 m ha by 2020.

3.107. Hone (op cit, on pg. 44) suggests that, on current pulpwood plantation projections, oversupply is likely. However, this claim seems based on the assumption that each HTI will establish 100 000 - 200 000 hectares of planted area. As pointed out in para 3.80, in the case of pulpwood HTIs, the likelihood is that only 60,000 - 80,000 of the 300,000 ha allocated in each case will be planted. In the ITFAP (op cit, on pg.7) document (ITFAP pg.59), projections are provided which indicate that by 2000 AD, 2.3 million hectares of

industrial plantation will be established, of which 40% (920 000 ha) is expected to be pulpwood. It seems unlikely that the sawlog/plylog component in this projection would eventuate unless policies change: although returns to sawlog plantation (see paras 3.82 to 3.87) are quite attractive, little interest is apparent as yet. This is due to the attractiveness to investors in pulpwood HTIs of gaining long term access to the large hinterland. The pulpwood component, if achieved, would not differ radically from the figure of 800 000 given in para 3.105. If, however, all of the 33 pulpwood HTIs which have already been allocated by the Government, were to establish 60,000 - 80,000 hectares of plantation each, then 2 to 3 times the volume demand projected by Hone for the pulp and paper sector would result. It may be in Indonesia's interests to level the playing field between sawlogs/plylogs on one hand, and pulpwood on the other: see para 4.20 for an example supporting this.

### Some Conclusions on the HTI Scheme

3.108. The question of how much and what type of plantation should be grown in Indonesia, and where these ought to be located, is one which properly should be left primarily to the private sector. The job of the government is to decide in broad terms upon locational and environmental conditions, and then to implement a policy and incentive structure which encourages investment compatible with these. Presently, the Ministry of Forestry is working on a Master Plan for plantations in Indonesia: consultancy inputs for this study are being financed under the Bank-GOI Second Forestry Institutions and Conservation Project. This exercise will yield valuable land capability, locational and economic information, so that establishment of priorities and ground rules should become more straightforward.

3.109. The analyses and observations presented above on the plantation sector lead to the following conclusions:

- (i) While some subsidization of pulpwood plantation on existing sites may in the past have been warranted, given that the government had decided upon a major expansion of the pulp and paper sector, such subsidy is no longer desirable or necessary. If sites chosen by existing or potential HTI investors are to be planted, the role of government is to assure secure title (see the following section on community issues), and possibly to assist with plantation research, given the public good nature of such research.
- (ii) Given the apparent environmental gains that are generated by opting to plant abandoned areas (see paras 3.93 to 3.97), the government may be justified in encouraging plantation on such areas, to induce investors to choose such sites. Such an option could, apart from anything else, encourage investors with no current access to forested land through natural forest concessions (since presently HPH concessionaires tend to be primary candidates for HTI concession awards) to pursue plantation forestry: sawmillers and secondary wood processors could be included in this group, as could local community groups with the necessary capability and interest. Obviously, pulp and paper processors who chose a similar course would also be eligible for whatever incentives apply. The incentive structure applied should, as in the present case, emphasize security of tenure, assistance with research and technology, given the public good nature of these. Subsidies could be considered if the national gains in plantation of such areas exceed the level of subsidy needed to encourage private investors - but other measures should be explored first.
- (iii) Procedures for environmental clearance for HTI projects need tightening and reorganization. A particular area of concern is the hinterland surrounding plantation sites, allocated for interim supply. It seems unlikely that all such allocation, would be needed for such supply, and that inadequate incentive to extract pulpwood efficiently from such sites are presently in place.

### Forest Communities: Rights and Sustainability

3.110. It is becoming increasingly clear that in the outer islands of Indonesia, communities (indigenous or recently immigrant) which depend to a significant extent on the natural forest will exercise a strong influence on forest management - especially on what occurs on forests after logging programs have been carried out.

3.111. Although no systematic study of the activities and aspirations of forest dwelling and adjacent communities has been done, it became apparent to the sector review mission on field visits that there is some conflict between communities, government agencies and the private sector arising from field forestry operations, and there is a need for improvement in the processes of prior consultation with communities likely to be affected by forest operations, and of defining and disbursing compensation, where this is agreed to be the most appropriate approach.

3.112. **The extent of community occupation.** As noted in para 2.17, the area of forested lands currently occupied or claimed by forest dwelling or adjacent communities is unknown. Nor is there consensus on the size of forest dwelling and/or forest dependent communities in Indonesia. Demographic data from the Human Relations Area Files (HRAF) at Yale University are not yet available. Data from Harvard's Cultural Survival tapes do not specify size of occupied area.

3.113. The Indonesian Department of Social Affairs Directorate of Development for the Most Isolated Peoples (DBMT) uses a highly restrictive definition of isolated people, which excludes many current forest residents. It estimates an isolated forest dwelling population of 1.5 million people. Some recent estimates made on the basis of including all people who can be classified as dependent on forested areas regardless of their origin (and therefore, including transmigrants and other relatively recent immigrants), conclude that as many as 65 million people in Indonesia might be in this category. The Ministry of Forestry has estimated that around 22 million people may be engaged in swidden agriculture on lands under its jurisdiction in Indonesia, while the Re PPPoT study of 1991 estimated around half this number for swidden agriculture.

3.114. It does seem reasonable to argue that, whatever the precise numbers under various definitions eventually turn out to be, they will be significant. It seems clear that many millions of people inhabit Indonesia's forest areas, and exercise significant influence over land use options in that area. Their interests should be represented in land use decisions, but the lack of data on spatial and demographic dimensions of forest dwelling and dependent communities will prevent this. Thus, the lack of data will undermine the achievement of sustainability in forest operations, and at conservation of biodiversity and improvement of welfare in these communities.

3.115. **The impact of communities on forest areas.** In para 2.24 above, it was suggested that the role of traditional agriculture - including slash and burn practices - might account for only 21% or less of total deforestation in Indonesia. In fact, the thrust of a good deal of recent study of this subject seems to be that, prior to intensive commercial timber operations, forest communities in Indonesia had developed a remarkable set of agroforestry practices, under customary institutions and laws, and had produced a sustainable result in many instances. Even swidden agriculture - much criticized in academic and official circles some years ago - has fared better in recent research, which has shown that in many cases swidden practices do not exhaust soil nutrients and cause erosion, and may in fact represent a reasonable environmental option in the humid tropics, given the combination of infertile soils, nutrient storage in biomass, and intense weed competition that applies.

3.116. It is clear however, that a good deal of once-forested land in the outer islands of Indonesia has in recent decades become degraded through various agricultural practices. Some areas infested by imperata grass (alang-alang) clearly were once forested, and would in that condition have had more intrinsic value than the grassland, which contributes little or no economic value. This is the key in linking sustainability and poverty issues: it is not suggested here that sustaining forest areas must take precedence over poverty

alleviation. Rather, it is suggested the two issues re-enforce each other: where sustainable forest use is the best usage of the land in question, from an overall economic point of view, there will be sufficient surpluses generated by doing so to compensate potential encroachers who would otherwise convert it. The only issue is whether such redistribution can be done effectively.

3.117. There are a number of explanations for adverse trends at present: introduction of inappropriate agriculture; sheer pressure of population leading to overuse; the simple increase in opportunities to utilize relatively infertile sites opened up by forest operations; and decay in customary ownership with its attendant responsibilities. It is likely that large scale forestry is implicated: it will displace forest dependent communities from significant areas, who must then find other areas to utilize; it does, in its role as a pioneer industry, open up tracts of land to external colonization - government sanctioned or otherwise; and, when undertaken without adequate consultation with and involvement of traditional owners and occupants of a given area, causes a breakdown in historically understood property rights and responsibilities.

3.118. This is not intended as a criticism of extensive forestry *per se*, nor as an appeal for rolling back sector operations. It does serve to emphasize, however, that in the outer islands of Indonesia, forestry operations, in addition to their economic role, are a major agent of social and environmental change. Those who make decisions about such operations - both in the public and private sector - by definition must bear the responsibility for what occurs on forest areas subsequently: they cannot confine their concerns only to planning and regulation of the forest operations themselves. They must therefore be fully aware of the potential impacts of forestry operations on forest dependent communities, and be equipped with policies and programs to deal with these impacts.

3.119. **The impact of forestry operations on forest dependent communities.** Because, as noted earlier, areas designated as production forests overlap in many cases with areas in which forest dependent communities form, hunt, fish and gather non-timber products, it is obvious that a large extraction operation will have major effects.

3.120. It is not possible to quantify, in Indonesia, what proportion of forest operations have created significant adverse impacts on local communities. It is apparent, from the very extensive amount of case study and anecdotal material available, that such impacts are widespread and, in certain cases, serious. The case study and anecdotal material suggest the following major problem areas:

- Although certain traditional or customary rights over forest areas may exist for local communities in Indonesia (see paras 3.125 to 3.127), in many instances the effect in practice of introduction of a HPH or HTI project into an area has been to disenfranchise traditional users of such areas, with resulting economic marginalization and displacement;
- The processes of road construction, site clearing and so on have frequently destroyed areas already under traditional agricultural use;
- In some instances (especially in Kalimantan) water access to markets for traditional users has been obstructed by bridge work related to HPH operations. Water quality has also been affected by obstruction of feeder streams due to forest operations; and health problems have emerged.

3.121. There are numerous accounts of instances where HPH and HTI operations have commenced without adequate consultation with local communities: protests, when forthcoming, have often elicited only the response that the operations planned have the imprimatur of the central government, and that no further dealings with local groups are required, under the terms of agreements entered into. This has apparently led, in some cases, not only to erosion of the efficacy of local, customary institutions which might otherwise have offered a mechanism for management of regenerating forest areas, but also to alienation of whole communities from the central government and its development policies.

3.122. The Government of Indonesia has recognized the likelihood of conflict between traditional land users, and development projects. The Directorate of Most Isolated Peoples (DBMT) has a broad mandate to address health, educational technological, economic and religious needs of this group. Historically, DBMTs approach has emphasized relocation of affected communities. There is an issue involved, as to whether this approach, coupled with DBMT's tendency to regard the target groups as indifferntiated and primitive, is appropriate, but this issue goes beyond the scope of this sector review.

3.123. The Ministry of Forestry has introduced the HPH Bina Desa (HPHBD) program, as a means of addressing the forest dwelling community issue. In effect, the HPHBD is intended to create income generating alternatives for forest dependent communities, by causing concessionaires to invest in such programs.

3.124. No systematic review of the success of the HPHBD has been made for this review. Some anecdotal comment collected in the field indicates that the major onus of decision making and negotiation of a specific HPHBD rests upon the concessionaire. Where concessionaires are bona-fide and capable, this produces good results, but otherwise, there is relatively little that either GOI, or communities themselves, can do to ensure good performance. In many cases, the interest of concessionaires and communities will be in conflict, and where this is so some process of directing or arbitrating the nature of HPHBD projects would seem to be necessary. Even in cases where concessionaires have been well-intentioned, adverse results have sometimes occurred due to an emphasis by the concessionaire on replacement of extensive agricultural practices with imported intensive technologies (such as wet-rice farming from Java) which have failed under local conditions.

3.125. The legal status of forest communities. Implicit in much of the foregoing commentary is the idea that, where social and economic disruption are likely results from forest operations, some form of prior agreement with affected forest community groups will need to be negotiated: these groups must be positively engaged in the development process, rather than damaged by it.

3.126. When considering options in this area, it is useful to obtain some understanding of the present legal position of such communities in Indonesia, as a basis from which to work towards new agreements. Annex 4 is a review of some recent and historic legislation in Indonesia which relates directly to this issue.

3.127. The basic conclusions which can be drawn from this review are:

- The Basic Forestry Law was not intended to invalidate the existing customary land rights of communities. Members of these communities, including the indigenous communities living in Indonesia's forests, have the right under the Agrarian Law as well as the Basic Forestry Law, to continue to manage their forested lands under local resource management regimes and customary law. They have the right, moreover, to have these rights legally recognized, registered, and honored by governmental and private sector actors. If a plaintiff can show that the effect of an implementing regulation is to force into non-existence traditional rights, then this regulation or its implementation in a particular case is in conflict with the law itself. It may possibly be invalidated through review in Administrative Court proceedings.
- The Basic Forestry Law of 1967 and the Agrarian Law of 1960 are now situated within the context of recent legislation, of equal legal status. This fact alters the legal environment within which indigenous community customary rights to land and resources are viewed and reviewed. Currently, Law Number 10 of 1992 and Law the of 1991 on Spatial Arrangement, recognize community territorial rights, the rights of cultural autonomy, and the priority accorded to historically vulnerable communities. In addition, these laws establish a community right to know what is being planned in its historic area, to review and critique these plans, to participate in a meaningful fashion in planning these activities, and to comment on implementation of these



plans. In sum, these recent legislative enactments constitute a new policy landscape in which the rights of indigenous communities are accorded a privileged status within the context of national development.

CHAPTER IV  
THE WOOD PROCESSING INDUSTRIES:  
POTENTIAL AND ISSUES

Introduction

4.1. As pointed out in Chapter I of this review, the forestry sector is an important building block in the economy of Indonesia. Obviously, maintenance and building of a good resource base is fundamental, and issues related to this have been discussed in Chapters II and III. In pure value added terms, however, presently most economic activity occurs within the processing sector, and it is likely this will continue to be the case. The fate of the natural forest resource - including many of its national and global environmental values - will in Indonesia depend heavily on the economic fortunes of the processing sector, for the foreseeable future.

4.2. In this chapter, it will be argued that global and regional trends in forest products trade suggest a stable, rather than a dramatically improving (or declining) situation for Indonesia's exports. Whilst the international trading environment in the past for tropical forest products has not been ideal, nor has it been particularly discriminatory: tropical forest products nations seeking a long term and sustainable place in the market need to give priority to review and reform of domestic resource, industry, and trade policies: international initiatives to improve the trading environment have an important, but secondary place. An important linkage between these issues is the emerging "green" trend in the international forest products market: the development of market resistance to products based on unsustainably managed resources. Whatever the eventual outcome of this trend, in the medium term it will be important, in trade and market access terms, for Indonesia to develop sustainable practices, and to demonstrate that it is doing so.

4.3. Indonesia has built a large and powerful forest product sector, on the basis, primarily, of restricting (previously exported) raw material supplies to domestic processing. Information on trends in processing advanced in this Chapter will be used to support some observations relevant to policy in this sector:

- (i) A large proportion of profit generated in the plywood sector arises from a flow of economic rent to plymills from their corporate ownership of logging concessions, rather than from efficient and competitive value added in processing.
- (ii) While the imposition of very high export taxes on sawn timber has eliminated the practice of export of large sized sawn material as a means of avoiding the log export ban with minimal value added (one of the objectives of the export tax policy), it has also eliminated smaller sized sawn material - which might equal plywood, in value added terms - from the export market.
- (iii) The sawnwood export tax policy may also affect the viability of secondary processing (stimulation of which was another goal of the sawn export tax policy) because this sector appears to depend on the existence of a viable, efficient sawmilling sector. Secondary processing development in Indonesia appears to have tapered off, following strong gains early on; a lack of ready access to log supplies may be a contributing factor.

Market Developments for Tropical Forest Products

4.4. Although domestic demand for forest products in Indonesia can be expected to continue to grow rapidly, the size and nature of the processing sector - natural forest and plantation based - will remain strongly dependent on developments in the international market for forest products for the foreseeable future.

4.5. A great deal has been written on the international market for wood products, and it is not possible to review this work here. All that can be attempted is a listing of findings which seem to find reasonable consensus among analysts, and a discussion of some more specific matters relating to Indonesia's case.

4.6. **Global consumption.** Worldwide, the rate of growth in consumption of wood has been slowing since the 1950s, and most economic models of the forestry sector predict a continuation of this trend.

4.7 **Value of trade.** In broad terms, the value of forest products entering international trade has increased more quickly than overall consumption. This seems to be a result more of changes in the composition of trade towards more highly valued products, than of increased volumes of log equivalent being traded. In the particular case of tropical forest products, volumes entering trade have actually declined by about 25 percent from a peak in 1979. Log export bans and related measures have had some role in this, but it is likely that reduced demand and increased competition from temperate sources have also been factors. This trend is not uniform, however: demand for quality hardwood - in raw and processed form - has remained strong, and this has also been the case for some processed products - moldings, beadings, some joinery and household items - not dependent on high quality raw material.

4.8. **Regional trend analysis.** The standard econometric approach to projecting demand is to identify some major determinants of consumption of wood products which are (to some reasonable extent) forecastable, and to link consumption patterns for specific products to these parameters, via regression analyses. As part of a study of market prospects for forest products from South East Asia commissioned by the Bank<sup>1</sup>, an exercise of this nature has been attempted, using a global forest products trade model developed by the Centre for International Trade in Forest Products (CINTRAFOR) at Washington State University. The model makes base case<sup>2</sup> projections of supply and demand for South East Asia forest inventory and products, and tests sensitivity of projections to some likely development, such as substitution by temperate hardwoods and softwoods in markets currently supplied by tropical hardwoods.

There is insufficient space here for a detailed exposition of the results of this modelling exercise: the Bank will be making this study available when drafting is complete. Some of the major results which emerge are:

- In the base case scenario, the price of logs in all South East Asian and North East Asian markets rises, to the end of the forecast period (2000 AD). Western Malaysia is most affected (a result of depleted log availability on the peninsula, and growing limits on East Malaysian Inventory), and prices in Indonesia are projected to rise by 5% pa over the period.
- Significantly, in the base case scenario, little or no rise in hardwood log prices in Europe or Japan is projected for the period, due to substitution in those markets by temperate hardwoods and softwoods. The market study assesses temperate hardwoods as being relatively abundant in the medium term, and softwoods also (but over a shorter time frame). These are not open-ended projections: ultimately, supplies for all may become constrained.

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<sup>1</sup> Jaakko Poyry Consultants/CINTRAFOR (1993) Tropical Deforestation in Asia and the Market for Wood, main report and 9 Annexes prepared for World Bank and ITTO.

<sup>2</sup> GDP, housing and construction starts and in some cases income elasticity are projected for each country, and linked to wood use via end use elasticities.

- Indonesian plywood exports in the base case remain relatively stable for the period, but destinations change significantly, away from Japan, and towards Korea and China. There is only modest price gain for hardwood ply projected for the major markets: Malaysia is the exception, due to declining domestic supplies combined with import bans.
- Sawnwood export from Malaysia in the base case is projected to decline (from 6 million cum p.a. to around 4 million cum p.a. by 2000 AD); Indonesia's production and consumption remain more or less in balance (constrained by current policies); sawnwood prices rise in all markets.

4.9. **Trade and sustainability.** The pattern of forestry operations in many tropical countries has frequently followed a boom-and-bust cycle: an accelerating exploitation of an originally abundant resource to well beyond the point of sustainable output, followed by a rapid decline as resources become scarcer and more costly to extract, to the point (as is presently occurring in both Thailand and the Philippines) where net importation of forest products is in prospect. Often, this pattern has been attributed to the nature of the trading relationship between developing country forest exporters, and more developed importers of forest output: richer countries have been accused of manipulating prices of tropical forest products downwards and discouraging development of value-added processing in the forest rich countries, through erection of high tariff and non-tariff barriers.

4.10. While there may be examples from the past where this occurred, there is little evidence to suggest that it is a significant factor now. Vincent<sup>3</sup> has compiled data which show that in 1989, developing countries exported only 11 percent of their roundwood harvest in raw form (more than double this amount was exported in processed form), and that much of this export went to other developing economies. Vincent acknowledges that tropical countries have suffered some harm from trade barriers on processed imports in developed country markets, but cites studies which show this effect has been fairly minor.

4.11. So far as the question of low prices for traded tropical forest products is concerned, it can be shown that, broadly speaking, tropical forest products do no better or worse in this respect than their temperate counterparts. They are, for the most part, commodity grade products sold in bulk, and in this market real price declines have been the rule rather than the exception in recent decades: diverse sources of competition and no shortage of the wide range of wood resources which can be used in such products suggests that this will continue to be the case.

4.12. Most studies of the tropical timber situation in recent years agree that sustainability of the tropical timber resource has relatively little to do with the nature of international trade, and much to do with domestic policies (and their implementation) applied in forest owning countries. Within the forestry sector itself, policies which enforce domestic processing by restricting raw material exports, and which otherwise force raw material prices to be low, will not necessarily promote sustainability and, if they create artificially low raw material prices, are in fact likely to contribute to forest decline. Ex-sectoral policies - especially those which subsidize other forms of landuse on forested areas - will also contribute to forest decline, and macroeconomic policies - trade and non-trade related - can also have this effect.

4.13. It can be concluded that Indonesia, in common with other forest product trading nations, will face strong competition in the international market. While continued opportunities will exist in trade, there is no apparent boom in demand for the products Indonesia exports in the offing, and domestic policies promoting efficiency and competitiveness will be fundamental to success in this sector.

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<sup>3</sup> Vincent, J.R., 1992, "The Tropical Timber Trade and Sustainable Development" Science, Vol 256, 19 June.

4.14. **The environmental factor in trade: the Japanese example.** One essential ingredient in development of a successful long term forest products industry, obviously, is availability of good quality raw material over the long term. But, in the case of sustainability of forests, the environmental movement has added a more immediate and urgent political dimension to this matter: whatever the views of tropical forest product exporting countries, a cost of remaining effectively in this trade is increasingly going to be the ability to manage natural forests sustainably, and be seen to be doing so. In recent months, awareness of this issue in Indonesia has escalated sharply, as a perusal of recent articles in the press will demonstrate. It seems the case that even consumer countries which do not enact blanket bans on tropical forest product imports are increasingly moving towards requirement of some form of certification that products being sold in their markets have come from properly managed forests: so-called "green labelling" is therefore a high profile issue in Indonesia at present. This is timely, because political positions on the matter have not yet hardened: there is still an opportunity for certification measures to be designed and promoted, as a preferred alternative to wholesale bans on importation of tropical forest products in major consuming regions.

4.15. Some insight into the practical implications of this issue can be obtained through observations of recent developments in Japan. Public concern in Japan over tropical hardwood resources rose significantly in 1992, and various actions have been taken or are being planned in both public and private sectors. These developments may have long-term demand implications for Indonesian forestry and forest industries, because Japan is by far the largest consumer of tropical hardwood plywood in the world. Japanese plywood producers use tropical hardwood logs imported primarily from Malaysia and Papua New Guinea (PNG). In addition, Japan imports a large volume of tropical hardwood plywood, over 95% of which comes from Indonesia; imports now account for one third of plywood consumption in Japan. In 1990, Japan consumed roughly 14.8 million cubic meters (roundwood equivalent) of tropical hardwood in the form of plywood. In addition, Japan consumed roughly 4.3 million cubic meters (roundwood equivalent) in the form of sawnwood. Including other minor products, Japan consumed about 20 million cubic meters of tropical hardwood in roundwood equivalent in 1990.

4.16. A particular target of public concern is the so-called "kon-pane", 12mm-thick plywood which is used for concrete forming during construction. This product forms a major part of Indonesia's exports to Japan (see Table 4.5). It is re-usable, but after being re-used several times it is discarded. Concrete panel has become a symbol of "wasteful" use of valuable nonrenewable tropical hardwood, along with disposable chopsticks.

4.17. Japan's Construction Ministry recently announced a plan to encourage use of softwoods, which are renewable and grow faster than tropical hardwoods, in publicly funded construction projects<sup>4</sup>. The plan includes: (a) an urgent review of construction standards in order to take account fully of the substitution potential of softwoods (with particular attention to plywood); (b) nation-wide distribution of a construction manual incorporating the results of that review; (c) selection of publicly funded construction projects all over Japan as "model projects" for implementing maximum use of softwood products in place of traditionally used hardwood products; and (d) issuing of purchase orders for such softwood products to be used for the selected projects before the end of the current fiscal year (March 1993).

4.18. This initiative was preceded by similar moves by local entities. In October 1991, the Tokyo metropolitan government announced a plan to reduce the use of tropical hardwood products in its construction projects. Several other major local entities also announced plans to study ways to minimize the use of tropical hardwood concrete panels in publicly-funded construction projects: e.g., Osaka City (January 1992), Osaka Prefecture (February 1992) and Kobe City (August 1992). Now that the central government has moved on this issue, many more local entities are likely to follow.

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<sup>4</sup> NIKKEI Commodity Information Service, October 12, 1992.

4.19. In the private sector, in February 1992, the Building and Construction Industry Association announced a target of 35-percent reduction in the use of concrete panels made wholly of tropical hardwood over the next five years. In making this announcement, the Association gave three reasons: (1) uncertain sustainability of future supply of tropical hardwood concrete panels; (2) the environmental wastefulness of using tropical hardwood as concrete panels; and (3) in view of rising labor costs in construction, the need to find less labor-intensive ways for concrete forming than the current procedures requiring tropical hardwood concrete panels.

4.20. The likely outcome of these initiatives needs to be kept in some perspective. Hardwood ply is still preferred in technical terms because it is stronger and more rigid. Also, at the present time softwood panels would cost 10% - 30% more to produce in Japan, because: (1) the average recovery rate in softwood plywood manufacturing is less than 50%, as compared with close to 70% for hardwood plywood; and (2) production of softwood plywood would require a substantial fresh investment in new machinery while most existing plywood machinery in Japan, which is geared to produce hardwood plywood, has been totally depreciated on the books. Reportedly, in 1992 production of plywood using New Zealand radiata pine as core-ply has increased in Japan, and investments in facilities to produce such mixed-species plywood have also increased. The investments in new equipment for producing mixed species plywood were triggered by the recent rises in the prices of tropical hardwood logs (Nihon Keizai Shimbun, October 17, 1992). This may go further: as capacity to produce plywood with a softwood core increases, in Japan, the likelihood that Japan will impose a ban or restrictions on imports of 100% tropical hardwood plywood increases. Such bans could be justified on environmental grounds (presumably, however, these will remain contestable under the General Agreement on Tariffs and Trade), albeit that they would coincidentally benefit local plywood producers. Thus, an important issue for Indonesia's plantation policy arises: the extent to which emphasis should be given to producing ply grade material from plantations in Indonesia.

4.21. It may also be that, driven in part by environmental concern, technologies may develop to bypass the use of plywood in construction. A major construction company has recently developed a new method of concrete forming, called the "pre-cast column" procedure, which uses pre-cast concrete columns instead of plywood forms. The pre-cast column made of concrete has been approved by the Japan Architectural Center (JAC). An approval by JAC is a prerequisite for an approval by the Minister of Construction. To date, the scope for practical application of this technology is quite limited, because it is economically applicable only in situations involving considerable uniformity in the size and strength requirements of such columns (the concrete pre-cast columns must be mass-produced in order to contain costs of production). Nevertheless, this, and the possibility discussed in para 4.20, suggest that Indonesia may have relatively little time to negotiate acceptance of its product on the basis of sustainability, and, by extension, to implement serious measures in the field to achieve that sustainability.

#### The Indonesian Forest Industries Sector: Recent Issues

4.22. GOI objectives. Forestry is not identified as a separate sector in the Repelitas, and in Repelita V, forestry-related programs are spread over seven sectors. However, the Ministry of Forestry (MOFr) had the following goals for the processing sector, based on a document prepared by MOFr for Repelita V at the end of 1986:

- (a) to reach the following production levels for the major products, by the year 1999:

sawn timber	17.2 million m <sup>3</sup>
plywood	11.9 million m <sup>3</sup>
wood-based panels	1.2 million m <sup>3</sup>
pulp and paper	1.6 million m <sup>3</sup>

- (b) to reach the above targets through optimal utilization of raw materials, especially by increasing the recovery rates for the entire wood processing sector (i.e. to 60% during Repelita IV, 70% during Repelita V and 80% during Repelita VI);
- (c) to create employment of 9.3 million in the industrial sector as a whole, with wood processing playing a significant role;
- (d) to equalize the distribution of development and income, with wood processing playing major roles in developing structurally underprivileged areas in the outer islands;
- (e) to promote small scale industries, with some forest products included specifically for this purpose under Repelita IV; and
- (f) to increase export volume (and earnings) from the wood processing sector, with the following specific targets:

	<u>Repelita V</u>	<u>Repelita VI</u>
sawn timber	4.2 mill.m <sup>3</sup>	4.8 mill.m <sup>3</sup>
plywood	5.8 mill.m <sup>3</sup>	7.5 mill.m <sup>3</sup>

4.23. **Institutional framework.** Since 1986, wood industry policies have been coordinated by the Coordination Team for Forest Industries or TKIHH, which consists of representatives from MOFr, MOI and the Ministry of Trade. The ministries take turns acting as the secretariat for its periodical meetings. This unit also provides inputs into the Repelita.

4.24. **Recent policy actions.** With the above objectives forming a basis, GOI undertook a series of policy actions, designed mostly to shift resources in the wood processing sector to higher value added activities. In 1985, GOI instituted a total ban on log exports. It also raised requirements for concessions to link with processing units. Starting 1989, in the face of an already expanded output capacity and more stringent restrictions on forest resource exploitation, GOI discouraged establishment of new plywood mills and sawmills, except in the less-exploited areas of Irian Jaya and East Timor. It also banned establishment of new facilities for processing of rattan, except in the outer islands. Also in 1989, GOI placed prohibitively high export tariffs on sawnwood. Finally, in 1992, GOI replaced the log export ban also with prohibitively high export tariffs. On the macroeconomic front, measures were taken to create an export-oriented incentive framework: large devaluations of the Rupiah in 1983 and 1986 helped to create an export-industry oriented incentive framework. The effects of these policy measures will be examined later in this chapter.

4.25. **Investment.** Trends in investment for the wood processing sector as a whole provide some useful background in analyzing each of the processing industries. As can be seen from Table 4.1, new investment in wood processing has had a very small share in total investment, both for domestic and foreign investment, especially after 1988, and the share appears to be decreasing. Both domestic and foreign investment amounts in wood processing fell sharply in 1991, and the downturn will most likely continue in 1992, judging from the January-June data. The data given are based on approvals, and the actual investment amounts would be lower. Domestic investment slowed down in general, falling from Rp. 59.9 trillion in 1990 to Rp. 41.1 trillion in 1991 and then to Rp. 18.0 trillion for the first seven months of 1992. In the wood based industries, the investment policies of BKPM<sup>5</sup> seem to have had a specific role in the investment slowdown: (a) restrictions on investment in plywood, sawmilling and rattan processing since 1989 mentioned above; and

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<sup>5</sup> The Investment Coordinating Board. It monitors and approves applications for investment, both from domestic and foreign investors.

(b) a new requirement for prospective investors in secondary wood processing to present BKPM evidence of wood supply when applying for approval (this exclusion does not appear on GOI's Negative Investment list proposed in Presidential Decree 23/1991).

4.26. Despite GOI's stated policy to promote wood-based industries, there are few specific instruments to promote investment in these industries, beyond the restrictions on raw and sawn exports. In the pulp and paper industry, holders of HTI over 1,000 ha are partially exempted from import tariffs for capital goods and raw materials needed to produce pulp and paper. There was also initially some concessional lending to investors in plywood manufacturing.

Table 4.1: INVESTMENTS IN WOOD PROCESSING BY YEAR, 1988 - 1991

	1988	1989	1990	1991	1992 (Jan.-June)
<b>Domestic investments</b>					
no. of approvals	149	120	116	55	8
amount of approvals (Rp. billion)	1,459.0	743.9	2,179.3	1,569.0	439.3
share in total approved (amount (%))	10.2	3.8	3.6	3.8	2.4
<b>Foreign investments</b>					
no. of approvals	13	25	30	13	4
amount of approvals (US\$ million)	76.9	105.9	217.6	62.2	21.2
share in total approved (amount (%))	1.7	2.2	2.5	0.7	0.5

Source: BKPM (National Investment Coordination Board).

### The Plywood Industry

4.27. **Growth of the industry.** Indonesia was a late starter in production of plywood, even among the countries in Asia and the Pacific. Investment in plywood mills started to expand dramatically in Indonesia during the late 1970s; between 1975 and 1979 plywood production increased six-fold (Table 4.2). Between 1979 and 1984 (the year before the total log export ban) production again increased six-fold, even though this period coincided with a major world recession. For comparison, plywood production in the Philippines dropped from 553,000 cu.m. in 1980 to 329,000 cu.m. in 1982, before recovering to 504,000 cu.m. in 1984. In 1991, plywood production in Indonesia reached 9.1 million cu.m., which is more than 80 percent higher than in 1985.

4.28. With such rapid expansion, Indonesia became the largest producer of plywood in Asia, and the largest in the world among those using tropical hardwood for inputs. As can be seen in Table 4.3 below, Indonesia was a relatively small producer in 1980, accounting for only 7 percent of total production from Asia. At the time, Japan and Korea were the dominant producers, with 55.3 and 10.9 percent of total production, respectively. The picture changed dramatically over the next ten years: Indonesia emerged as the dominant plywood producer in the region, accounting for 43.7 percent of the region's output. Production by Japan and Korea has declined not only in relative terms within the region, but also in terms of absolute amounts.



Table 4.2: PRODUCTION OF PLYWOOD BY YEAR, 1973 - 1991

Year	Number of Mills	Production (m <sup>3</sup> )
1973	2	19,000
1974	5	24,000
1975	8	10,700
1976	14	214,000
1977	17	279,000
1978	19	424,000
1979	21	624,000
1980	29	1,011,000
1981	40	1,552,000
1982	61	2,140,000
1983	79	2,943,000
1984	95	3,820,000
1985	101	4,983,000
1986	NA	5,302,000
1987	NA	6,400,000
1988	NA	6,560,000
1989	NA	NA
1990	NA	NA
1991 <sup>a</sup>	118	9,063,735

Source: - APKINDO.

- FAO/GOI Forestry Studies UTF/INS/065/INS.

- Project Data Base.

Table 4.3: ESTIMATED PRODUCTION OF PLYWOOD IN ASEAN COUNTRIES

Country	(in thousand cum)			Share in Region
	1980	Share in Region	1990	
Indonesia	1,011	7.0%	9,250	43.7%
Japan	8,000	55.3%	6,417	30.3%
Korea	1,575	10.9%	1,124	5.3%
Malaysia	601	4.2%	1,090	5.2%
Philippines	553	3.8%	397	1.9%
Singapore	579	4.0%	399	1.9%
Other Asia	2,140	14.8%	2,485	11.7%
Total	14,459	100.0%	21,162	100.0%

Source: FAO Forest Products Yearbook, 1990.

4.29. **Distribution of mills: By Regions and Ownership.** Much of the new investment in plywood mills took place in the outer islands, particularly in Kalimantan. By fiscal 1983/84 Kalimantan was producing 51% of the total volume of plywood manufactured in Indonesia, and production in Kalimantan more than

doubled during the next five years, to account for 57% of the national total in fiscal 1988/89. Production increased only marginally in Java and Bali.

4.30. There are now 118 plywood mills in Indonesia (Table 4.4). This is a nominal figure, as some large production facilities belonging to nominally separate companies operate under one roof and the same management, and are counted as separate mills (e.g. 12 lines belonging to five nominally different firms, all in one large plant in Maluku). About half of these are concentrated in Kalimantan, with East Kalimantan alone accounting for 28 on a nominal basis. Due to lack of the wood species traditionally preferred for plywood production, there is only one plywood mill in Irian Jaya, which was recently established. However, with resource constraints becoming apparent elsewhere in Indonesia, this situation may soon change rapidly.

Table 4.4: PLYWOOD PRODUCTION CAPACITY AND ACTUAL OUTPUT BY PROVINCE, 1992

PROVINCE	Number of Establish-ment	Installed Capacity (cu m)	Share in Total	Actual Production (cu m)	Share in Total	Capacity Utilization	Av. Capa. per Estab. (cu m)	Share in Total Capacity
D.I. Aceh	2	203,400	2.4%	179,835	2.2%	88.4%	101,700	2.4%
North Sumatra	5	467,950	5.6%	448,290	5.5%	95.8%	93,590	5.6%
West Sumatra	1	60,000	0.7%	41,278	0.5%	68.8%	60,000	0.7%
Riau	12	785,736	9.4%	809,770	9.9%	103.1%	65,478	9.4%
Jambi	9	500,000	6.0%	484,700	5.9%	96.9%	55,556	6.0%
South Sumatra	4	262,572	3.1%	247,105	3.0%	94.1%	65,643	3.1%
Lampung	1	83,700	1.0%	66,396	0.8%	79.3%	83,700	1.0%
West Java	1	71,428	0.9%	58,535	0.7%	81.9%	71,428	0.9%
Central Java	1	432,000	5.2%	387,748	4.7%	89.8%	432,000	5.2%
East Java	3	435,700	5.2%	413,440	5.1%	94.9%	145,233	5.2%
West Kalimantan	14	1,041,962	12.4%	1,142,619	14.0%	109.7%	74,426	12.4%
Central Kalimantan	7	924,695	11.0%	905,537	11.1%	97.9%	132,099	11.0%
South Kalimantan	14	456,450	5.5%	438,427	5.4%	96.1%	32,604	5.5%
East Kalimantan	28	1,759,523	21.0%	1,720,102	21.0%	97.8%	62,840	21.0%
South Sulawesi	2	85,472	1.0%	69,912	0.9%	81.8%	42,736	1.0%
Maluku	13	710,600	8.5%	694,405	8.5%	97.7%	54,662	8.5%
Irian Jaya	1	90,000	1.1%	63,901	0.8%	71.0%	90,000	1.1%
Total	118	8,371,188	100.0%	8,172,000	100.0%	97.6%	70,942	100.0%

Source: Ministry of Industry.

4.31. Most of the plywood mills are owned by Indonesian firms, except for one state-owned mill in East Kalimantan and another in Java. There are about 10 mills based on joint venture arrangements.

4.32. Size of the mills. With greater availability of labor and better transport infrastructure, installed capacities for mills in Java are much larger than those in other regions (roughly twice the national average), although there are only five of them. With an average (nominal) installed capacity of about 71,000 cu.m. per year, plywood mills in Indonesia tend to be much larger than those in the Philippines, where the average was 13,300 cu.m. in 1984.

4.33. Markets. Most plywood produced has been directed to the international market (Table 4.5): less than 20% of production has been sold domestically. Producers have an incentive to sell to export, because this can be done in large shipments, and prices received tend to be better. It has been reported in a number of studies that plywood sold domestically is largely material that would not be acceptable on the export market.

Table 4.5: EXPORT OF PLYWOOD BY DESTINATION, 1991

Market	Volume M3	Amt.CNF.US\$	Share (of total amount)	Unit Price (US\$/m3)
USA/Canada	662,308	254,189,839	11.1%	383.8
UK/Ireland	191,559	75,338,129	3.3%	393.3
Continental Europe	428,142	165,150,054	7.2%	385.7
China	1,149,198	434,610,052	18.5%	369.5
Taiwan	233,324	73,881,507	3.2%	316.6
Singapore	63,329	18,292,558	0.8%	288.8
Middle East	307,325	103,993,504	4.5%	338.4
Japan	1,975,363	685,295,674	29.8%	346.9
E.Asia (excluding Japan)	999,860	337,986,860	14.7%	338.0
Hong Kong	286,433	91,208,681	4.0%	318.4
Others	169,613	66,286,921	2.9%	390.8
<b>Total</b>	<b>6,464,696</b>	<b>2,296,224,179</b>	<b>100.0%</b>	<b>355.2</b>

Source: APKINDO.

4.34. Japan is the largest buyer of Indonesian plywood (Table 4.5). Originally, most of this volume went into concrete-forming panels ("kon-pane") but, according to the forthcoming World Bank-ITTO consultants study of trade in forest products from South East Asia (op cit, see pg. 56) this usage accounted for slightly less than half of total Indonesian plywood exports in 1991. Penetration of the Japanese plywood market, and those of Korean and Taiwan, has been spearheaded by the industry association, APKINDO, which is able to exercise considerable influence in the sector, via compulsory membership, control over export licensing, and control over marketing outlets in Japan (NIPINDO). Some processors claim that APKINDO has obliged processors to sell part of their output at prices as low as \$230/cu.m., in pursuit of market share: no substantiation of this was possible, although it is known that in January 1990, APKINDO did require a quota of output of 15% (based on previous year's production) to be sold through its agency in Japan, presumably in pursuit of market share there. It is possible that at least part of the recent rapid expansion in output of decorative ply in Indonesia could be related to this factor: output of this product rose from 25000 cum. in 1989/90, to 0.5 million cu.m. a year later. It appears that, originally, producers were allowed to include decorative plywood as part of their APKINDO quota, but were exempted from marketing it through APKINDO. It will be a relatively simple matter to evaluate whether there is substance to this theory soon, because apparently this exemption has now been revoked: significant declines in decorative ply output would signal that it has been a factor.

4.35. **Capacity utilization rates.** Although capacity utilization was low in the plywood industry at its early stages, which was quite natural with the rapid expansion in installed capacity, it has been rising steadily since 1979 (Table 4.6). The rate improved from 35 percent in 1979 to 81 percent in 1985.

4.36. With the ban on establishing new plywood mills in areas other than Irian Jaya and East Timor in 1989, expansion of installed capacity has virtually stopped, pushing up the capacity utilization rate further: it has therefore approached officially recorded maximum levels (97.6% in fiscal 1991/92, see Table 4.4, and Table 4.7 below), and according to some estimates of actual production, may have exceeded these and now be close to the technical maximum. Targets prepared by MOI to feed into Repelita VI suggest that GOI sees new investments in plywood mills taking place slowly (about 200,000 cu.m. per year) during the coming years, while continuing to operate virtually at full capacity (Table 4.7).

Table 4.6: DEVELOPMENT OF CAPACITY UTILIZATION (1973 - 1985)

YEAR	Installed Output Capacity (tons)	Actual Production (tons)	Capacity Utilization
1973	28,000	19,000	67.9%
1974	103,000	24,000	23.3%
1975	305,000	107,000	35.1%
1976	405,000	214,000	52.8%
1977	535,000	279,000	52.1%
1978	799,000	424,000	53.1%
1979	1,809,000	624,000	34.5%
1980	1,949,000	1,011,000	51.9%
1981	2,601,500	1,522,000	58.5%
1982	3,292,400	2,140,000	65.0%
1983	4,477,100	2,943,265	65.7%
1984	5,327,600	3,820,000	71.7%
1985	6,172,140	4,983,000	80.7%

Source: Atlanta (op cit, see pg.22).

4.37. **Supply of raw materials.** All plywood mills have either their own concessions, or are supplied by concessions with close ownership ties to their mills. However, the majority of mills also buy some logs in the open market: in 1987, according to Atlanta (op cit, see pg. 22), about 10 percent of total log requirements for plywood production were purchased in the open market, and anecdotal evidence suggests this proportion may now have increased. Given the dominance of major plywood operations, especially in some regions, it is difficult to assess the impact of oligopsony or monopsony in price formation of logs sold in the market.

Table 4.7: PRODUCTION, INSTALLED CAPACITY AND DEMAND FOR PLYWOOD, BY FISCAL YEAR - ACTUAL AND PLANNED

	87/88					(growth 87/88-91/92)	(in thousand m3)			
		88/89	89/90	90/91	91/92		92/93	93/94	94/95	95/96
		- ACTUAL					- PLANNED -			
Installed capacity	7,067	7,574	7,820	8,372	8,372	18.5%	8,500	8,750	9,000	9,200
Actual production	6,160	6,940	7,076	7,558	8,172	32.7%	8,200	8,500	8,700	8,900
Capacity Utilization	87.2%	91.6%	90.5%	90.3%	97.6%		96.5%	97.1%	96.7%	96.7%
Domestically Solid (share in total dem.)	1,160 18.8%	1,200 17.3%	1,250 17.7%	1,500 19.8%	1,550 19.0%	33.6%	1,600 19.5%	1,650 19.4%	1,700 19.5%	1,750 19.7%
Exported (share in total dem)	5,000 81.2%	5,740 82.7%	5,826 82.3%	6,058 80.2%	6,622 81.0%	32.4%	6,600 80.5%	6,850 80.6%	7,000 80.5%	7,150 80.3%

Source: Ministry of Industry.

4.38. **Recovery Rates.** The average recovery rate for the plywood industry in Indonesia was estimated to be 54 percent in 1987 (Atlanta, op cit, see pg. 22), which is high for a developing country (e.g. compared to 50 percent in the Philippines in 1980). APKINDO estimates a figure of 58 percent. This may be explained by the good size and shape of the logs used in plywood production and the relatively new equipment used (over 60 percent of the mills were constructed after 1980). The Atlanta study also conducted some field investigation on a sampling basis, and discovered that, while the average recovery rate for the 12 sampled mills was 53.2 percent, there was considerable variance among the mills (ranging from 76.7 to 41.0 percent), and that the recovery rate for each mill was affected by the raw material used, the condition of equipment, and the level of training for the employees. Wood recovery has been increasing slightly in recent years, i.e. by 3.53 percent per annum during 1986-87 according to an estimate by Constantino (in FAO Studies, op cit, see pg.35).

4.39. **Total Factor Productivity.** Total factor productivity has increased by 1.6 percent per annum over the period 1975-87 (FAO, op cit, see pg. 35), which is in sharp contrast with the sawmilling industry where it declined over the same period (see para 4.56 below). The relative efficiency of the plywood industry has been attributed to two factors: (a) the relatively new vintage of the equipment and technologies used; and (b) the possible prevention of inefficient producers from entering the market due to a decline in international prices in the 1980s.

4.40. **Production Costs.** There is very little information on actual production costs for plywood in Indonesia. The two published studies which exist on this topic, one done in 1987 (Atlanta) and the other in 1989 (FAO/GOI), have drawn similar conclusions on the structure of production costs for plywood in Indonesia, that 50 - 60 percent of total production cost can be attributed to raw material (log) costs. However, these estimates assume delivered log prices of \$70 per cum: in the case where logs come from concessions integrated with mill operations, cost of logs will be less (see Table 5.1 and surrounding discussion). The World Bank-ITTO Study (op cit, see pg. 54) will show an estimate that manufacturing costs for plywood in Indonesia, excluding log costs and net of margins, are about \$145 per cum. A delivered log cost of \$62/cum round (see para 5.18) is equivalent to \$114 log cost per cum of processed output, on the basis of recovery of 54% (see para 4.38 above). On this basis, log cost would amount to 44% of total costs.

4.41. If delivered log costs for 1985 of \$40 per cum (an estimate based on extraction costs in that year, and the lower DR & IHH fees which applied), and \$62 per cum for 1991 are used, the overall production costs shown in Table 4.8 result. Had ply mills in 1991 actually had to pay around \$90 per cum

Table 4.8: ESTIMATED PRODUCTION COSTS FOR PLYWOOD IN INDONESIA, 1986 AND 1991

Cost Item	1986 / <u>a</u>		1991 / <u>b</u>	
	US\$/m3	Percentage	US\$/m3	Percentage
Logs	74.6	44 %	<u>115</u>	44 %
Auxiliaries	40.0	24 %	<u>49</u>	19 %
Maintenance	3.0	2 %	—	
Labor	21.0	12 %	<u>35</u>	13 %
Depreciation	21.0	12 %	<u>25</u>	10 %
Other	11.0	6 %	<u>39</u>	15 %
<b>Total Production Costs</b>	<b>170.0</b>	<b>100.0 %</b>	<b>263</b>	<b>100.0 %</b>

Sources: /a Atlanta (op cit, see pg.22) but with an at-million price of \$40 pr cum substituted.

/b World Bank - ITTO (op cit, see pg.54) but with log prices and recovery rates as estimated by review mission.

for logs at mill, which is given as the market rate (see paras 5.19 to 5.21), then production costs (net of margins) would have been \$314 per cum. Prices given in the FAO Yearbook for Indonesian plywood have been static at around \$320 per cum (although the review mission received an estimate nearer \$355/cum). On these figures, producers would have been under considerable pressure, especially if there has been pressure to sell below these prices (see para 4.34).

4.42. **Efficiency and competitiveness issues in plywood manufacturing.** The above analysis suggests that, if plywood manufacturers in Indonesia were compelled to pay prices nearer international norms for logs, efficiency of log harvesting and utilization would rise. In Japan, where raw material for plywood manufacture is expensive, recovery from raw log to processed form is 68 percent by volume. In Indonesia, one major company is presently achieving a recovery rate of 60 percent, and it is perhaps significant that this company has no connection to a concession operation, and is compelled to purchase its log supplies on the open market.

4.43. In a situation where high-grading of the raw material resource is possible, as seems at least in some cases to apply in Indonesia, and where rent capture for that resource by the industry is high, as also seems to be the case (see Chapter V), it would be expected that the processing sector acts as a proxy for log exporting: the motivation in processing becomes raw material rent capture, rather than profitability and efficiency in processing per se. The calculations given in para 4.41 suggest this may be the case.

4.44. The Government of Indonesia, and the plywood industry, have recognized that the limits to growth of the sector are being approached, and there have been recent moves on the part of both to discourage installation of additional plywood manufacturing capacity in Indonesia. The main thrust of industry policy in this sector since the early 1980s has been the establishment of a large domestic plywood manufacturing base, and this has been achieved. Presumably, the objectives now must become consolidation, efficiency, and competitiveness.

4.45. As implied in paras 4.15 to 4.21 above, a stagnation in demand for concrete panelling - a major user of tropical plywood - is possible in Japan. The industry may need now to look at diversifying. One direction which may need to be pursued is further processing of tropical plywood into fancy or decorative grades. This is less a technical matter than one of developing the necessary marketing expertise to produce on a made-to-order basis, which may require establishment of closer relations with buyers than has been needed in the case of commodity grade plywood.

4.46. Another possibility, which links closely to the economics of plantation examined in paras 3.85 to 3.92, is the development of either (or both) commodity grade and high grade plantation plywood material, so that potential environmental barriers to marketing can be overcome.

4.47. These are possibilities for the private sector to explore. The private sector would be more encouraged to do so if the operation of the log market is allowed to adjust to the realities of increasing scarcity, and a new awareness of the other values of the forest. The specific log pricing issue is examined in Chapter V. If the Government chooses to use price to ration the raw material resource (on the basis of sustainable output) among users in Indonesia, it can choose from two basic approaches:

- (i) the linkage between concessions and plywood mills could be nullified, by offering all concession renewals for auction, or arranging for contract logging and log markets to replace the concession system altogether. This would be a radical departure from current GOI policy, which is to foster linkage between logging and processing (see para 3.38);
- (ii) the less radical option would be to retain present concession arrangements, but to promote efficiency by setting prices for the raw material in a manner that emulates the working of a stumpage market as closely as possible, so that only efficient users are encouraged to remain

in processing. Or, if price calculation per se proves problematical, then taxes on log production could be employed, at least until a pricing methodology can be implemented.

4.48. Such a move would promote technical and efficiency developments within the plywood manufacturing sector, and may stimulate some reallocation of log volumes amongst the various processing options in the country. It would need to be supplemented by deregulation in trade and foreign investment. In trade, export licensing - however administered - should not be used as a means of directing production into certain commodities or markets. It is most unlikely, when looking at the overall trading picture for Indonesian forest products, that any significant long term monopoly advantages will result from gaining market share in present markets: the options major consumers have, in terms of competing suppliers and substitute products, are too broad for such a strategy to succeed. In general it is preferable that individual producers should decide upon the value of market share and the strategies to apply in marketing output especially in the wood products sector, where niche marketing and specific linkage to traders in major markets is important. Also, it is the case that Indonesia has implemented a program to encourage greater foreign participation in industry. It will be particularly important for this to occur in forest processing if, as seems likely, the future of the industry lies in higher value added and more efficient use of the raw material resource, in an internationally competitive context. It does occur, it is certain that individual foreign participants will have their own ideas on market strategy.

#### The Sawwood Industry

4.49. **Output, Demand, Exports.** Since sawwood is produced by a large number of mills, including many small and medium sized ones, its actual production is extremely difficult to estimate. According to ISA statistics, output of sawwood increased from 7.8 million cu.m. in 1984 to 11.1 million cu.m. in 1989, a rate of 7.3 percent per annum (see table 4.9 below). Roughly a third of the output was exported during these years.

**Table 4.9: OUTPUT AND EXPORTS OF SAWWOOD BY YEAR,  
1984 - 1991**

Year	Output ('000 m3)	Exports ('000 m3)
1984	7,750	2,318
1985	8,108	2,152
1986	8,649	2,419
1987	9,331	2,772
1988	10,515	3,540
1989	11,100	3,488
1990	7,796	n.a.
1991	8,480	n.a.

Source: ISA.

4.50. However, the high tariffs imposed on sawwood in October 1989 changed the course of development for the industry. Actual production dropped by 30 percent between 1989 and 1990, from 11.1 million cu.m. to 7.8 million cu.m., and export earnings went from US\$665 million to US\$ 100 million. The effect on installed capacity is much less clear; according to Ministry of Industry statistics it has stayed constant since fiscal 1989/90 at about 15 million cu.m. per year (see Table 4.10). It may be that manufacturers have for the time being only reduced their output and not yet gone out of sawmilling. This can be expected to cause unit production costs to rise, and to squeeze margins from sawmilling. Many of the less efficient mills, especially the smaller ones not linked to HPHs (see para 4.51 below), will soon exit from the market, or may already have done so, according to anecdotal evidence. For the present, official statistics record the existence of about 4,000 sawmills throughout Indonesia.

Table 4.10: SAWWOOD PRODUCTION CAPACITY AND ACTUAL OUTPUT BY PROVINCE, 1992

Province	Number of Establishments	Installed Capacity (cu m)	Actual Production (cu m)	Capacity Utilization	Average Cap. per Est. (cu m)	Share in Total Capacity
D.I. Aceh	200	497,445	313,012	62.9%	2,487	3.3%
North Sumatra	229	832,950	565,737	67.9%	3,637	5.6%
West Sumatra	54	638,260	493,575	77.3%	11,820	4.3%
Riau	241	991,424	699,375	70.5%	4,114	6.6%
Jambi	89	1,024,558	826,406	80.7%	11,512	6.8%
Bengkulu	3	122,800	91,966	74.9%	40,933	0.8%
South Sumatra	808	1,756,625	1,136,544	64.7%	2,174	11.7%
Lampung	82	250,900	162,441	64.7%	3,060	1.7%
DKI Jakarta	47	120,820	94,952	78.6%	2,571	0.8%
West Java	155	156,418	116,881	74.7%	1,009	1.0%
Central Java	546	1,129,129	844,872	74.8%	2,068	7.5%
D.I. Yogyakarta	34	11,595	9,931	85.6%	341	0.1%
East Java	554	770,850	591,344	76.7%	1,391	5.1%
West Kalimantan	81	1,076,300	754,069	70.1%	13,288	7.2%
Central Kalimantan	161	1,142,211	741,223	64.9%	7,094	7.6%
South Kalimantan	202	1,155,496	733,882	63.5%	5,720	7.7%
East Kalimantan	224	1,755,660	1,240,207	70.6%	7,838	11.7%
North Sulawesi	167	83,097	55,526	66.8%	498	0.6%
Central Sulawesi	241	576,885	386,311	67.0%	2,394	3.8%
South-East Sulawesi	52	179,608	117,224	65.3%	3,454	1.2%
South Sulawesi	98	296,220	195,555	66.0%	3,023	2.0%
West Nusa Tenggara	16	38,629	26,290	68.1%	2,414	0.3%
Maluku	102	385,700	285,674	74.1%	3,781	2.6%
Irian Jaya	4	10,420	9,003	86.4%	2,605	0.1%
Total	4,386	14,993,580	10,482,997	69.9%	3,419	100.0%

Source: Ministry of Industry.

4.51. **HPH vs. non-HPH.** According to Hardie<sup>6</sup>, of the 4,000 or so sawmills in Indonesia (of all sizes), those linked directly with HPHs account for only about 10 percent in number, but have 65 percent of the total production capacity for the industry (most with installed capacity of more than 12,000 cu.m). The majority of HPH mills are integrated with plywood operations, and in many cases also with blockboard mills. Kalimantan and Sumatra account for about 52 and 32 percent of the total installed capacity for these mills. Smaller non-HPH mills have 80 percent of their capacity in Kalimantan and Sumatra. Their output is mainly directed to the domestic market, and this was so even before the introduction of high tariffs on sawnwood. With the probable fall in domestic sawnwood prices after 1989, these non-HPH mills will be hard pressed to survive. Note that the proportion of capacity located in Kalimantan and Sumatra are much higher in these figures than in the more recent MOI estimate provided in Table 4.10 above; although it is reasonable to assume that much of the expansion in sawmilling capacity took place in regions other than Kalimantan and Sumatra between 1987 and 1992, the difference does seem too large to be realized in only five years, which may suggest data accuracy problems.

4.52. **Capacity utilization rate.** According to Ministry of Industry (MOI) statistics, the capacity utilization rate for sawmills as a whole was 70 percent in 1992 (table 4.10). This is not consistent with Hardie's findings, that the rate is about 60 percent for the larger HPH mills, and even lower for the smaller

<sup>6</sup> Hardie, D (1989) "Sawmilling and Woodworking: Prospects for Development" in FAO (cited pg.35).



non-HPH mills. Using Hardie's methodology and using 1991 figures, the capacity utilization rate can be estimated as shown in Table 4.11.

**Table 4.11: ESTIMATED CAPACITY UTILIZATION RATE**

Total log output (mission estimate: see paras 2.30)	36 million m <sup>3</sup>
Of which sawn (assuming 50% of total logs /a)	18 million m <sup>3</sup>
Sawnwood production (assuming 43% conversion /b)	7.7 million m <sup>3</sup>
Installed capacity (MOI estimate)	15.0 million m <sup>3</sup>
Capacity utilization rate (7.7/15)	51.3 percent
Notes: /a The share assumed by Hardie for the post-export tariff scenario.	
/b The rate estimated in Atlanta (op cit on pg.22).	

4.53. The resulting capacity utilization rate is only 51 percent, which is considerably lower than the MOI figure of 70 percent and the Atlanta study estimate of 60 percent. It should also be noted from the above that, based on the above estimates for logs produced and the share of logs going to sawmills, the estimated sawnwood production would only be 7.7 million cu.m. for 1991, which is only 73 percent of the figure estimated by MOI for the same year, and almost identical to the ISA figure of 7.8 million. The high capacity utilization rate calculated solely from MOI estimates seems to result from an overestimate of sawnwood production. The sawmilling industry has probably already adjusted to the imposition of export tariffs on sawnwood by reducing output considerably.

4.54. **Recovery rate.** The Atlanta study concluded, based on estimates of inputs used and field investigations, that the recovery rate for the industry as a whole is about 43 percent, with about 46 percent for larger mills and 38 percent for smaller ones. These rates are very low, when compared with 52-55 percent in the Philippines, and levels of 60 percent or more in Japan. Explanations for the low rates could include low log prices, antiquated equipment, low quality of logs brought to the sawmills, and lack of training for workers.

4.55. According to FAO (op cit, see pg.35), wood recovery declined substantially, in fact at a rate of 7 percent per annum, during the period 1975 - 87. More importantly, after the fall in domestic log prices caused by the log export ban, wood recovery declined by about 30 percent between 1986 and 87, i.e. wood consumption per unit of sawnwood produced increased by 30 percent during that period. This contrasts with the plywood industry, where wood recovery improved both during 1975 - 87 and after the log export ban. With the export tariffs and the consequent exit of smaller, more inefficient mills from the industry, the recovery rate is expected to improve somewhat.

4.56. **Total factor productivity.** Again in a sharp contrast with the plywood industry, total factor productivity declined in the sawmilling industry, at 3.6 percent per annum between 1975 and 87, and by 6.5 percent between 1986 and 87, suggesting that the industry as a whole has become technologically less efficient over the long term, particularly after the introduction of the log export ban. This is mostly due to the aforementioned fall in wood recovery, as factor productivity either improved or declined marginally for labor, capital and energy. One possible explanation of this decline, as put forth by in the FAO studies, is the entry of inefficient producers into the industry particularly after the log export ban. Existing sawmillers must have also had less incentives to save on wood usage. Although the export tariffs will surely "weed out" some sawmills as mentioned above, the industry as a whole will continue to be subsidized by low domestic log prices, continuing to discourage efficiency gains.

4.57. **Production costs.** The production cost structure was estimated by Atlanta as shown in Table 4.12 below. About 66 percent of total cost was accounted for by logs in 1986. When updated with

higher log prices (assuming US\$90 per cu.m. for meranti) and accounting for inflation with the other items, the estimated total cost would be about US\$300 per cu.m., which is higher than the unit cost for producing plywood, due mostly to the lower recovery rate and the assumed difference in at-mill log cost. As the domestic price of meranti sawnwood is reported to be in the range of US\$175-200 (export quality) and US\$100-125 (non-export quality), this does not make sense: a possible explanation is that logs used for sawmilling are much less expensive than the ones used for plywood production, which is logical with the reported lower quality of logs used for sawmilling.

4.58 **Efficiency and competitiveness issues in sawmilling.** The predominant policy event in this sector in recent times is the imposition, in 1989, of very high export taxes on basic sawn products<sup>7</sup>. The eventual outcome of this measure is not yet known: so far, it appears that production from the sector as a whole has not recovered to pre-tax levels: the proportion of production previously exported has not found a domestic market as yet. Very low capacity utilization is now prevalent in the sector.

4.59 A primary motivation of the export taxes was to prevent the practice of minimally processing logs through sawmills as a means of circumventing the ban on export of logs: this was apparently a widespread practice prior to introduction of the taxes.

**Table 4.12: ESTIMATED PRODUCTION COSTS FOR SAWMILLING IN INDONESIA  
(CURRENT PRICES)**

Cost Item	1986		1992 /a	
	US\$/m <sup>3</sup>	Percentage	US\$/m <sup>3</sup>	Percentage
Logs	158.85	66.3 %	209.30	70.00 %
Fuel	7.00	3.0 %	8.01	2.68 %
Maintenance	7.10	3.0 %	8.12	2.72 %
Handling	4.50	1.9 %	5.15	1.72 %
Labor	18.95	8.0 %	21.68	7.25 %
Depreciation	10.70	4.5 %	10.70	3.58 %
Administration	15.00	6.3 %	17.16	5.74 %
Other	16.50	7.0 %	18.88	6.31 %
<b>Total Production Costs</b>	<b>236.60</b>	<b>100.0 %</b>	<b>299.00</b>	<b>100.00 %</b>

Source: Atlanta (op cit, pg.22), mission calculations.

/a Assuming: - 43.0% Recovery rate.

- 14.4% Domestic inflation in US Dollar terms between 1986-1991.

- 90 US Dollars per cu.m as log price.

4.60 Another intention of the measure was to drive raw material resources into the secondary (downstream) processing sector, in pursuit of higher value added within Indonesia. As suggested in para 4.76, there was some initial stimulus in this regard but it seems not to have been sustained.

4.61 Anecdotal evidence collected during the sector review mission suggests that, even before the imposition of export taxes, many independent sawmills were experiencing difficulties in obtaining adequate log supplies for their operations. If so, this may to some extent explain why the expansion of the secondary

<sup>7</sup> Export taxes for Meranti Merah Rose from a range of \$5 - \$50 per cum (depending on grade) to \$250 - \$500 per cum. For Ramun, taxes went from \$30 - \$40 per cum to \$500 - \$1000 per cum.

wood processing sector has not persisted, because those processors will depend on sawmills for their basic timber inputs for further processing. This would particularly be the case if sawmills which are integrated with plymill operations have chosen to divert their export logs to the ply operation, instead of into production for the local secondary market.

4.62 Even if a government is able to justify industry policies aimed at increasing value-added, on grounds of employment priorities and regional development imperatives, this would not in itself justify the application of punitive export taxes across the spectrum of what is normally termed sawn timber - which is apparently the coverage of the taxes in this case. Some sawn product would attract prices in the same order as commodity grade plywood on the international market, and there would seem to be little economic reason why exports of such products should not be permitted. Limiting the application of taxes, either on a sawn product size basis, or some per unit price threshold, would achieve the objective of retaining value added, without loss of export markets. In fact, the present export tax regime does differentiate between large sized material and smaller dimensions, but even the smaller dimension material (anything greater than 6 mm thickness) is taxed at \$250-\$500 per cum, depending on species (unless the product is laminated, finger jointed, or decoratively moulded). At these rates, it is clearly not saleable on the international market to any significant extent. For a graduated export tax scale to work, the lower limit for small dimension or otherwise more processed and valuable product would need to be lowered significantly. It is not possible to determine what proportion of the 25 percent of total sawn production which was exported would be exportable again, if such a change were made. Some anecdotal evidence collected on the sector review mission suggests the change could be significant: one of Indonesia's larger concession and processing operations reported that, on their holdings, a significant volume of Merbau was present. This is a species which is unsuitable for plywood manufacture but for which the company had developed a strong export sawn market, which was lost when the taxes were applied. This species is now left in the forest during logging operations and, according to the company, one effect has been a rise of around \$10 per cubic meter in average logging costs for their operations as a whole. Overall, introduction of a graduated export tax, to encourage export of processed timber, would not only provide better support for the secondary processing sector, but might also introduce stronger competition into the log market (provided policies linking concessions to processing are eliminated).

### Woodworking

4.63. **Definition.** Woodworking is defined here to include all forms of secondary processing of wood, including smoothing and shaping (e.g. molding) and assembly of wood (e.g. window frames). Since furniture and furniture components (sometimes called tertiary processing) are quite different from other types of downstream industries in terms of value added, employment effects, nature of markets, and skills needed for production, they are treated separately at the end of this section. As woodworking products are extremely heterogenous, and because most of the plants are extremely small, their number and other statistics are difficult to quantify. Therefore, in this review the focus is placed on selected types of products where data are available.

4.64. **Main product groups.** The Atlanta study estimated the shares of major products in total output volume for woodworking products. The largest share, about one-third, belonged to building materials, including doors, window frames, and shingles. Moldings was the second with 29 percent. "Others" included wooden tools, toys, coffins, musical instruments, chopsticks, and boat parts. (Table 4.13).

4.65. **Plant size.** The industry is dominated by small and household/cottage plants; data on household/cottage plants are however not available. According to Hardie (op cit pg. 67), 1,680 small-scale plants existed for building materials, handicrafts, and wooden containers alone, as opposed to 85 large and medium scale ones.

Table 4.13: BREAKDOWN OF WOODWORKING OUTPUT BY PRODUCT

Product Group	Share in total output volume (%)
Building materials /a	32
Parquet	1
Moldings	29
Packaging material	7
Poles	3
Others	28
Total	100

Source: Atlanta, 1987 (op cit on pg.22).

Note: /a Does not include prefabricated housing.

4.66. **Output, installed capacity, demand.** The major woodworking products monitored by MOI are window frames and prefabricated housing. Their output, installed capacity and demand are summarized in the table below. Although their output has expanded rapidly over the last five years, they are still insignificant when compared with plywood and sawnwood. While prefabricated housing is mainly directed to the domestic market, window frames are increasingly being exported: in fiscal 1991/92, nearly 60 percent of their output was exported (table 4.14 below).

4.67. With small-scale plants, most of the woodworking products are directed to extremely localized markets near production facilities. According to Hardie (op cit pg.67), 23 percent of building materials, 29 percent of wooden containers and 13 percent of handicrafts manufactured by small-scale producers in 1986 were directed to their sub-districts. Virtually nothing was exported from these three categories.

Table 4.14: PRODUCTION, INSTALLED CAPACITY AND DEMAND FOR WINDOW FRAMES, BY FISCAL YEAR - ACTUAL AND PLANNED

	87/88	- actual -				(Total growth 98/88 - 91/92)		- planned -		
		88/89	89/90	90/91	91/92	92/93	93/94	(in m <sup>3</sup> )		
								94/95	95/96	
Installed capacity	458,619	471,300	500,000	725,000	875,000	90.8%	1,050,000	1,200,000	1,300,000	1,450,000
Actual production	382,200	414,200	460,000	691,900	852,400	123.0%	950,000	1,150,000	1,175,000	1,200,000
Capacity Utilization	83.3%	87.9%	92.0%	95.4%	97.4%		90.5%	95.8%	90.4%	82.8%
Domestically Sold	340,000	360,000	390,000	450,000	500,000	47.1%	550,000	600,000	700,000	800,000
(share in total dem.)	89.0%	86.9%	84.8%	65.0%	58.7%		57.9%	52.2%	59.6%	66.7%
Exported	42,200	54,200	70,000	241,900	352,400	735.1%	400,000	550,000	475,000	400,000
(share in total dem)	11.0%	13.1%	15.2%	35.0%	41.3%		42.1%	47.8%	40.4%	33.3%

Source: Ministry of Industry.

4.68. **Number and regional distribution.** The Atlanta study estimated the regional distribution of woodworking plants according to their size, without trying to specify their exact numbers, as shown in Table 4.15 below. Forty percent of the large and medium scale plants established in Kalimantan are integrated with sawmills as a further stage in downstream processing, while 58 percent of small-scale plants found in Java are obviously located away from resource supply, oriented towards local consumption.

**Table 4.15: REGIONAL DISTRIBUTION OF WOODWORKING PLANTS**

Region	Large and Medium scale establishment (%)	Small scale establishments (%)
Sumatra	25	14
Java	13	58
Kalimantan	40	6
Sulawesi	10	9
Flores, Timor	0	11
Maluku	7	1
Irian Jaya	5	1
Total	100	100

Source: Atlanta (op cit on pg.22).

4.69. **Distribution of woodworking production capacity, as well as output, by region** is as shown in Table 4.16 below. In marked contrast with other wood-based industries, production facilities in woodworking are heavily concentrated (57.6 percent of the total) in Java.

4.70. **Capacity Utilization Rates, Recovery Rates.** It is extremely difficult to estimate production capacity for woodworking plants, since the capacity of the same machine can vary significantly depending on: (a) whether or not it is used for series or individual production; (b) the wood species used; and (c) the skills level of workers. It then becomes difficult to calculate capacity utilization rates. With this caveat, the Atlanta study estimated that for large and medium scale plants, the capacity utilization rate would be about 30 percent. For small and household/cottage plants, the Atlanta study concluded that the capacity utilization rates cannot be calculated since with these plants production is done mainly by hand. The wood recovery rate was estimated to be 28 percent in the same study. These rates were based on field investigations.

4.71. **Furniture: Output, Installed Capacity, Demand.** Like other woodworking products, the furniture industry began its growth from a very small base. Although the installed capacity and production for furniture and its components more than doubled between fiscal 1987/88 and 1991/92 (see Table 4.17 below), the industry is dwarfed by the plywood and sawmilling industries. It should be noted, however, that the structure of demand has changed considerably in recent years: the share of exports in total demand for furniture and its components has risen during the same period from about 10 to 40 percent. This can be substantiated by the increase in export earnings, which went from US\$9 million in 1986 to US\$313 million in 1991.

Table 4.16: WOODWORKING PRODUCTION CAPACITY AND ACTUAL OUTPUT BY PROVINCE, 1992

Province	No. of Est.	Installed Capacity (cu m)	Actual Production (cu m)	Capacity Utilization	Av. Cap. per Est. (cu m)	Share in Total Capacity
D.I. Aceh	4	19,480	7,353	37.7%	4,870	0.4%
North Sumatra	28	260,930	218,705	83.8%	9,319	4.7%
West Sumatra	6	29,450	13,853	47.0%	4,908	0.5%
Riau	41	293,762	261,990	89.2%	7,165	5.3%
Jambi	20	128,587	109,643	85.3%	6,429	2.3%
Bengkulu	2	23,000	10,396	45.2%	11,500	0.4%
South Sumatra	27	229,800	174,075	75.8%	8,511	4.2%
Lampung	6	20,405	8,273	4.5%	3,401	0.4%
DKI Jakarta	127	677,349	590,451	87.2%	5,333	12.2%
West Java	155	986,381	918,882	93.2%	6,364	17.8%
Central Java	41	295,914	265,453	89.7%	7,217	5.4%
D.I. Yogyakarta	0	0	0	0.0%	0	0.0%
East Java	189	1,228,835	1,119,141	91.1%	6,502	22.2%
West Kalimantan	42	343,970	295,476	85.9%	8,190	6.2%
Central Kalimantan	19	135,280	105,187	77.8%	7,120	2.4%
South Kalimantan	25	152,684	119,668	78.4%	6,107	2.8%
East Kalimantan	47	293,070	250,450	85.5%	6,236	5.3%
North Sulawesi	34	41,673	27,089	65.0%	1,226	0.8%
Central Sulawesi	8	62,850	48,067	76.5%	7,856	1.1%
South-East Sulawesi	14	16,655	4,880	29.3%	1,190	0.3%
South Sulawesi	10	73,120	55,173	75.5%	7,312	1.3%
Bali	5	6,855	5,656	82.5%	1,371	0.1%
West Nusa Tenggara	3	2,910	2,399	82.4%	970	0.1%
East Nusa Tenggara	14	10,921	7,876	72.1%	780	0.2%
East Timor	0	0	0	0.0%	ERR	0.0%
Maluku	35	101,119	81,337	80.4%	2,889	1.8%
Irian Jaya	12	95,000	63,827	67.2%	7,917	1.7%
<b>Total</b>	<b>914</b>	<b>5,530,000</b>	<b>4,765,300</b>	<b>86.2%</b>	<b>6,050</b>	<b>100.0%</b>

Source: Ministry of Industry.

4.72. **Furniture: Number and regional distribution.** It was estimated in 1987 that there are 137 large and medium scale establishments, and 5,600 small scale ones in Indonesia (Atlanta, op cit pg. 23) Again the large and medium ones are generally integrated with primary processing plants, but its share in the total number (6 percent) is extremely small, even compared to woodworking. The regional distribution of all establishments was estimated in the same exercise (see Table 4.18 below); it shows heavy concentration in Java, with 80 percent or more of both size groups located on the island. This can be explained by: (a) closeness to markets; (b) abundance of skilled labor; and (c) availability of infrastructure.

4.73. **Furniture: Employment.** The total number of employees estimated for the furniture industry, using the benchmarks of 42 persons in a large and medium establishment and 7 in a small one, was 45,000 in 1984 (Atlanta op cit pg.22).

4.74. **Furniture: Capacity Utilization Rates, Recovery Rates.** There are the same problems with calculating capacity utilization rates and recovery rates that exist with the woodworking industry. Based on MOI statistics, the capacity utilization rate can be calculated to be 90 percent in fiscal 1991/92, although the caveats mentioned in the woodworking section apply. As for recovery rates, it was found during field interviews that about 40 - 50 percent of log inputs are recovered as finished products.

**Table 4.17: PRODUCTION, INSTALLED CAPACITY AND DEMAND FOR FURNITURE/FURNITURE COMPONENTS, BY FISCAL YEAR - ACTUAL AND PLANNED**

	87/88	- actual -				(Total growth 98/88 - 91/92)		- planned -		
		88/89	89/90	90/91	91/92	92/93	93/94	(in m <sup>3</sup> )		
								94/95	95/96	
Installed capacity	1,319	1,500	1,600	2,350	2,675	102.8%	3,000	3,500	3,800	4,000
Actual production	1,159	1,226	1,400	2,006	2,411	108.0%	2,800	3,000	3,100	3,150
Capacity Utilization	87.9%	81.7%	87.5%	85.4%	90.1%		93.3%	85.7%	81.6%	78.8%
Domestically Sold	918	950	1,000	1,050	1,100	19.8%	1,200	1,300	1,400	1,500
(share in total dem.)	79.2%	77.5%	71.4%	52.3%	45.6%		42.9%	43.3%	45.2%	47.6%
Exported	241	276	400	956	1,311	444.0%	1,600	1,700	1,700	1,650
(share in total dem)	20.8%	22.5%	28.6%	47.7%	54.4%		57.1%	56.7%	54.8%	52.4%

Source: Ministry of Industry.

**Table 4.18: REGIONAL DISTRIBUTION OF FURNITURE PLANTS**

Region	Large and Medium scale establishment (%)	Small scale establishments (%)
Sumatra	0	11
Java	84	80
Kalimantan	9	1
Sulawesi	0	7
Flores, Timor	0	0.6
Maluku	0	0.2
Irian Jaya	7	0.2
Total	100	100

Source: Atlanta (op cit on pg.22).

4.75. **Efficiency and Competitiveness issues in secondary wood processing.** The policy of imposing prohibitively high export taxes on sawnwood, instituted in late 1989, was aimed at establishing further processing of wood products, particularly woodworking and furniture products, as a major exporting industry for Indonesia. Indeed, both foreign and domestic investment in this industry jumped in 1990, and exports of these products increased sharply. However, investment in this industry appears to have tapered off since 1990, and failures and dropouts seem to have increased noticeably in these activities.

4.76. BKPM data show that both domestic and foreign investment in the wood processing sector measured in terms of amounts involved and number of cases approved, peaked in 1989 and 1990, and declined in 1991 and in the first half of 1992. BKPM data show investment proposals on approvals basis but do not show the extent of investment actually implemented.<sup>8</sup> Table 4.19 shows Indonesia's imports of woodworking tools and machinery in the 1985-1991 period.<sup>9</sup> If it can be assumed that total investment in the secondary wood processing industry changed broadly in parallel with imports of machinery and tools shown in Table 4.19, it appears that total investment in this industry, having increased in the 1986-1990 period, decreased in 1991.

Table 4.19: INDONESIA: IMPORTS OF WOODWORKING TOOLS & MACHINERY  
(US\$ Million, 1985-1991\*)

Description of Woodworking Tools & Machinery	1985	1986	1987	1988	1989	1990	1991
Machines, Tools					4.5	7.7	4.2
Sawing Machines					15.8	22.1	16.8
Planing, Milling or Moulding Machines					19.4	36.6	19.4
Grinding, Sanding or Polishing Machines					7.1	12.9	10.1
Bending or Assembling Machines					2.5	9.4	4.6
Drilling or Morticing Machines					1.7	3.2	2.3
Splitting, Slicing or Paring Machines					5.8	5.2	7.2
Other Machines for Working Wood					58.6	128.2	91.7
Parts of Machines for the above (8465)					7.6	9.9	10.2
Sawing Machines for Working Wood	3.7	0.0	3.2	14.0			
Accessories/Parts for CCCN 8446 or 8447	5.9	7.1	8.5	10.1			
Machines for Treating Wood	5.6	7.6	19.6	42.7			
<b>TOTAL OF ABOVE</b>	<b>15.2</b>	<b>14.7</b>	<b>31.3</b>	<b>66.7</b>	<b>122.9</b>	<b>235.2</b>	<b>166.2</b>

Source:

\*/ Classification Schedules changed in 1989, from CCCN to HS. So, there may be a difference in coverage between the data for 1985-1988 and those for 1989-1991.

4.77. Not all of the apparent contraction in investment interest in the sector should be attributed to domestic factors: there has been a slowdown in the growth of export demand for secondary processed wood products caused by the economic recessions in industrial countries, especially in Japan and the United States. Indeed, the income elasticity of demand for woodworking products and furniture is known to be relatively high; woodworking products being used mainly in housing/building industries and furniture being consumer durables. Thus, demand may be an important factor causing the current financial difficulties and investment slowdown in these sub-sectors in Indonesia.

<sup>8</sup> A recent study by IFC/MIGA's FIAS states: "Based on the analysis of the data published by both BKPM (approvals) and Bank Indonesia (Implementation), we have estimated that in the period 1968 to 1987 only 31% of the value of BKPM approved projects (including cancellations) have been realized. A similar ratio (35%) for the years 1967-September 1988 appears in a recent publication of FDI in Indonesia by an Australian researcher." See IFC/MIGA's FIAS (February 1990), p.13.

<sup>9</sup> Table 7 includes only the selected SITC codes that are judged to be definitely related to sawmilling and woodworking. Also, since Indonesia changed its trade classification system in 1989, it is not certain that data shown for the period 1985-1988 and those for the period 1989-1991 are precisely consistent.



4.78. However, the sector review mission encountered considerable anecdotal evidence that woodworking and furniture producers are experiencing considerable difficulties in procuring adequate supplies of logs or sawnwood.

4.79. The apparent diminution in investor interest in secondary wood processing appears to have at least some origin in domestic policy. These industries are dependent on the existence of a healthy sawmilling sector, and that has been affected by export taxes: counterintuitive as the argument may seem, it may well be that a regaining of at least some part of the sawn export market by Indonesian sawmills may have spin-off benefits for secondary processing. In peninsular Malaysia, it has become evident that restriction of sawnwood exports has reduced the supply of needed material to downstream processors.

4.80. The extent to which Indonesia will wish to pursue promotion of the secondary processing sector will, in view of the general policy objectives of the Government, relate closely to the potential of the sector to deliver high employment. Some analysis of this matter is therefore pertinent, and can be undertaken using standard industry data on employment and value added. Annex 4 to this review describes a simple spreadsheet model used to explore this issue, and reports the results of its application. The basic approach in the model has been to compare the employment and value added impacts of shifting log volume from other forms of processing to secondary processing.

4.81. The model shows that if 20 percent of total log supply were shifted to secondary processing (from plywood manufacture), a net increase in value added of 10 percent (around \$370 million in national terms) and 11 percent (66 000 workers) in employment would result. For the sake of comparison, it can be calculated that a rise in recovery rates in sawmilling of 6 percent, and plywood manufacture of 5 percent, would achieve the same gain in valued added, but would produce employment increase of only 3 percent.

4.82. This simple analysis does not assess the investment costs involved in increasing secondary processing, nor those needed to produce the recovery rates adopted. Moreover, it ignores a positive linkage between the sawmilling and secondary processing sectors: if additional secondary processing capacity is integrated with sawmilling, one result will be a rise in sawmilling recovery, because of the ability to utilize smaller sizes off the saw.

4.83. This analysis is not meant to imply any recommendation that Indonesia should attempt to boost secondary processing by legislative means or administrative fiat. Rather, it is intended to indicate that if the secondary processing industry is able to acquire both the log supplies and technology needed to become a competitive supplier internationally, then significantly higher employment per unit of log volume input (now the limiting input in the forestry sector) would result.

#### Pulp and Paper

4.84. **Output, Installed Capacity, Demand.** There has been a rapid expansion of production capacity in the pulp and paper industry. Between 1980 and 1991, the average annual growth was between 18 and 20 percent per annum. Output grew by 20 percent per year from 0.83 to 1.44 million tons and installed capacity increased by 21 percent per annum from about 1 million tons to 1.7 million, between 1987 and 1990 (see Table 4.20 below). Investment in pulp expanded particularly fast between 1988 and 1991. Such high growth in output was fueled by a rapid rise in consumption of paper, which practically doubled during the period. It grew by 10 percent per annum between 1980 and 1990, and is expected to grow at 8.5 percent per year between 1993 and 2000, slowing down further to 6.5 percent per year between 2000 and 2010 (Hone, op cit, pg.44). In the year 2000, Indonesia is projected to produce 3.9 million tons of paper (nearly three times the level in 1991), of which 3.0 million will be consumed domestically (more than twice the level in 1991) and 0.9 million tons will be exported (five times the level of 1991). Some projections given in a consultancy

report<sup>10</sup> prepared for the forthcoming Bank industry sector review give a range of 5.6-7.1 million tons for domestic demand per annum by year 2010.

Table 4.20: OUTPUT, INSTALLED CAPACITY AND DEMAND FOR PAPER BY YEAR, 1987 - 1990

		1987	1988	1989	1990
Production (m ton) 1987 - 1990	Capacity	980,000	1,162,000	1,481,000	1,716,000
	Paper	826,500	931,400	1,154,800	1,438,100
	- Newsprint	121,800	140,000	143,700	157,100
	- Writing & Printing	283,800	317,800	417,700	503,800
	- Industrial Paper	414,400	466,700	586,900	771,400
	- Others	6,500	6,900	6,500	5,800
Utilization (%)	84.3%	80.2%	78.0%	83.8%	
Import (m ton) 1987 - 1990	Paper	144,400	110,200	124,700	123,600
	- Newsprint	6,900	7,200	5,100	13,800
	- Writing & Printing	9,700	9,100	13,600	16,100
	- Industrial Paper	119,900	85,000	90,800	44,500
	- Others	7,900	8,900	15,200	49,200
	Pulp	232,500	199,300	208,000	216,700
Waste Paper	225.5	323.7	382.5	463.4	
Export (m ton) 1987 - 1990	Paper	188,479	213,409	204,366	190,329
	- Newsprint	24,807	21,251	3,220	0.042
	- Writing & Printing	76,151	96,079	121,844	112,913
	- Industrial Paper	86,635	93,808	79,251	77,180
	- Others	0.886	2,271	0.051	0.194
	Pulp	7,500	7,700	86,481	180,875
Waste Paper	0	0	0	0	
Consumption (m ton) 1987 - 1990	Paper	782,421	828,191	1,075,134	1,371,371
	- Newsprint	103,893	125,949	145,580	170,858
	- Writing & Printing	217,349	230,821	309,456	406,987
	- Industrial Paper	447,665	457,892	598,449	738,720
	- Others	13,514	13,529	21,649	54,806
Manpower 1987 - 1990		18,583	19,724	29,530	33,326
	Indonesia	18,298	19,444	29,076	32,884
	Expatriate	0.285	0.28	0.454	0.442

Source: Indonesian Paper Trade Directory, 1991; APKI Jakarta, June 1991.

4.85. **Imports.** With the expansion of the domestic industry, the share of imports in domestic consumption dropped from 19 percent in 1987 to 9 percent in 1990. It also decreased in absolute terms, from 0.14 to 0.12 million tons: this however is due mostly to a sharp decline in imports of industrial paper and pulp, as imports of newsprint, writing and printing paper and waste paper increased during the period. Tariffs on most grades of paper have been reduced from 40-60 percent in the early 1980s to 30 percent in 1991. The duties on newsprint, waste grades, and imported pulps are very low, at 5 percent. However, the level of effective protection remains extremely high, and it may be difficult to expand paper exports substantially without facing the risk of countervailing duties in some markets.

4.86. **Exports.** In 1987, Indonesia became a net paper exporter: exports of paper (mostly printing and writing grades, and industrial papers) remained at about 0.2 million tons during the period. The export share of total production dropped considerably, however, from 19 percent to 11 percent, as domestic demand

<sup>10</sup> Jaakko Poyry Consultants (1993) *Microview on Indonesian Forest Based Industry*, World Bank.

rose. Export prospects are quite good for bleached hardwood pulps, and printing and writing papers, to East Asia, especially Japan, Korea, Taiwan, and the People's Republic of China.

4.87. **Number and regional distribution.** In 1991, the pulp and paper mills were distributed by ownership and region as shown in Table 4.21 below. In terms of ownership, the salient features are: (a) the large (35.8 percent of total installed capacity) share of the public sector in the pulp industry, which incidentally is higher than in any other wood-based industry (there are plans to privatize this sector, and some sales of public operations were made in 1992); (b) the large (42 percent) share of foreign ventures in the pulp industry; and (c) the dominance of private domestic operators (69.2 percent) in the paper industry: the paper industry in Indonesia is dominated by three conglomerates, and this situation is expected to intensify in future. In terms of regional distribution, it should be noted that: (a) virtually all production capacity of pulp is split between Sumatra (57.2 percent) and Java (41.4 percent), notably with none in Kalimantan; and (b) most (85.7 percent) of the paper producing capacity is located in Java, with the rest situated in Sumatra. There is likely to be further pulp and paper investment in Sumatra, with Indah Kiat's investment plans between 1992 and 1995.

Table 4.21: DISTRIBUTION OF PULP AND PAPER MILLS BY OWNERSHIP AND REGION, 1991

		Nos.	Installed Capacity (tons per annum)			
			Pulp	Share	Paper	Share
No. of Mills and Status 1991	- State Enterprises	6	396,400	35.8%	422,900	13.8%
	- Private Company Domestic	30	246,100	22.2%	2,124,700	69.2%
	- Private Company Foreign	5	465,000	42.0%	523,900	17.1%
	Total:	41	1,107,500	100.0%	3,071,500	100.0%
Location of Mills 1991	- Java	35	458,500	41.4%	2,631,100	85.7%
	- Sumatra	5	633,000	57.2%	410,400	13.4%
	- Sulawesi	1	16,000	1.4%	30,000	1.0%
	Total:	41	1,107,500	100.0%	3,071,500	100.0%

Source: Indonesian Paper Trade Directory, 1991; APKI Jakarta, June 1991.

4.88. **Production costs and prospects.** Provided it can maintain capacity utilization and reasonable wood costs, Indonesia has prospects of being amongst the lowest cost producers of pulp in the world. A consultancy report (see Jaakko Poyry op cit on pg.54) done for the Bank's forthcoming Indonesia industry sector review shows a calculation of prices needed for hypothetical pulp operations to generate market returns to capital in the nine most competitive producer countries: Indonesia's price is \$497 per air dry tonne (ADT); followed by Venezuela at \$550/ADT, and then other Southern American and African countries. The same study calculates that, if all plans for pulp production in Indonesia are realized, the country will produce 20% of global production of bleached kraft short fibre pulp by 2005. This would have a market value, in 1992 prices, of US\$2.2 billion p.a.

4.89. Most paper produced in Indonesia now is sold on the domestic market at internationally competitive prices: the major exception is newsprint, which sold in 1992 for Rp117.0/kg on the domestic market, compared to an international price of Rp870/kg for that product. The government introduced a 20% duty and surcharges on newsprint in 1992. Some paperboard products also sell at prices up to 25% higher than international prices on the domestic market.

4.90. The printing and writing paper market in Indonesia is dominated by a single producer - the Sinar Mas group - which appears to be aiming to become even more dominant. At present, this group is pricing aggressively on the domestic market, and prices of printing and writing paper have dropped from Rp.2000/kg in 1989, to Rp.1350/kg by October, 1992. Jaakko Poyry consultants (see op cit pg.77) have carried out some

analysis which suggests that this price level - which is slightly below international parity - is significantly below costs of production plus capital charges. It may therefore be a temporary phenomenon related to the market share strategy being pursued by Sinar Mas.

4.91. On the basis of these observations, Indonesia's prospects in the pulp and paper sector appear relatively good. However, the international pulp and paper market is notoriously cyclical and highly competitive, and no single producer country can hope to gain a predominant position in it. In recent years, the pulp cycle in particular has been in decline: spot prices on Asia markets have recently ranged from US\$430 to 460 per ton. A major impact in these years has been the entry of large volumes of Brazilian pulp. Increases from this source will now taper off: the new uncertainty could be Russia, which has large export capacity for pulp, and presumably will be inclined, in the short term at least, to use this as a means of generating much needed foreign exchange.

4.92. Expansion of Indonesian capacity will, on present indications, be based on exports, and on large scale operations. These will require relatively expensive pollution control investments - small, domestic scale mills may be able to dispose of waste in waterways, but this will not be an option for large mills, particularly in relation to control of dioxin and chlorine.

4.93. Although the pulp and paper sector in Indonesia is presently strongly linked to the natural forest resource - the major focus of this review - through the operation of the HTI scheme, in future this linkage will weaken, as the sub-sector becomes more reliant on plantation resources under rotation on lands already committed to that purpose. From this point of view, the economic and environmental issues involved in pulp and paper making will become more closely related to the generic ones of industry growth in Indonesia: industry, trade, and protection policies; competitiveness; the role of government and public enterprises; pollution abatement. These issues will be dealt with extensively in forthcoming Bank reports on the industry sector and environmental management in Indonesia.

CHAPTER V  
PRICING INDONESIA'S FOREST RESOURCES

Introduction: The Role of Price

5.1. It has been implied at various places in this report that the price of standing timber is presently set too low, and that this is distorting both the log supply market, and the efficiency and competitiveness of the processing sector. This chapter will present the case for log price rises in Indonesia. Although revenue impacts from doing so are calculated, it is a central argument of this chapter that the reasons for raising prices go well beyond revenue, into basic issues of sustainability and the structure and nature of the forest products sector, and some indicative calculations of value added outcomes are presented in support of this point.

5.2. Price rises alone - especially if applied on a uniform basis- will not achieve all the objectives of sustainability and efficiency of resource use, and this reservation should be explained clearly at the outset. Across-the-board rises will not, without accompanying support in the area of supervision and enforcement, increase efficiency of wood utilization: high grading and more illicit removals might otherwise be the result. Moreover, the means by which price is assessed and collected is important: if, for example, volume is assessed in the forest, rather than at the log dump (and if, at the same time, logging operations are confined to a designated area), then this will create an incentive to extract the maximum volume from the stand. If, as a second example, part of the price calculated for logs is in fact a performance bond, rebatable to the concessionaire upon evidence of acceptable and well controlled operations, then a strong incentive to comply with concession conditions is built into the system (see para 6.76).

5.3. There are two compelling reasons why standing timber revenues collected by government should rise in Indonesia. First, it is the intention of the Government of Indonesia, and presumably of a significant proportion of the private sector, that forestry should be a long term industry for Indonesia. Measures to bring about sustainability will not be costless, and it must be made evident to all that the investment in the resource is worthwhile: this is highly dependent on the value of that resource. Moreover, the price of plantation material - especially that which will directly compete with natural forest material - will be conditioned by natural timber prices, in a market which will be dominated by natural timber output for some considerable time to come. The Government of Indonesia cannot expect private investor interest in plantation (without recourse to large subsidies) to be high, if low price structures for natural standing timber are institutionalized.

5.4. The second reason relates to processing industry structure and performance. The issues in this regard have been raised at various places in Chapters IV above, and have also been raised by GOI (for example, in its Action Plan for Forestry Sector Development in Indonesia). Sustainability requires that there be a limit on how much natural forest area can be logged in a given time frame: the limit may vary according to interpretations of sustainability (see paras 1.21 and 1.22), but ultimately some limitation on output will apply. It is in the national interest that as much commercial volume as possible be taken from such areas (consistent, of course, with silvicultural and management prescriptions), and that the maximum gain, in terms of genuine value added arises from whatever is done with the volume from then on. The more competition that can be introduced into the process, the more likely it is that the most efficient and competitive processors will emerge as predominant users of the resource.

5.5. With these observations in mind, it is appropriate to review the current status of economic rent collection for standing timber in Indonesia, and the extent to which this might be changed.

### Fees for Standing Timber: Economic Rent

5.6. Past and present system of government charges. This discussion is confined to revenue collection from sale of logs, by government. Although the sawn timber export tax is technically a revenue generator, it is discussed separately in paras 4.58 to 4.62.

5.7. In the 1979's and early 1980's, fees for standing timber were assessed on the basis of actual volumes assessed at the logging site. In 1985, the system was altered, to assessment based on processed output, using a 50% recovery factor.

5.8. The main element in the government's collection of fees at present is the reforestation levy (DR), which was introduced via presidential decree in 1980, at \$4/cum, and has since been raised to \$7/cum (1989) then \$10/cum (1990), and \$15/cum (1993). Funds from collection of the DR are accumulated in the Reforestation Fund, managed by the Ministry of Forestry. This fund is used to finance the HTI and other works as sanctioned by the Minister. As noted in para 3.77, about \$900 million is now in the Fund. Some \$125 million has been allocated to applicants for assistance.

5.9. The second major element in fee collection is the forest products royalty (IHH) which is set according to a tariff, approximating 6% of the delivered price of logs. This revenue is transferred to the Ministry of Finance, which then distributes it as follows: provincial governments (40%); local governments (20%); national rehabilitation of forest areas (25%); regional forestry (15%).

5.10. There are other charges levied: a forest concession license fee; land and building taxes; and scaling and grading fees; but together these amount only to some 3-4% of total government fee collections.

5.11. The basis of fee calculation was altered, on an experimental basis, to self-assessment, by individual concessionaires or the industry as a group, in 1990 (see para 3.75).

5.12. On the basis of official log removals averaging about 25 million cum, and an average per cubic meter total government fee collection of \$15.40/cum, total government revenues from logging in recent years have averaged \$385 m per annum. This makes forestry the second largest (after oil and gas) natural resource revenue source for the Indonesian Government.

5.13. Were the Indonesia Government able to collect revenues for illegally removed timber (see paras 2.28 to 2.30), and on the basis of the expected DR fee, which will take average total fee collection to about \$20/cum, GOI's revenues from 1993 onwards would be on the order of \$700 - \$800m p.a., although these would decline towards 2000, as lower log output limits come into force.

5.14. The economic rent issue. A crucial question for Indonesia is: how much revenue should be collected as standing timber fees from its forest resources? This question needs to consider the balance between the nation's desire to have a major forest processing export sector, on the one hand, and on the other hand the fact that, of all factors of production involved in that sector, logs are the most limiting, with regional shortages already occasionally apparent, and according to GOI's projection a declining supply from the natural forest areas over the next three decades.

5.15. The normal means in a market economy by which a scarce resource is allocated amongst users is the price mechanism. In the case where supply is limited by biological and administrative determinants, as is the case with logs from the natural forests, the selling prices of logs in the forest might have been expected to have moved upwards faster than prices of other products. In fact, from 1985 to 1991, the wholesale price index for the log extraction and processing sector as a whole rose by 150%. Had fees for standing timber risen by the same proportion over the same period, they would have reached an average of about \$33 per cum in the latter year: as noted earlier they were actually about \$15/cum in that year.

5.16. There is no apparent reason why logging costs will have risen disproportionately over this period, and therefore it would seem that fees for standing timber are well below what the market might bear, and that therefore Government is not extracting full economic rent for standing timber. This is borne out by almost all recent studies of this question. Table 5.1 summarizes some recent calculations of the revenue situation in Indonesia forestry.

Table 5.1 COMPARISON OF RECENT ESTIMATES OF ECONOMIC RENT ESTIMATES FOR LOGS IN INDONESIA

SOURCE	At mill Log price assumed	Costs of Logging assumed	Available Rent	Actual fee Collected as % of Available Rent
<u>Domestic log price base</u>				
APHI <sup>1/</sup>	75	54	21	84
Sutopo, Darusman <sup>2/</sup>				31
World Bank - ITTO <sup>3/</sup>	85	33 - 40	45 - 52	19 - 33
Reid-Collins <sup>4/</sup>	85	40 - 45	40 - 45	25 - 35
FAO <sup>5/</sup>				29

Source:

1/ APHI: Report on Forestry Economic Rent, October 1992.

2/ Cited in "Tinjauan Economic Rent di Indonesia" (D. Darusman) in proceedings, Aspek Ekonomi Pengusahaan Hutan, Jakarta, 6-7 October 1992.

3/ World Bank - ITTO commissioned study by Jaakko Poyry Consultants Tropical Deforestation in Asia and the Market for Wood, forthcoming 1993.

4/ Reid Collins "Log Revenue Systems" in Concession Management & Inspection Services Project Workshop DG Forest Utilization, October 1992.

5/ FAO Forestry Studies, under World Bank Forestry Institutions and Conservation Project, 1991.

5.17. Eliminating the extreme estimate of APHI, some consistency emerges among these estimates, with a range of rent capture from the existing fee structure of between 19% and 35% of potential. Cost estimates for logging and extraction in the studies vary through a range of \$33/cum to \$45/cum. For the most part, these cost estimates are based on field questioning of operators, and seem to include varying levels of profit and risk: in some data collected in the field work of Reid-Collins (cited under Table 5.1) for example, "administration, overhead and other" costs ranged from \$2.62/cum to \$28.92/cum in the individual responses.

5.18. Engineering based studies of logging - especially if based on the optimal technology possible in the Indonesian situation - would undoubtedly show much lower operating cost figures. Some estimates made in the World Bank - ITTO study cited in the table imply logging operation costs of less than \$20/cum. To this would need to be added a reasonable return to capital invested, but it is difficult to determine how much capital is invested in the sector. Some studies (the APHI study, the Reid-Collins study) suggest depreciation and amortization costs of \$5 per cum or less, which, at a conservative depreciation figure of 10%

per annum, suggests a capital investment of \$50 per cum. Allowing a generous risk and profit return to this capital investment of 30% (\$16.66), and adding in depreciation, amortization and operating costs of \$25 would yield a total extraction cost of about \$42 per cum, inclusive of returns to capital and risk. Adding in the \$22/cum government charges would suggest that processors will be paying around \$64 per cum at mill for logs from their own concession operations.

5.19. It is difficult to be precise on the matter of domestic delivered log price. Most logs in Indonesia are not sold on the open market, but are transferred through integrated operations: most plymills, which are the major consumers of logs, are linked under corporate ownership to concession operations.

5.20. Logs, moreover, are a variable commodity: the mix of species, and of quality grades, is important when considering an average price. It is quite likely that the average species and quality mix of all logs sold in Indonesia is below that of, say, an average shipment of export logs (primarily ply logs and good quality sawlogs) from Sabah or Sarawak in Malaysia. Comparison of average prices of all Indonesian logs, with Malaysian export logs, would therefore overestimate the gap between Indonesian domestic and international parity log prices.

5.21. However, it is more reasonable to compare the higher quality logs supplied for manufacture of export grade ply in Indonesia, to export shipments out of Eastern Malaysia. In essence, the comparison is then between the typical Meranti logs, which comprise the bulk of material used for this purpose in each market. In Indonesia, according to APKINDO, the price of this material at mill has recently been in the order of \$90/cum. Internationally, the f.o.b. price of meranti logs has fluctuated widely in recent years, over the range of \$100/cum to \$200/cum. Table 5.2 is a compilation of some recent log and sawn price information from Malaysia.

5.22. Obviously, there will be cases in Indonesia where a combination of poor quality logs, difficult site conditions and remoteness from mill sites might warrant an average standing timber fee of \$20/cum, or even less. The Concession Management component under FICP II will provide a basic formula which will determine a scale of fees, allowing for some of the species and locational differences. However, this formula will need to be anchored with an estimate of what the average standing timber fee should be in Indonesia. The indication from the sources and analysis given above is that this average could probably be set somewhere in the \$30 - \$50/cum range, on the basis of domestic at - mill prices.

5.23. However, this order of fee would not collect full economic rent, because any reasonable definition of economic rent will be based on international, not domestic, prices: and as discussed, international prices (at least for a major component of total log supply) are well above the domestic levels estimated. If, therefore, the Government wishes to use standing timber fees as a mechanism to allocate timber amongst the most efficient users, and to promote processing competitiveness internationally, it would need to implement further standing timber fee rises, either via an auction system, where feasible, or by the use of administered prices which follow market forces as closely as possible.

5.24. It is not possible to be precise about the extent to which the surpluses implicit in the sector arising from low government rent capture are dissipated in inefficiency or illicit incentive payments, as opposed to accruing to windfall profits. This is an important issue, because windfall profits might be re-invested in productive areas elsewhere in the economy, or at least be subjected to taxation, whereas wastage is not recoverable in any form. Perusal of Table 5.2 shows that for the Malaysian case over years 1986-1990, the differential between log and sawn f.o.b. prices is small, implying negative value added in sawing given that around 2 cubic meters of log volume is required per cum of sawn output. Presumably, quality differentials must explain part of this. See also Box 5.1.



**Table 5.2: PRICES OF MALAYSIAN MERANTI LOGS, AND SAWN TIMBER FROM INDONESIA AND MALAYSIA**

Year	Meranti Log Prices		Sawnwood Prices		
	FOB Sabah / <u>a</u>	Importers Sale Price In Japan / <u>b</u>	Dark Red Meranti in Europe / <u>c</u>	Export Unit Value	
				Indonesia	Malaysia
1980	NA	195	365	215	186
1981	NA	156	314	161	153
1982	NA	156	302	151	160
1983	NA	145	304	159	171
1984	NA	167	307	153	170
1985	NA	136	276	154	148
1986	101	151	267	209	160
1987	181	221	276	169	174
1988	160	233	307	186	175
1989	165	225	422	286	212
1990	156	209	524	215	215
1991	169	220	472	NA	na
1992					
January	180	248	486	NA	NA
February	170	252	502	NA	NA
March	195	237	507	NA	NA
April	180	235	512	NA	NA
May	180	241	518	NA	NA
June	180	248	519	NA	NA
July	180	250	523	NA	NA
August	180	250	523	NA	NA
September	205	258	522	NA	NA
October	205	261	522	NA	NA

/a Average offer price for plywood quality logs, FOB Sabah, Malaysia.

/b Average prices of Meranti, Sabah SQ best Quality, Sale price charged by importers, in Japan.

/c Average weekly prices, Dark Meranti Select and better quality, standard density, CIF French ports.

Source: Nikkei Sangyo Shohin Kenkyu-jo, Nikkei Newsletter on Commodities; Marches Tropicaux et Mediterranes; FAO Forest Products Yearbook 1979-1990, 1990 Edition.

5.25. A rough indication for Indonesia can be obtained from a comparison of potential log sale margins with processing margins. A concessionaire could generate a surplus of \$60 per cum by selling logs to the international market (at a conservative price of \$130 per cum), if the law permitted. The conversion factor for plywood manufacture is 54% (see para 4.38). It is assumed that 1 cum of plywood could be sold for \$320 - \$355 per cum (see para 4.41). If the cost of processing is \$145 (see para 4.40) and the mill is able to obtain its log volume for \$62 per cum (equivalent to \$115 per cum of processed output) then the surplus accruing to the mill lies in the range \$60-\$95 per cum of output-i.e. \$32 - \$51 per cum of log volume.

5.26. Clearly, it will be worthwhile on these figures, from the viewpoint of the private sector, to remain involved in processing. This results, however, from the high rents accruing to the private sector from logging: on the basis of the (admittedly approximate) calculations made here, application of capital and technology from that point on does not in fact add value to the resource at all. This suggests that the benefits of employment generation and regional development attributed to processing in Indonesia are presently being attained at high cost. It may be that significant profits are concealed in the costs of manufacturing figures used here, but it seems unlikely this could be so to the extent needed to move surpluses up to the level estimated to be available from log export. These observations provide support for a phased, rather than an

immediate, approach to raising rent capture by Government in the forestry sector. Clearly, some time for adjustment in the processing sector will be justified, because structural change is going to be required. Current industry resistance to this will be strong, and a realistic, negotiated time frame to achieve it will achieve the best results.

#### Box 5.1 THE ECONOMIC COST OF PROMOTING VALUE - ADDED PROCESSING IN MALAYSIA

A number of southeast Asian countries have used export restrictions to make wood cheap for local processors, and thereby promote local processing, increase value added to wood products, and even discourage logging. Although local processors would in any case enjoy an advantage due to proximity to raw materials (low or no freight charges), protection of domestic processors has no doubt been successful in increasing the extent of processing and apparent value-added in the processing sector.

The questions which need to be asked are: What has this cost in terms of exports foregone? Has the additional value-added from processing exceeded this cost? Has the protection created a processing industry which can stand on its own feet, or would it be unable to compete without protection?

Experience with export restrictions suggests that the costs of these restrictions frequently exceed the benefits. A World Bank study indicates that the effects in Peninsular Malaysia over two decades were as follows:

- \* Sawnwood production increased by 24 percent with the restrictions, employment increased by about the same amount, and log production was reduced by 15 percent; but,

- \* Without the restrictions, export earnings (from logs and sawnwood only) would have been 22 percent higher, economic value-added 34 percent higher, and resource rent (from harvested logs, and not necessarily captured by the government) 49 percent higher than their actual historical values.

Comparing benefits and costs, each sawmill job created by the log-export restrictions cost Peninsular Malaysia annually M\$16,600 in economic value-added, M\$44,800 in export earnings, and M\$92,600 in resource rent. In contrast, the average annual wage in sawmills in 1989 was around M\$6,000.

There were three additional sources of economic loss to the government. First, the high profits in processing due to depressed log prices attracted excess investment into the industry, causing waste due to overcapacity. Second, mill owners were insulated from the cost pressure that would have induced them to adopt or develop wood-saving, or market-capturing processing technologies. Third, lower log prices may have discouraged more complete utilization of log input into sawmills.

The World Bank's general recommendation for development of wood processing industries has been to promote it only on the basis of policies which maximize net gains to the national economy by avoiding misguided distortions of incentives. This means: (a) taking excessive profits out of logging by raising royalty rates, and out of primary processing by eliminating rebates (if any); and (b) eliminating log export restrictions, but using increased public revenues to overcome limitations of infrastructure, and other facilities which may hold back the development of processing.

Source: Thomas Wiens, 1992. "Forest Policy Issues in Southeast Asia." Paper prepared for the EDI Seminar on "Forestry Management for Sustainable Development." Genting Highlands, Malaysia, January 26 - February 1, 1992. A development of this analysis has been published by Jeffrey Vincent; "A Simple Non-spatial Modelling Approach to Analyzing a Country's Forest Products Trade Policies" in Proceedings, 10th World Forestry Congress, Paris 1992.

5.27. As noted at the outset of this discussion of economic rent, there is a balance to be struck between Indonesia's desire to remain a large exporter of processed forest output, and the need to price the resource so as to

encourage its efficient allocation and thereby, to promote efficient processing. As noted in paragraph 5.2, it is also the case that if log prices are raised precipitously, the temptation to illegally remove timber and/or operate even more carelessly in extraction - so as to maintain profits - will be strong. As discussed in Chapter III of this report, implementation of improved supervision and enforcement in the forest will not be simple, and it can be expected to take several years to achieve. This adds to the argument for phasing in price rises over time, so that as prices approach high international parity levels, the system for tracking log movements and recovering revenue, are in place. A staged approach as follows is therefore suggested:

- . Phase I: A statement of intention to raise the IHH + DR total to \$32 per cum could be promulgated immediately. The rise could come into effect through application of a production tax, as soon as some initial monitoring and supervision improvements are made (see para 5.2). It might be preferable for the additional tax to be collected as IHH, rather than DR, since the Reforestation Fund, formed from the DR, is already large (see para 3.77) and also since the DR was raised recently.
- . Phase II: Further rises could be implemented at regular intervals, so that by some agreed target date (year 2000 would be appropriate, since this is already the year by which Indonesia intends to be in compliance with the ITTO sustainability guidelines), the difference between the domestic IHH+DR average standing timber fee, and that which would apply to a similarly composed group of logs to be sold internationally, is no more than, say, 25%: this would leave some allowance for possible quality differentials in the log mix going to local processing. A pricing formula, allowing for stand quality and locational differentials, should replace production taxes as soon as possible. It may be necessary to release a certain proportion of logs direct to export sale (perhaps through the Inhutani), so as to provide a constant market monitor on international prices.

5.28. The overall revenue implications of revenue rises, especially if combined with more effective enforcement and log tracking, would be significant for the Government of Indonesia. This can be illustrated as follows:

- . Assume that improved enforcement and log tracking enables fees to be collected for 33 million cum of current removals;
- . Assume declines in annual allowable cut to 22 million cum p.a. by year 2000 become necessary to conform with ITTO guidelines;
- . Assume that fees for standing timber rise immediately to \$32/cum;
- . Assume that logging costs (inclusive of profit margin) are \$40/cum, and international log prices remain at a (conservative) \$130/cum;
- . Assume that the Government targets collection of 75% of this rent by year 2000 and phases in increases sufficient to achieve this target over the 1993-2000 period.

Table 5.3 below shows the revenue stream in real terms produced under this scenario:

Table 5.3: POTENTIAL REVENUES FROM INCREASED FEES

	Present Situation	1993 <sup>a/</sup> (following fee increase and improved Collection)	1995	2000
Extraction/Transport (\$/m <sup>3</sup> )	40	40	40	40
International price (\$/m <sup>3</sup> )	130	130	130	130
Implied rent <sup>a/</sup> (\$/m <sup>3</sup> )	90	90	90	90
Standing timber fees (\$/m <sup>3</sup> )	20 <sup>c/</sup>	32	60	68
Rent collection	22%	35%	67%	75%
Volume involved (mm <sup>3</sup> )	25	33	29	22
Revenue (\$m)	500	1056	1740	1496
Revenue Rp(bn) <sup>b/</sup>	1015	2144	3532	2964

<sup>a/</sup> At world market price.

<sup>b/</sup> Constant exchange rate Rp.2030/\$.

<sup>c/</sup> New DR+IHH total per m<sup>3</sup> (see paras 5.8 and 5.9).

5.29. To give these figures some perspective: revenues from forestry under this scenario would reach close to 10% of all central Government revenues, and would be approximately equal to present total Government outlays for education in Indonesia. They would amount to fifteen times the current level of annual government expenditure on forest management and development

5.30. One essential requirement in this matter of wood pricing is to give greater public access to the regular process of review of prices. This, in addition to focussing greater public scrutiny on standards of management within the sector, will ultimately assist Government when it seeks to limit the use of forest resources to sustainable levels. Extraction by government of higher rents, and investment of the proceeds in the public good, can be used to offset concerns about lost output if overall volumes are reduced.

CHAPTER VI  
POLICY AND INSTITUTIONAL  
ISSUES: AN AGENDA FOR REFORM

The Motivation for Change in Forestry

6.1. The primary impetus for change in forestry comes from: the broad national economic objectives of the Government of Indonesia, as expressed by the Government; a strong commitment to retain significant areas under forest cover, for environmental and production purposes; and an increased awareness in Indonesia of the need to demonstrate genuinely sustainable management in the natural forest to international purchasers, who are becoming more concerned with this matter. Taken together, these aims place a heavy onus on all parties involved in the forestry sector to work together, plan the changes needed, and ensure that operatives active in the field in the sector adapt to such change.

6.2. There are strong political undercurrents in forestry: these emphasize the urgency of the need for change, but simultaneously raise the risks associated with political and policy reform in the sector. On the one hand, it is becoming increasingly apparent that a certain amount of restiveness in some outer island regions of Indonesia has resulted from the major forest operations which have opened up there. It has been strongly suggested in this review that both local governments, and local communities, will need to receive larger outlays from the proceeds of forest operations, if real progress with sustaining the natural resource is to be made. On the other hand, a forestry extraction and processing sector as economically significant as that of Indonesia automatically accumulates considerable political power. Although a certain amount of dislocation is inevitable when major resource programs are initiated, there eventually comes a point where the costs of social instability must be weighed against those of restraining the vested interests of the extraction and processing establishment. It is apparent that Indonesia now needs to pursue a political consensus in this sector actively. In the final analysis, it may be the need to resolve conflict among the emerging interest groups, rather than specific commitments to environmental goals, which will promote change in the sector.

6.3. In Chapter IV of this review, it was argued that domestic forest sector policies, rather than external trade factors, have primacy in determining the outcome for the forest resources. It has been accepted in this review that the basic objectives of the Government, in committing to specific forest areas for preservation and sustained natural forest production (paras 1.21 to 1.24), and to management of that production forest according to the ITTO Guidelines by 2000 AD, are worthwhile, acceptable targets. It is argued here that three basic understandings on the part of the Indonesian Government will be necessary to achieve this:

- (a) Indonesia will need to maintain the political will to resolve the conflicts among interest groups that are apparent in the forestry sector;
- (b) It will be understood in Indonesia that correct domestic policy settings are vital to progress in the sector, and must be considered as prerequisites to attaining the sectoral objectives discussed above;
- (c) It will be accepted that, even after policy reform is undertaken, a great deal of institutional and human resource work remains to be done in the sector, to allow implementation of the basic objectives to proceed.

6.4. Since it is policies which will shape the direction and structure of institutions, the policy implications which emerge for the forestry sector from Chapters I to V of this review are discussed below. This is followed by an analysis of the institutional changes such policies might foreshadow.

## The Policy Agenda

6.5. The major policy issues which have arisen in the course of the foregoing Chapters are summarized below, and where appropriate and possible, recommended changes are suggested.

6.6. **Resource estimates/forest zoning.** Many uncertainties surround the definition and demarcation of forest boundaries and categories in Indonesia. It is apparent that a review of the resource situation in many concessions is necessary. Forthcoming national inventory work will assist, as will development of current government and private sector mapping and remote sensing efforts. In a policy sense, progress with two initiatives already in hand to some extent is important:

- Improvement or replacement of the TGHK maps and zoning, on the basis of information already available from various public and private sector agencies, is a priority resource management task.
- Progress with implementation of the KPHP model, or some other mechanism for reviewing and re-zoning concession operation areas and organizing management of these under Provincial units, should be pursued. It will be important that effective means of building interests and views of the forest dwelling or adjacent communities into re-zoning are implemented.

6.7. **Natural Forest Management and the Concession System.** Indonesia's broad objectives in natural forestry management are to retain substantial areas under effective forest cover, and to generate maximum value to the nation in so doing. One broad conclusion which can be drawn from the economic analyses presented in paras 3.10 to 3.24 of this review is that wood production will have to remain a significant element in the mixture - unless major compensatory payments to Indonesia (on grounds of global values) are forthcoming. It is unlikely that this will occur to the extent needed to offset timber values which, in Indonesia's case, are very large: taking the bottom figure (\$32/cum) from the range calculated in Chapter V as standing value of the resource, and applying the conservative figure of 25 million cum as an annual output, yields a Government wood revenue figure in the order of \$800 million a year to which, if compensation were to be paid for preservation, an even larger amount to cover industry dislocation and losses would need to be added. The figures shown in Tables 3.1 to 3.3 of this review demonstrate that significant global values attach to sustainable management of natural forests and plantation on degraded sites. These values might form the basis of compensatory programs, such as the carbon emission offsets currently being pursued in Malaysia and various South America countries by North American power generating corporations. Such inputs, if they arise, would certainly make sustainable forestry more attractive to Indonesia - but they would not justify complete preservation of the forest resource.

6.8. It is occasionally suggested that debt relief to nations which are heavily exploiting their timber resource (and are carrying heavy debt loadings) may be a means of taking pressure off the resource. However, as has been argued in this review, the origins of unsustainable use of forests are essentially internal, not trade related, and this argument applies equally to the debt relief case. If a country with significant forest resources adopts policies which collect the appropriate economic rents for the resource, and encourage sustainability, then the cause of debt amelioration is served as well as that of sustainability. As a corollary to this: there is no strong evidence to suggest that, even if national debt is reduced, that this in itself will alter forest practices and rates of exploitation.

6.9. The policy issues arising from planning, management, and enforcement in forestry operations have been, and remain, a subject of considerable interest in Indonesia. A great deal of experimentation with new systems - some of it donor supported - is current in Indonesia, and it is prudent not to anticipate results in this area at this stage. It has been pointed out in this review that in recent years, the Ministry of Forestry has upgraded enforcement of concession regulations: a dynamic towards greater compliance is evident, and this should be recognized. Some general observations of a policy nature can, however, be made at this stage

relating to concession conditions, silviculture, monitoring and enforcement, and the value of standing timber. The latter subject is broader than the forest management issue, and is taken up in its own right in paras 6.23 to 6.25 below.

6.10. Alternatives to the concession system are available and operational in many parts of the world, and it has been argued in this study that these could be applied in renewing or newly opening areas. Where the rights to exploitation of timber have been allocated under the concession system, and where long term rights still apply, there is less scope to fundamentally alter the situation. What can be altered in such cases are the terms under which concessionaires operate, and the effectiveness of supervision and enforcement of those operations in the field. Specific policy changes which could be considered are:

- The period over which concessions are held should be extended, so that bona fide long term investors in the sector can realize the benefits of good regeneration and management inputs in a second crop. Rather than nominating a specific time frame, a rolling renewal of cutting rights on a periodic basis (probably a 5 year interval) would achieve this incentive, without foregoing Government sovereignty.
- Although no analysis of the different institutional mechanisms for logging has been done in Indonesia, experience from elsewhere suggests that concessionaires should directly manage logging operations on their areas. There would appear to be no reason why such a condition could not be made mandatory at least in negotiation of concession renewals (or issue of new concessions) in Indonesia.
- The regulatory base for governing forest operations in Indonesia is now complex, and the weight of such regulation may become self-defeating. Streamlining and prioritizing of regulations, so that the field operatives of forestry agencies who must bear the primary burden of enforcement have clear and simple guidelines, is now a priority.
- Complexity of regulation is compounded in Indonesia by remaining uncertainties in practice as to jurisdiction and responsibilities at Kanwil and Dinas levels. In theory, it would be particularly useful if Kanwil offices, as outposts of the central Ministry, were able to act as centers of policy and regulatory development, and perhaps quality control, while Dinas agencies were mandated (and supported) to execute field responsibilities, and to represent Provincial views in intergovernmental dialogue. A division along these lines seems to be the intent of current arrangements but, in practice, responsibility and accountability in some areas are not clearly defined, and the result is poor incentive and motivation in control over field operations. Better definition of responsibilities, and a re-ordering of agency funding sufficient to allow all units to carry out their responsibilities, are required. However it is argued in this report (see paras 6.67 to 6.73) that for the medium term at least, measures which go beyond upgrading performance of existing agencies are required: specifically; the introduction of independent inspection and monitoring of forestry field operations.
- Poor data bases on increment, compartment location, and operations seriously inhibit the application of better forest management.
- Although silviculture in natural forest management is properly a technical and research issue, it seems that in Indonesia a certain rigidity has developed, leading to a more automatic application of the 35 year rotation polycyclic TPTI system than the natural variation in forests warrants. The policy implication in this case is that more authority and flexibility in the application of silvicultural prescriptions should be vested in field level decision makers.

6.11. **Plantation sector.** The basic conclusions of policy interest from this review on the plantation sector are:

- (i) The HTI scheme, which subsidizes pulp and paper investors to establish pulpwood plantations has succeeded on its original terms, in that a number of large pulp and paper investors have availed themselves of the scheme, or will soon do so.
- (ii) Some technical problems in the clearance procedure for the HTI scheme exist, but the larger concerns are: whether the scheme might in some cases be causing clearing of areas potentially regenerable as natural forest; and whether adequate measures will be taken to prevent use of potentially regenerable natural forest for pulpwood supply.

6.12. The concern noted in (ii) above needs to be kept in some perspective. It is unlikely that more than 1.2 m ha of land will actually be utilized for pulpwood planting in Indonesia. The practice of using HTI hinterland areas as tropical moist forest pulpwood supply zones should cease immediately. Also, measures to ensure that areas selected for pulpwood supply are not those effectively returning to productive natural forest condition, and measures to encourage plantation on open, degraded sites, should be implemented.

- Government assistance for plantation activity should be redirected to investors willing to establish plantation on open, significantly degraded sites such as *alang-alang*. Non-HPH investors, including secondary wood processors, sawmillers, local community groups, and, if appropriate, Provincial governments, should be approached as possible recipients alongside HPH holders willing to invest. Whether subsidies are justified, under such circumstances, is a debatable point: other means of assistance - the guarantee of tenure, research into tree breeding, and other public good elements of plantation - should be offered first.
- Government must ensure that long tenure on such sites is guaranteed: the community issues (see para 6.13) will be important in this respect.
- Given the commitment to sustainable forest management, it must be made clear that HTI schemes which place at risk significant areas of potentially regenerable natural forest are unacceptable. In this vein, withdrawal of exceptions such as appears to be the case in Ministerial Decree (442/92) to the general requirements for HTI is indicated, and review of whether the requirements themselves are sufficiently rigorous, are also necessary.

6.13. **Forest dwelling/Adjacent communities.** Information and impressions gathered during the course of the Sector Review Mission indicate that there are substantial numbers of people who depend in some significant way on forested areas for their livelihood. Although no precise estimates can be made, it seems apparent that significant numbers of people have been displaced or disturbed in some way by forest operations. While DBMT and Ministry of Forestry initiatives which address this issue in a generic or specific way have been implemented, it is reasonable to suggest that, so far, these have encountered only limited success. Considerably more thought needs to be devoted to finding equitable and acceptable means for involving local communities in official forest land use programs. Given the complexity of this matter, and the dearth of accurate information about it, it is unlikely that any single policy set and modus operandi will apply in all cases.

6.14. Policy determination and implementation in specific cases would be greatly assisted by the availability of accurate data on the spatial and demographic dimensions of forest dwelling and forest dependent communities. This data could be accumulated and analyzed through:

- A human resources inventory gathering demographic data on all forest-dependent communities;



- Micro-economic and anthropological rapid rural studies of existing community-based forest management institutions;
- Pilot programs in community-based forest resource management;
- Forest mapping exercises showing the territorial extent of indigenous and migrant communities and their territorial relationships with Ministry of Forestry forest categories.

6.15. The intent of recent legislation (discussed in paras 3.126 - 3.128, and Annex 4) and high level Government policy statements in Indonesia is to involve forest adjacent communities in land use decision-making and management of forest resources. Although the Ministry of Forestry has jurisdiction in forested areas, it is not an untrammelled power and is not intended to eliminate customary claims. Now is the time to operationalize the recent legislative and policy initiatives, including use and strengthening of AMDAL provisions for consultation. Forestry agencies and private sector forestry operators would be well advised to be more proactive in the search to identify and positively involve affected community interests in forest operations. Administrative guidelines and an operational manual for programs dealing with forest-dwelling communities should be developed.

6.16. These guidelines should include procedures for timber concessions which, inter alia:

- Mandate that an applicant for a timber concession, industrial tree plantation, or other commercial forest-based enterprise must provide indigenous forest-dwelling communities with notice of their intent to file an application;
- Provide communities with an opportunity to review and comment on the proposed activity;
- Provide communities (especially those with a long-standing land use claim) with an opportunity to negotiate a joint management agreement monitored by relevant governmental and non-governmental organizations; and
- Provide communities who do not negotiate a joint management agreement with adequate compensation arrangements monitored by relevant governmental and non-governmental organizations.

6.17. Those responsible for decisions on forest operations must also take responsibility for what occurs after logging, in general. Regional planning, management, and dispute resolution mechanisms should address these concerns and involve all interested parties (e.g. Government, concessionaires, communities).

6.18. Local communities require funding to facilitate their involvement in forest management. A mechanism to accumulate such funding and to allocate it among affected groups, or to agencies capable of working with them on the generation of useful and sustainable investment proposals, should be developed. Such a fund could be created from (enhanced) royalty collection (see paras 6.23 to 6.25). Paras 6.77 to 6.80 below discuss possible disbursement mechanisms.

6.19. Trade and forest industries. The international markets into which Indonesia will wish to sell its forest products appear to offer prospects of steady growth. Indonesia's share of these markets will, however, depend on its success in producing demonstrable progress towards sustainability, and upon internal development of efficiency and competitiveness in processing.

6.20. This represents an altered policy situation for Indonesia. Major trade and industry policies enacted in the sector in the past decade - the log export ban, and high taxes on sawn exports - have been

aimed at raising the level of domestic value added in the sector, and, by this broad criterion, they have succeeded. Moreover, it should be acknowledged that some of the reasoning originally advanced in favor of banning log exports had logic: for example the need, in a business and marketing sense, to create a large, unified processed product supplier, to overcome some barriers to entry of processed forest products in major consumer nations, and to carry sufficient weight to maintain pursuit of market share. Whilst this kind of argument finds limited support in classical trade theory, it is more appealing to those who need to be persuaded to mobilize investment capital in the sector. However, the era during which the processing sector was expanded rapidly is now largely in the past: diversification, consolidation and development of efficiency and competitiveness should now be the goals of policy in this sector. One means of generating competitive pressure in the sector would be to re-open the log market to exports, so that local processors would be forced to pay international prices for their log supplies. It is likely that such a move, if introduced summarily, would be highly disruptive and politically unpopular in Indonesia. Even a restructuring of log export taxes to allow limited export of raw material would still be extremely difficult politically to introduce in Indonesia.

6.21. The next best solution, and the one recommended in this review, is to retain the log export taxes intact for the present, but to implement a schedule of domestic log price rises so that, eventually, local processors are paying something close to international parity prices. This would retain the psychological value of the taxes, in view of the perceived increasing scarcity of the raw material resource and the need for local investors to know that it will be available to them in the longer term. But over time it would reduce the cost of the policy, in terms of economic rent foregone, to the resource owners. Provided it is done over a reasonable time frame, but on the basis of a clear policy statement by Government, it would allow time for the sector to adjust to a more competitive pricing regime, and provide the necessary incentive for structural change to occur.

6.22. That such adjustment is needed emerges fairly clearly from the information and analyses put forward in this review:

- The plywood industry holds a favored position in the forestry sector of Indonesia, largely through the strong linkage between forestry concessions and plywood operations. This linkage is a deliberate act of Government policy, intended to encourage a long term approach to the resource by constraining its use to processors who have made major investments and are therefore expected to have a long term view. However, given that large rents accrue to the private sector in logging operations, whereas the margins in processing are decidedly more risky, the effect of this nexus appears to have been to encourage a view of the plywood industry as a means of legitimizing access to excess rents in logging, rather than a profit maximizing processing sector in its own right. This leads to a lack of innovation in plywood processing (for example, towards production and marketing of consumer grade decorative plys, instead of heavy reliance on relatively low value commodity grade material). It will also discourage investment by plywood manufacturers in replacement of the natural resource with plantation material, unless subsidies are paid. The most obvious and immediate measure the Government could take, under these circumstances, would be to enact standing timber pricing policies designed to extract the maximum rental for the logs, so that processors who remain active in the sector will be those capable of competing internationally without benefit of a large implicit raw material subsidy.
- Some observations were made in this review as to the role of APKINDO in setting marketing policy and strategy in plywood. No judgement is made here as to the overall effect of the organization in the past, beyond the observation that it has had a central role in the creation of the sector. A policy issue arises for Government, in that, if the plywood sector is to diversify in Indonesia under the impetus of log pricing and international market developments, some plywood manufacturers may be ready to operate independently of the Association. On the one hand, if this is allowed to occur, the Government loses a powerful potential ally for imposing

discipline on the sector, since the Association would lose its veto over export licensing under such circumstances. On the other hand, more freedom in the trade and marketing area, coupled with efficiency incentives in the raw material area, might stimulate more vigour in the sector.

- The sawmilling sector in Indonesia was not particularly efficient prior to imposition of high sawn export taxes. Since then, capacity utilization and productivity appear to have declined, although the industry still has protected access to the domestic Indonesian market. One of the major reasons given in support of the sawn export tax policy was to generate higher value added by forcing more log volume into secondary wood processing in Indonesia; and, in the process, to curb the practice of export of very large sized sawn material (i.e. relatively unprocessed material) largely as a means of avoiding the log export ban. However, there is some indication that the viability of that secondary processing sector is dependent upon the health of the sawmilling sector. A shift in the export tax policy, to some sort of sliding scale (based on sawn sizes, or unit f.o.b value of the product to be exported) would allow the Government to retain the effective prohibition on export of very large sized material - by applying high taxes to such material - but would encourage sawmillers producing more valuable products (and sawmills are capable of producing sawn and dressed products which are certainly of equal value to plywood) to export.
- The above measure may, or may not, in itself, stimulate the secondary wood processing sector in Indonesia. Some secondary processors (and potential investors in that sector) who responded to inquiries by the Sector Review Mission claimed that their principal problem was a lack of guaranteed access to logs in Indonesia: a problem exacerbated by the apparent unwillingness of the Investment Coordinating Board (BPKM) to approve investments in such capacity without evidence of supply. Thus, after an initial surge, investment in this sector now appears to be stagnating in Indonesia. While nothing can be deduced from material gathered for this review about the likely international competitiveness of the secondary wood processing sector, it is clear that its capacity to generate employment and regional income are higher, per cubic meter of log input, than either plywood manufacture or sawmilling in Indonesia.
- Assuming that Indonesia chose to alter the export tax structure for sawn timber as discussed above, and possibly to relax BPKM constraints on investment in secondary processing, the evolution of all processing sectors reliant on natural forest raw material would then depend on access to raw material. Some indication of current status in access is given by the capacity utilization figures shown for the various subsectors in this review: essentially, the plywood sector is operating at near full capacity (some constraint on expansion of capacity has been applied by the industry association); the sawmilling and secondary processing sectors are operating well below capacity.

6.23. The central role of standing timber prices. It has been a central argument of this review that the mechanism of standing timber price determination is critical both to in-forest management and utilization, and to the structure and efficiency of the processing sector. It is recognized that simply raising prices for revenue purposes, without improving supervision and monitoring capacity, would probably not have the desired efficiency effects.

6.24. Even though the natural standing timber fee has been raised from \$15 to around US\$22 per cum in Indonesia, it is still too low. This price undervalues the resource, and encourages waste. It allows only very limited competitive bidding among processors for the resource - even though wood raw material is the scarce resource - because price does not take any allocative role in disposition of the resource, in most cases.

6.25. As noted earlier, it may not be politically feasible in many cases Indonesia to revert to an auction system for sale of timber: concession rights have been allocated, and investments made on that

commitment by Government. However, a staged escalation in raw material prices, coupled with improved supervision and monitoring and introduction of performance deposits (see paras 6.67 to 6.76 and Box 6.4), would simulate the effects of competition for the resource, while offering some time period to allow potential users to adjust.

- An immediate rise in average standing timber fees to \$32 per cum - the bottom end of the calculated available economic rent range - should be implemented. Prior to calculation of a pricing formula which could take better account of stand quality and locational differentials, an across-the-board increase in the form of an additional production tax could be introduced: this could be phased out as a more precise pricing formula emerges.
- The pricing formula introduced should ultimately be capable of recovering an appreciable proportion of available rent, at international parity prices. In this case, it would seem reasonable to opt for a standing timber fee collecting 75% of available rent at international parity prices for logs by year 2000.

### The Institutional Implications of Change

6.26. The forestry sector of Indonesia is now at a major point of change. Gone is the era when natural forest resources were abundant and opportunities for forest land conversion appeared open-ended. Ahead lies a situation where limits to easily accessible natural resources can be foreseen. This necessitates consolidation and rationalization of land use to accommodate an increasing population; preservation of soil and water values within forest areas and downstream from them; and harbouring biodiversity and other environmental values.

6.27. In addition to these newer concerns, forestry management agencies in Indonesia will continue to be called upon to carry out their core responsibilities of field operational planning and management, and revenue collection: indeed, major improvements in implementation of these responsibilities will be as important for attainment of new, broad objectives, as for the more traditional ones.

6.28. The Government of Indonesia has identified a number of technical and social issues that need to be addressed. (ITFAP, op cit on pg.7) These include the need to:

- Improve forest management via a system, or a combination of systems, under which the forest will produce most and deteriorate least;
- Increase efficiency in land-use in all land using sectors;
- Ensure environmental stability;
- Promote soil and water conservation;
- Establish protected area systems to the maximum extent possible;
- Enhance the social contributions of forestry;
- Harmonize the practice of shifting cultivation;
- Provide adequate mechanisms to ensure peoples' participation in forestry;
- Promote the utilization of lesser known species and small dimensioned materials;

- Reduce the volume and increase the utilization of logging and processing residues;
- Increase the contribution and role of non-timber forest products (NTFP);
- Establish and expand industrial forest plantations;
- Generate income through non-damaging uses of forests (e.g. ecotourism);
- Increase the raw material from non-forest sources (i.e. plantations of coconut, rubber and oilpalm, home gardens, agro-forestry plots);
- Promote the utilization of substitute raw materials, (e.g. waste paper, rags, bagasse etc. for pulp/paper and boards);
- Recognize and respect the value of local peoples' indigenous forest management knowledge; and
- Solve the problems caused by encroachment into forest areas.

6.29. To translate these goals into concrete actions (such as policies, regulations, programs, projects) would require the Ministry of Forestry to develop capabilities in the following areas:

- Define, or refine, the government's strategic objectives in forestry (what is sometimes called a "mission statement");
- Establish strong links with other sectors, other ministries, and among various agencies within forestry;
- Enable the private sector, forestry communities, NGOs, and others to use or manage the forest resource on a sustainable basis;
- Formulate policies and guidelines on forest management practices and be able to implement the rules and regulations; and
- Review opportunities, and develop options, in the newer areas (e.g., biodiversity, ecotourism, carbon sequestration, green labelling).

6.30. **Institutional performance.** When the Ministry of Forestry was created in 1983, it had three broad objectives: conservation, land rehabilitation, and forest utilization. At the beginning of the fourth five-year plan (Repelita IV) in 1989, three additional objectives were added: concessionaire discipline, timber estate establishment, and control of shifting cultivation.

6.31. The additional objectives reflected concern with the management of concessions, the need to augment a rapidly dwindling natural forest base, and the demand for agricultural land by a growing population. Although administrative guidelines are in place, problems in these areas persist, and in some cases have grown more serious. As observed elsewhere in this review, there is evidence of concession damage, overexploitation, illegal logging, underreporting of log offtake, failure to reforest, and dissatisfaction among forest communities. Although some elements of the private sector have been self-motivated to pursue a high standard of sustainable management, the general policy and incentive mix, and its field implementation, has not avoided the prevalence of wasteful techniques in exploiting a once plentiful and now undervalued resource.

6.32. **Human resources management.** The sources of these problems are many in Indonesia; the management of human resources is a major factor. While there is a large base of human resources in forestry--about 680,000 work in the formal sector--less than 5% have any sort of training in forestry.<sup>1</sup> However, the major factor impeding forestry development is the lack of adequate procedures in the recruitment, placement, compensation, motivation, appraisal, and retention of trained manpower. These, combined with low levels of remuneration, and a lack of accountability, lead to low motivation, indiscipline, and a lack of commitment.

6.33. In the absence of proper procedures, human resources are allocated on an ad hoc basis, often based on questionable assumptions and unrealistic work norms. The sector is deprived of some of its most promising people, as vacancies are generally not advertised, and transparent recruitment procedures are not observed. Returning postgraduate trainees are frequently left unplaced (or wrongly placed) for long periods. There is increasing incidence of a "brain drain" from the public institutions to the private sector. Recently, a trend toward concentrating forestry graduates at headquarters and away from forest areas has been observed: about 30% of the forestry graduates are in Jakarta.

6.34. Even where formalized procedures are followed, they are often of limited use: for example, the criteria for promotions laid out by the Agency for Civil Servants Administration (BAKN) rely heavily on existing rank and grade and length of service, and less on individual performance, education and training. The personnel appraisal system is not regarded as objective; career paths do not exist for most staff; and promotion procedures do not seem to encourage professionalism, or motivate employees.

6.35. Although a great deal of training and training capacity exists, no overall training needs assessment for the public and private sectors has been completed. In-service training is regarded as weak and not in step with the current needs of the sector. The training methods are considered ineffective: too much lecturing, insufficient practicals, little time for self-learning, and little access to scientific literature. Instructors and trainers are not selected from the upper ranks of structural positions--since the rewards in training institutions are fewer than those in the field--and are frequently untrained and poorly prepared for the job of instructors.

6.36. At various places in this review, the problem of a lack of clarity in the roles of the Kanwil and Dinas offices has been raised. This is a specific manifestation of the more general problem of poor communications and coordination in the sector. Even at the central headquarters of the Ministry, communications between and cooperation among work units is ad hoc and sporadic, where they occur at all (see Box 6.1). A rigid hierarchy and territorialism has evolved within the Ministry structure--a situation compounded by the lack of good reporting procedures, inadequate dialogue between senior officials and their subordinates, and proliferation of work units with unclear responsibilities. Some units in the system have only two or three staff members.

6.37. The lack of management practices and supporting coordination structures will clearly inhibit the implementation of change in the sector. It would be unrealistic to presume that comprehensive solutions will emerge in the short term. A great deal of structural work needs to be done, including the following:

- Design and development of an integrated human resources management system which would link recruitment, promotion, and training to institutional needs, derived from clear and comprehensive statements of objectives and responsibilities for all units.

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<sup>1</sup> Mohamed A. Elrasheed, 1991. "A Review of Human Resources Management in the Indonesian Forestry Sector." Study on Manpower Development Planning. Field Document No. 7. Jakarta. Ministry of Forestry, Government of Indonesia.

- Reform of the training institutions. The role of the training institutions needs to be reviewed, and any changes needed to ensure they have capacity to meet the future needs of the public and private sectors should be proposed. One measure that could be considered is placement of some existing institutions under an autonomous Board that would have representatives of public and private sectors and local communities. The Board should have the authority to raise funds, hire the best trainers, offer market-based wages, and develop curriculum relevant to the sector's needs.
- Specific measures to facilitate pressing needs--such as the improvement of intra-agency communication and inter-agency linkages, meaningful devolution of some responsibilities to field and quasi-government operations, and the development of mechanisms to better motivate and utilize available personnel (especially those identified as having most promise).

6.38. None of these reforms will be simple to implement, and the Government of Indonesia will need to satisfy itself that the effort and expense involved in such reform will be worthwhile. Since it is apparent that neither the goal of sustainable management of the forest resources, nor that of maximizing the contribution that this sector makes to the economy, are achievable without major institutional reforms, the prima facie case for change is strong. The question then becomes one of selecting options and strategies to produce the desired results.

6.39. **Options for institutional change.** In Indonesia, as elsewhere, any effort to improve the capabilities of the public sector forestry institutions to introduce change will be of little value unless these institutions receive strong support from the country's political leadership. Since a large and economically valuable resource is at issue, and strong commercial interests are involved in its exploitation, the initial costs of political support for change may be high, but the pay-off to Indonesian society as well as the global community is even greater.

6.40. The essential first step in bringing about institutional change is to clarify the role and objectives of the institution. Defining such objectives should begin with general declarations, such as that by the Ministry of Forestry in the Summary of Forest Development in the fifth five-year plan (Repelita V):

"It is clear that Indonesian forestry management policies are based on utilization and conservation to get maximum sustainable benefits. Economically, the forests must be utilized for the greatest welfare of the people."<sup>2</sup>

6.41. This broad policy goal should be defined further into a list of objectives. Each objective should give rise to a series of activities and tasks. The hierarchy of objectives, subobjectives, activities, and tasks would lead to the formation of various Directorates General and specialized agencies, which together comprise the Ministry of Forestry. Thus, the internal structure of the Ministry is defined by the government's broad policy goal and the Ministry's strategic objectives--not the other way around.

6.42. In the 1990s and beyond, Indonesia's forestry institutions will be confronted with difficult choices. On the one hand, they will have to deal with the prospect of diminishing areas of natural forest; possible decline in the market for tropical hardwood overseas (if the forests are managed unsustainably); and the demand for land from its increasing rural and urban population. On the other hand, the forestry institutions will have to cope with increasing pressure from the government, the Indonesian public, and the international community to do more in basics (such as, protection, management, harvesting, and regeneration of forests) and in new agenda items (such as biodiversity and conservation).

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<sup>2</sup> Ministry of Forestry, Government of Indonesia 1990, page 1. Introduction.

6.43. Under these circumstances, it is suggested here that now is an opportune time for the Government to reexamine what role the Ministry of Forestry should play in the 21st century. The preparations for Repelita VI and the Long-term Perspective Plan (1993-2018) and the proposals to decentralize some forestry functions from the central to the provincial staff provide a good opportunity for reviewing the Ministry's role.

6.44. As part of the review, first, an attempt should be made to evaluate the Ministry's "capacity" to manage change through its internal processes, systems, and resources. A report prepared for the Minister of Forestry indicates that the Ministry is ill-equipped to face the pressures from the environmental groups, the Indonesian society, and the international community.<sup>3</sup> The report highlights serious problems of: (1) lack of motivation among the Ministry's staff caused, in part, by low salaries, poor career prospects, and absence of rewards for good performance; (2) absence of an information system to disseminate to staff the goals, objectives, and tasks of the Ministry; and (3) weak management controls on work programs, staff deployment, and supervision (see Box 6.1).

6.45. Second, the "capacity analysis" should also review the Ministry's ability to deal effectively with the hierarchy of objectives, activities, and tasks framed as part of the broad policy goal. The objectives should be reviewed from several viewpoints, including: legal authority, organizational design, financial support, inter-Ministry and intra-Ministry linkages, and human resource management.

6.46. Once the Ministry's future role and its existing internal capacities have been reviewed, the next step should be to consider a plan of action for change. Among the options that could be considered are the following:

- Strengthen the existing institutional structure and staff to enable the Ministry to do a better job with available resources;
- Reorganize the Ministry by dropping or de-emphasizing some of the traditional functions and strengthening some of the newer areas;
- Move responsibility from the center to the provinces and districts in a program of devolution and decentralization;
- Entrust some forestry functions to other public sector institutions, the private sector, community groups and NGOs; and
- Contract out some of the activities to private firms, individuals, and others in a commercial or partnership arrangement.

6.47. These five options are not mutually exclusive; nor is there a need to choose a single solution to overcome a perceived institutional shortfall. The options are elaborated further below.

6.48. **Strengthen existing institutions.** The choice of this option would logically be made if existing organizational structure, staff, and budgets were assessed to be adequate to perform traditional forestry functions and, perhaps, shoulder newer responsibilities. Whatever shortfalls are identified would be corrected through "technical assistance" and "institutional development" mechanisms. This is a conventional approach, one that would have the support from many traditionalists in the government and aid agencies.

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<sup>3</sup> "The Problems of Managing Change regarding Forestry Development: Towards the Second Long-Term Plan." (A Survey on Motivation, Information and Controlling). Ministry of Forestry. 1991.



**Box 6.1: "THE MANAGEMENT OF MINISTRY OF FORESTRY NEEDS TO BE CHANGED"**

The current practices in forestry management in Indonesia are not suitable to face the pressures from the environmental groups, the Indonesian society, and the international Community. Because of these pressures, as well as higher expectations of forestry institutions, the Minister of Forestry invited Dr. Henry Claude de Bettignies to advise the government on how to anticipate, accelerate, and manage institutional change in the ministry.

After conducting a survey in Riau, Central Java, and Maluku provinces in June 1991, a pilot team from the Ministry, with help from Dr. Bettignies, identified three main problem areas in the Ministry:

**1. Lack of motivation among staff.** Low salaries, uneven distribution of workload, and absence of reward for good performance in career planning contribute to low motivation. Education, training, and individual capabilities are not reviewed in the placement of personnel. Managers do not make effort to improve the capacity of their subordinates. Boredom among staff is common due to the monotonous nature of jobs, or the long duration in the same job.

Recommendations: More even distribution of workloads, development of a career planning system based on individual performance, and placement of personnel based on individual performance and capability. The personnel management system should be part of a management information system.

**2. Absence of information system.** No clear guidelines exist on how to prepare reports. Data collection is difficult, not accurate or reliable, and not regular. The central office does not make good use of information from regional centers. In general, the management style is not open: senior staff do not offer enough information on the institution's tasks to their subordinates. The mechanism for information flow in the Ministry is inadequate.

Recommendations: Improvements in the information system in the Ministry, provision of electronic communication equipment for field offices, and use of regular staff meetings to narrow the communication gap between superiors and subordinates.

**3. Weak management controls.** Work programs are not always based on government guidelines or regulations; staff activities may not have the sanction of superiors. Supervisors do not fully understand their jobs; even if they do, additional supervision may be necessary. Built-in controls are weak. Reporting system is not used for supervision purposes. Cultural norms (eg, reluctance to express opinions) make supervision difficult.

Recommendations: Promotion throughout the Ministry of the concept of using supervision as a management tool, improvement in the quality of supervision through education and training, strengthening of coordination among supervision agencies, improved communication facilities, and support for supervision visits.

**Source:** "The Problems of Managing Change regarding Forestry Development: Towards the Second Long-Term Plan." (A Survey on Motivation, Information and Controlling). Ministry of Forestry, 1991.

6.49. However, this option would go against the current trend and sentiment in Indonesia toward reduction in the size of public sector organizations in view of: scarcity of funds to pay for adequate salaries to government staff and for development programs; overlap of functions and poor performance in key areas by many forestry agencies; and improper mix of skills and deployment of staff.

6.50. Worldwide, the trend across sectors indicates that public sector institutions are increasingly being encouraged to shed and share responsibilities with others rather than regroup and grow.

6.51. **Reorganize the Ministry.** The choice of this option would indicate that needs of the sector have outpaced the capacity of the Ministry and that some of its activities have become less significant, while others are in need of more attention. The reorganization of the Ministry might entail redeployment of staff at the central, provincial, and district levels and retraining of the reassigned staff to enable them to carry out their new responsibilities. In some cases, it might also mean reduction in staff.

6.52. Reorganization (also called restructuring) is an active issue throughout Asia and the Pacific. Governments have completed, or are in the process of, reorganization of the forestry agencies in Thailand, Philippines, Myanmar, Lao PDR, Papua New Guinea, and some states in India.

6.53. **Devolution and decentralization.** This is another option available to the government to improve the implementation of its policies and programs. Both these measures call for moving decision-making away from the center, the main source of power. "Decentralization" implies moving both responsibility and accountability for decision-making further down the organization—that is from Ministry headquarters to the Kanwil and district levels. The general rationale for decentralization is that: most of the specific problems which emerge in forest management are localized, and need local attention (albeit with policy and technical guidance from the centre); and local responsiveness to and awareness of the concerns of those with the greatest stake in the resource, will be more developed. The Government of Indonesia is planning to decentralize at least 10 percent of the functions currently performed by the Ministry of Forestry to the 27 Kanwil offices. The functions to be decentralized have already been identified (Box 6.2).

#### Box 6.2: PROPOSED DECENTRALIZATION OF FORESTRY FUNCTIONS

At least 17 activities—about 10 percent of the functions—presently performed by the central headquarters of the Ministry of Forestry are proposed to be decentralized to the provincial level. Eleven of these activities are proposed to be decentralized further down to the district levels.

The activities to be decentralized to the district level are marked with an asterisk (\*); the rest are to be the responsibility of provincial authorities:

- \* 1. Drawing the boundaries of forest areas.
2. Implementation of forest protection, including efforts to prevent and/or limit the destruction of protection forests, production forests, and national parks by forest fires, wildlife, and people's activities.
3. Forest inventory.
4. Drawing boundaries of forest concessions (HPH) and timber estates (HPHTI).
- \* 5. Specifying the boundaries of logging areas under HPH.
- \* 6. Permission for harvesting forest products in private forest.
- \* 7. Permission for harvest non-wood forest products in the production forests.
- \* 8. Water and soil conservation.
- \* 9. Promotion of bee-keeping and sericulture.
- \* 10. Forest extension.
- \* 11. Regreening.
- \* 12. Reforestation and rehabilitation of protection forests, production forests, and national park.
13. Controlling shifting cultivators.
- \* 14. Scaling and grading forest products.
15. Forestry training for middle-level personnel.
16. Development of eco-tourism.
- \* 17. Support for breeding wildlife (eg, crocodiles).

Source: Ministry of Forestry, 1993.

6.54. "Devolution" implies transferring power and authority from the national government to the local governments to perform specific functions. For example, in the Philippines, about 1,000 staff members of the federal Department of Environment and Natural Resources are being transferred from Manila to local government units, along with corresponding budgets, assets, and records of the devolved functions and programs (see Box 6.3). For Indonesia, it might be useful to understand the institutional implications of devolution from the Philippines experience.

### **BOX 6.3: DEVOLUTION OF FORESTRY FUNCTIONS: THE PHILIPPINES EXPERIENCE**

In 1991, following passage of the Local Government Code, the Department of Environment and Natural Resources (DENR) in Manila began to devolve some of its functions on the conservation, management, and protection of the country's natural resources. Some 1,000 staff members of the DENR are currently being reassigned to local government units (LGUs) to enable local authorities to undertake the new responsibilities. These are to be accompanied by the transfer to LGUs of DENR's budget, assets, and records that correspond to the department's devolved functions and programs.

However, there has been no significant transfer of the resources from the federal government to local authorities. The deadline for effecting devolution has been changed twice. Some critics believe the DENR is reluctant to devolve functions and personnel, while local governments would rather have the funds and not have to accept the devolved DENR personnel. In fact, 85 percent of the LGUs recently surveyed requested deferment of the devolution citing lack of clarity on the new responsibilities of local authorities, lack of financial capability, inadequate office space to accommodate new staff, and so forth.

The postponement of devolution has highlighted problems in three main areas:

**Legislative and administrative.** The government did a good job of enacting the legislation and enumerating the functions and services to be devolved through an administrative order (called "Guidelines for the Implementation of Devolved Functions"). However, confusion has prevailed among LGUs on the functions to be devolved (particularly the delineation between provincial and municipal authorities) and on the new responsibilities of the local chief executives. Lack of a fuller understanding of the devolution process and the implications has been the most serious handicap to its implementation.

**Institutional.** The basis for devolution has not been clear. Were the capacities of LGUs and NGOs to absorb the new functions reviewed before deciding on devolution? NGOs have alleged that DENR programs that are community-based and lacking adequate funds are being transferred to LGUs, while foreign-assisted projects are being retained by DENR. Some of the devolved DENR personnel were being assigned tasks (eg, manning check points) unrelated to their field of expertise. The inadequacy of trained human resources at local levels is regarded as a serious constraint in the implementation of devolution.

**Financial and budgetary.** The government has earmarked 11.75 billion pesos (US\$470 million) from internal revenue for the implementation of devolved functions, of which 81 million pesos (US\$3.2 million) has already been transferred to LGUs. In addition, local governments have been given the authority to collect revenue through taxes, royalties, and fees from mineral mining, fishery, forestry, and other natural resources. Nevertheless, fear of inadequate funding support continues to be a serious concern among local government officials, one that could imperil the sustainability of devolved DENR programs.

Source: Emmanuel D'Silva and others, 1993. Forestry Management for Sustainable Development. An EDI Seminar Report, World Bank, Washington (forthcoming).

6.55. While GOI appears to be committed to decentralize at least some forestry functions, there are some doubts in the Ministry about the capacity of provincial authorities to manage the forest resource (particularly the areas set aside as protection forests), and it is likely that autonomy to provincial offices would be given only gradually, unless major political pressure to hasten the process arises.

6.56. **Entrusting responsibilities to other entities.** A number of possibilities exist, including shedding some of the functions to: other public sector institutions; the private sector; community organizations; and NGOs. Each option is reviewed below:

6.57. **1. Shedding Functions to Other Public Sector Institutions.** In some countries, national parks are the responsibility of the Department of Tourism, or the Ministry of the Environment. In Liberia, between 1973 and 1974, the responsibility for granting forest concessions was vested with the Ministry of Finance rather than the Ministry of Agriculture because the government was keen to regulate harvesting plans and enhance rent capture. However, in Indonesia, other ministries are already overloaded with work programs, and experience many of the same difficulties as the Ministry of Forestry; so, shedding responsibility from one ministry to another may not offer much scope for improving efficiency.

6.58. **2. Shedding Functions to the Private Sector.** The well-organized private sector in Indonesia appears willing to go beyond its traditional role in logging and wood processing by shouldering some of the government responsibilities in forestry management. The private sector has identified six areas where it could complement government efforts. These are: forest administration and maintenance, forest inventory, research, human resources management, timber estates transmigration, and dissemination of public information (see Box 3.2, pg. 37).

6.59. In Indonesia, there is an absence of adversarial relationship between the government and the private sector. The trade associations (eg, APKINDO, APhi, ISA, etc.) are well organized, politically powerful, and financially successful. They also perform some self-policing functions. The Ministry of Forestry can forge a genuine partnership with private industry for carrying out some of the functions presently restricted to the public sector, provided mechanisms for accountability and transparency in decision-making are implemented.

6.60. **3. Shedding Functions to Community Groups and NGOs.** There is no consensus in Indonesia on the number of people who live in and around the forests, but estimates run into the millions (see paras 3.101 - 3.102). In the past, many of these people have been looked upon by foresters as encroachers in, and destroyers of, forests. Recent studies indicate that prior to commercial logging, forest communities had practised agroforestry on a sustainable basis under customary laws and institutions. However, the introduction of HPH or HTI, in many instances, may have led to the disenfranchisement of many traditional users of the forests (para 3.108).

6.61. It is now recognized that the cooperation of forest dwellers is necessary to manage the resource on a sustainable basis. Local communities could be involved in the rehabilitation of degraded forests and maintenance of natural forests. Some see the possibility of local communities operating forest concessions. Small concessions owned by community groups exist in South Sulawesi. However, there is legitimate concern among government officials that these communities might undersell their rights to unscrupulous businessmen. The "joint management" of forests by the Kanwil or Dinas staff with local communities—as practised in China and India—could be considered. The forest income could be shared with the community groups in return for their managing the resource on a sustainable basis. Another option is the European model wherein segments of forests are handed over to local communities, or associations of small private owners (e.g. in Germany). The communities could engage foresters to manage the forests in accordance with national policy and community guidelines. The transfer of forest resources to local communities has worked in Europe. It might work in Indonesia too because of long traditions in community management. It is an option that could be made feasible under the strategy put forward in paras 6.77 to 6.80.

6.62. Public sector forestry institutions generally have not been successful in working with forest dwellers in Asia, and Indonesia is no exception. Part of the problem lies in the orientation of foresters: they have been trained to understand forest dynamics, identify species, and plant and harvest trees. Few of them have been trained to work with local communities. In general, NGOs are known to do a better job of communicating with and organizing local communities than public sector institutions. The Ministry of Forestry could consider using the skills, motivation, and experience of NGOs in helping local communities to manage and protect the forest resource. This would free the forestry staff to concentrate in other areas of management and regulation. Care should be taken to select those NGOs that have a good record of working with local communities and collaborating with government agencies. Bina Swidaya, for instance, has 10 years of work experience in social forestry. WALHI, as an umbrella organization for over 200 environmental NGOs, could serve as a useful forum for discussing collaboration issues.

6.63. **Contracting out services.** Under this option, the overall responsibility for meeting the objectives of the forestry sector would remain with the Ministry, while the contractor would deliver the service for a fee, or an agreed margin of profit. Possibilities for contracting exist in: research; concession management; marketing; data collection, analysis, and management; and training.

6.64. The contract system could operate both inside the Ministry as well as outside. Outside the Ministry, there are opportunities for engaging the services of universities, research institutions, consulting firms, and non-government organizations. Inside the Ministry, it should be possible for individuals, or groups of individuals, to bid for the contracts on a competitive basis using market prices for the services. The Ministry could make special administrative arrangements (eg, leave of absence, secondment, etc.) to enable its employees to participate in the contract system.

6.65. For contracting to be effective, and to avoid potential abuses, there must be transparency in the system. It is important that bidders have information on the services sought, the selection criteria to be used, and the people who will decide on contract services. Rules and regulations on bidding, penalties for noncompliance, and mechanisms for reviewing the work done should be clearly spelled out.

6.66. Contracting has been successfully applied in Indonesia's telecom sector where much of the administrative, planning, and managerial work previously performed by the government bureaucracy is now done by contractors. Permitting Ministry employees to participate in the contract system might also help overcome some of the motivational problems associated with inadequate salaries, lack of incentives, and boredom with routine work (see Box 6.1).

#### Improving Sustainable Forest Management: An Inspection Service

6.67. It is obvious, from the foregoing observations in this review - especially those in the immediately preceding section - that much work needs to be done on institutional reform and human resources development. This process should be implemented without delay to demonstrate Government's commitment to this issue, but even if this happens, it must be considered a long term option. In the intervening period, a great deal could be achieved (and learned) in the major problem area of compliance and control in forest management, by implementing a rigorous procedure of field inspection of forestry operations, which would utilize a reporting structure set up to operate at a high level of government, and to be transparent in its functions.

6.68. **Objectives.** The objectives of implementing such a service would be:

- (i) to focus high quality human resources on field operations, instead of having all responsibility for field regulations vested in the lowest level staff;

- (ii) to build a reporting structure which will easily allow integration of accreditation or certification procedures, so that Indonesia will have a major initiative in sustainability to offer international markets;
- (iii) to involve the private sector in the enforcement and standards procedure, by utilizing private sector personnel in the service, and ensuring private sector participation in the reporting/deliberative procedures set up.

6.69. Methodologies for the technologies and regulatory procedures exist in forestry (and are in fact being tried in the field in Indonesia in Ministry of Forestry initiatives - including the forthcoming concession management component of the World Bank financed Second Forestry Institutions and Conservations Project). No model for establishment of a high level, independent inspection service in forestry exists. However, Indonesia is the pioneer in a project with similar objectives - to raise performance in the then-troubled area of customs and excise - by use of a consultancy contract which allowed the application of highly trained local and international professional expertise to the problem, under a basically corporate, rather than bureaucratic, approach. This project is generally regarded as a success in Indonesia. For forestry, one option would be to collect the necessary professional expertise under a project working to a committee or board appointed under the National Standards Association. Such a committee could comprise of selected government, private sector and community representatives, and could be convened primarily to debate grievances or issues arising from the activities of the inspection service.

6.70. A second option would be to set up an Inspection Service under the existing Ministry of Forestry framework, but on contract terms which would allow the best professional expertise - local and international - to be appointed, and with sufficient funding to guarantee mobility and field effectiveness.

6.71. A third possibility would be to combine the first two, so that an arm of the service would service the National Standards Association on matters specifically related to sustainability and certification, whilst a second group would work within the Ministry of Forestry (probably directly to the Director-General, Utilization) on matters to do with procedures and performance of forestry sector personnel in the field. In this option, however, the independence of the service would need to be guaranteed, and a consultancy based superstructure to ensure full integration of data bases and other resources would be required.

6.72. Such an independent inspection service, charged with improving the quality of field forestry operations, could only succeed if it is equipped with sufficient sanctions to act as a genuine deterrent to non-compliance or poor performance, on the part of the private sector and public sector officials as well. Some part of this deterrent power would accrue so long as the agencies to whom the service reports are both equipped and inclined to act. In the case where the private sector is involved on a committee which may be called upon to decide upon such matters (as discussed under the first option), the ultimate sanction power - the power to withdraw export licenses - already exists. In the case where the Ministry of Forestry is the agency involved, power to cancel concession licenses already exists. However, these are extremely blunt instruments. It would certainly be preferable if the Inspection Service were able to apply graded penalties - confiscation of performance bonds or part thereof (see para 6.76 and box 6.3) or the power to suspend operations for prescribed periods in the case of concessionaires, and the ability to link field performance of provincial governments to applications for regional development funds (see paras 6.77 to 6.80 below), in the case of public sector agencies.

6.73. At the outset, given that relatively poor field operational standards are presently assumed to apply, the role of the service would be educational: inspection procedures (on a random basis) would be set up, and reports would be written, but the early objective would be to document, and to advise, so that field operatives (private and public sector) learn what is required, and have the opportunity to explain why compliance is poor. Only after this procedure is well in train, should more direct deterrents begin to be applied in the field.

Improving Sustainable Forest Management: Using Increased Revenues to Build Efficiency and Equity

6.74. The forest utilization and industry efficiency arguments in support of increased fees for standing timber in Indonesia have been presented in chapter V, and referred to at many other points in this review. The interest in this section of the review is in exploring two options for applying the proceeds of increased revenue to the larger Indonesian national goals of increasing efficiency and equity in the economy, while at the same time contributing to sustainability of the forest resource.

6.75. Both options rely on the introduction of incentives for groups involved in the sector, either to raise their level of performance, or to induce them to take a more specific and positive interest in the development processes made possible by forest use.

**BOX 6.4: PERFORMANCE DEPOSIT--AN INCENTIVE FOR SUSTAINABLE FOREST MANAGEMENT**

The performance deposit is recommended as a key instrument in a package of rent capture and tenure reforms designed to provide incentives for sustainable forest management. The objective of these reforms is to make logging an enterprise generating normal rates of return, not exorbitant profits, for those who practice sustainable forestry, and conversely, financially unattractive for those who do not--the opposite of the present situation.

To ensure satisfactory logging performance, loggers would be required to put up a refundable performance deposit--sufficient in magnitude to provide a financial incentive for them to undertake sustainable forestry practices. The amount of the deposit would be related to the estimated net profitability of logging after all costs, including royalties, are paid. It has been estimated that an amount between \$5 and \$10 per cum might be adequate for Indonesia.

The deposit would be placed in an escrow account with the Ministry of Forestry at the time the license is granted. The MoFr would conduct regular field inspections to ensure that the operator complies with the conditions specified in his contract. Based on a schedule of fines, MoFr would deduct fines from the deposit for poor performance. Approval of subsequent annual cutting permits, would be contingent upon restoring the deposit to its original amount.

When the logged-over area has stabilized from the initial impact of logging, MoFr would conduct a survey to assess the adequacy of regeneration--stocking, species composition, and so forth. Based on the result of this assessment, the operator may be required to undertake stand treatment activities, such as enrichment planting, to ensure sufficient stocking of commercial species.

The deposit, plus interest, would be refunded to the operator in periodic installments starting some years after the initial harvest, and ending with the full production cycle or at some agreed date ahead of that point. Refunds would be contingent on adequate regeneration and protection of the residual forest.

Source: Emmanuel D'Silva and others, 1993. Forestry Management for Sustainable Development. An EDI Seminar Report, World Bank, Washington (forthcoming).

6.76. **Performance deposits.** If sufficient revenue is collected at the outset, part of the total could be considered a performance deposit or bond, rebatable to the concessionaire over time (with interest) on the basis of good performance in the forest. Such a bond, if collected at all, needs to be sufficiently large to offer a real incentive for operators to seek its return: an amount between \$5 and \$10 per cubic meter should achieve this objective. This amount would need to be additional to whatever average resource price (recommended

initially at \$32/cum in para 5.27) is collected. Concessionaires could initially apply for a rebate in the form of a plan to produce an effectively regenerating forest in their area of operations, and be rebated progressively upon realization in the field. This would resemble the current concession planning requirements in place, but would significantly raise the interest of concessionaires to comply (Box 6.4).

6.77. **Funding community development.** It has been argued in para 6.13 that, in addition to whatever powers over forest land use decisions are to be offered to forest dwelling or forest dependent communities, it will be essential that they also be offered some share of the proceeds of forest operations. This will both encourage their full participation in sustainable management, and offer alternative income possibilities in cases where displacement from forest areas has occurred.

6.78. This could be achieved in a manner which concurrently could engender regional competition for development funding, by accumulating some proportion of revenues in a community or regional development fund. Community groups and local or provincial government agencies could be encouraged to submit proposals for use of the funds, based on criteria such as:

- (i) The degree of need in the group applying, determined on the basis of displacement from forest areas;
- (ii) The extent to which groups - NGO or government based - making proposals actually represent affected communities;
- (iii) In the case where provincial or local governments are involved, the extent to which they are effectively managing their current field forestry responsibilities;
- (iv) The economic returns to the activities proposed, and the long term viability of the project.

6.79. The mechanism of offering regional development funding on a competitive basis is being implemented under World Bank forestry lending in China, and has excited considerable interest there. In the Indonesia case, by requiring local government and community groups to make convincing proposals, it would ensure that applicants are genuinely motivated. Nor would HPH concessionaires who are willing and able to undertake community development projects be excluded so long as proposals meet the criteria: the difference from present practice would be that financing would come from a fund managed for the purpose. By not targeting communities alone, it would realistically allow for NGO and local government agencies to combine with communities, provided bona fide representation of all interests can be shown. However, it could also eventuate that the availability of funds might directly encourage the development of skills for project identification and management in the communities themselves (see Box 6.5).

6.80. Such a fund would, of course, require high quality management, both to assess proposals, appraise compliance with forest management requirements, perform the necessary regional extension work, and soon. This suggests two immediate requirements:

- (i) An interdisciplinary group, comprised of selected personnel from the relevant Ministries, supplemented by contracted internal or external consultants, would need to be established. This group should operate on a contract basis (see paras 6.63 to 6.66), and be given basically corporate guidelines to mobilize investments. The group would also need to be mandated to identify and consult with community groups likely to be affected by proposed developments, in advance of such developments being implemented;
- (ii) Strong linkages to the Inspection Service (see paras 6.67 to 6.73) are recommended: reliance would need to be placed on the service to determine that proposals put forward are consistent with long term forest management objectives for the area concerned.



**Box 6.5: THE AGA KHAN RURAL SUPPORT PROGRAMME IN PAKISTAN**

The Aga Khan Rural Support Programme (AKRSP) has been developed in Pakistan as a direct alternative to the approach of relying on large numbers of official extension workers for delivery of services, and also to the option of relying solely on non-governmental organizations to implement development work.

In brief, the AKRSP offers a partnership with identified villages in Pakistan, whereby villagers organize themselves, identify their investment needs, generate their own capital through savings from an initial grant, and upgrade their human skills. The AKRSP invests in analysis of the portfolio of needs, and will if necessary subsidize villagers to work themselves on such identification. It supports the formation of village structures to implement projects identified, but expects villagers to generate savings from such intervention to fund capital investment in the projects designed.

In nine years of work, the AKRSP has organized 1477 villages (involving over half a million people). Almost one hundred million rupees in savings have been generated; and 3000 village managers and 5000 specialists have been trained. Of the 1165 village organizations given a subsidy to identify needs and projects, none have applied for a second subsidy, but nearly 500 have obtained development loans by being able to provide savings as collateral.

Source: Khan, SS (1990) "Non governmental Organization Alternatives and Fresh Initiatives in Extension: in Public and Private Roles in Agricultural Development, proceedings of the twelfth Agricultural Sector Symposium (eds Anderson and de Huan), World Bank.

## ASSUMPTIONS USED IN THE INFORMAN ANALYSES

### 1. Assumptions on Forest Growth, Yield and Harvest

- (a) Initial Stemwood, Biomass and Carbon. In the initial growth and yield studies the stemwood volume of trees greater than 15 cm DBH is 205 m<sup>3</sup> per ha. To include trees of less than 15 cm DBH this was increased by 15% to 236 m<sup>3</sup> per ha. Total Biomass volume was calculated by multiplying by a biomass/stemwood ratio of 1.7:1 to arrive at a total biomass volume of 401 m<sup>3</sup> per ha. Volume was converted to weight by multiplying by a drywood density of 0.565, and to biomass weight to carbon weight by multiplying by 0.5 (portion of carbon in wood) to give an average of 113 t of biomass carbon per hectare.
- (b) Commercial Timber Harvest and Residual Standing Volume. Harvest to a minimum diameter of 53 cm. recovers 56 m<sup>3</sup> per ha of commercial timber volume, leaving a residual standing volume of 183 m<sup>3</sup> per ha. Harvest to minimum diameter of 38 cm, recovers a commercial timber volume of 84 m<sup>3</sup> per ha leaving residual volume of 134 m<sup>3</sup> per ha. Improved harvest to 53 cm. recovers 63 m<sup>3</sup> per ha of commercial timber volume, leaving a volume of 240 m<sup>3</sup> per ha. Improved harvest to 38 cm. recovers 94 m<sup>3</sup> per ha of commercial timber, leaving 189 m<sup>3</sup> per ha.
- (c) Utilization. For initial harvest to 53 cm, the portion of commercial species is assumed to be 74%, commercial sized trees 40%, and available commercial timber recovered is assumed at 80%. For initial harvest to 38 cm, the portion of commercial species is assumed to be 74%, commercial sized trees 60%, and portion of available commercial timber recovered is assumed to be 80%. In subsequent harvests the portion of commercial species is assumed to be 100%, because the volume increments used in the study only account for growth of commercial species. Improved logging increases the commercial timber recovery percentage from 80% to 90%. Likewise the portion of commercial sized timber recovered in subsequent harvests increases due to reduced damage to the residual stand during the initial harvest.
- (d) Species Distribution of Commercial Timber Harvest. One difficulty in projecting long-term stand growth and composition is the fact that Dipterocarps increase their proportion of total volume as the stands mature - major changes in composition may not occur until the third decade - as pioneer species give way to commercially valuable Dipterocarps. For the purposes of INFORMAN analyses, it is assumed that dipterocarps represent 50% of the initial harvest and reduced proportions in subsequent harvests - the magnitude of the reduction being inversely proportional to the length of cutting cycle. The shorter cutting cycles have lower proportions dipterocarps in the harvest than longer cutting cycles.
- (e) Proportion of Dipterocarps/non-dipterocarp. Initial harvest consists of 70% dipterocarps and 30% non-dipterocarps. Subsequent polycyclic harvests at 35 year intervals result in 50% dipterocarps, whereas subsequent monocyclic harvests at 70 year intervals result in 70% dipterocarps.
- (f) Size Distribution of Commercial Timber Harvest. For harvest to 53 cm minimum diameter all of the commercial timber harvest is in large logs. For harvest to 38 cm minimum diameter, 80% of the harvest volume is in large sized logs and 20% in small sized logs.

- (g) Minimum Diameter Cutting Limits. The experimental design of the Malaysian growth and yield trials applied a number of logging prescriptions, ranging from removal of all commercial species above 30 cm DBH (diameter breast height) to removal of all commercial species above 60 cm. For the purposes of the INFORMAN analyses, stand table data from two of these prescriptions, representing a range of realistic utilization standards was used. The first, involving harvest of commercial timber down to 53 cm, approximates the present TPTI system which harvests dipterocarps down to a 60 cm minimum diameter and nondipterocarps down to a 50 cm. The second, harvest of commercial timber down to 38 cm, approximates present commercial log utilization in Indonesia - the minimum diameter which can be economically harvested in conversion forests where there are no cutting-limit regulations. The 38 cm limit is also the lowest prescription for which replicated plot data were collected.

## 2. Costs, Prices, and Financial Parameters

- (a) Harvesting Costs of \$45 per m<sup>3</sup> are assumed for natural forests. For forest plantations a harvesting cost of \$15 per m<sup>3</sup> is assumed for fast growing, short rotation plantations producing small sized logs and \$25 per m<sup>3</sup> for long-rotation native species plantations producing large sized logs. A cost of \$35 per m<sup>3</sup> was assumed for harvesting of enrichment planting areas in natural forests.
- (b) Log Prices used in the INFORMAN model reflect current prices paid by the Indonesian forest industry for logs. Since many companies are integrated - that is, they harvest and process their own logs - a check of end-product prices and processing costs was undertaken to determine what potential funds were available for log purchases. This check confirmed prices quoted by the industry for log sales. The following Log prices used in INFORMAN reflect differences in log species and size.
- (i) Logs from natural forests: Large dipterocarp logs - \$85 per m<sup>3</sup>; small dipterocarp logs - \$70 per m<sup>3</sup>; large nondipterocarp logs - \$65 per m<sup>3</sup> and small nondipterocarp logs - \$50 per m<sup>3</sup>.
- (ii) Logs from plantation forests: Pulpwood \$25 per m<sup>3</sup>; Small Sawlogs \$40 per m<sup>3</sup>; Dipterocarp logs \$70 per m<sup>3</sup>.
- (c) Domestic versus International Log Prices. It should be noted that these prices are substantially less than log prices in other countries in the region. For example: Log prices received in E. Malaysia for similar species and grades of logs range from \$150 to \$200 per m<sup>3</sup>. To examine the effects of these price differentials on forest management in Indonesia, a separate set of analyses was undertaken using International Log Prices for the native species. The following prices were used: Large dipterocarp logs - \$150 per m<sup>3</sup>; small dipterocarp logs - \$125 per m<sup>3</sup>; large non-dipterocarp logs - \$100 per m<sup>3</sup> and small nondipterocarp logs - \$75 per m<sup>3</sup>.
- (d) Post-Harvest Stand Treatment and Protection Costs. Post-harvest stand tending and protection in natural forests under "improved" practices costs \$10 per ha per year.
- (e) Plantation establishment costs are \$500 per ha. Tending for the first 3 years following establishment costs \$15 per ha per year.
- (f) Discount Rate: The basic discount rate used for all INFORMAN analyses is 10%. Additional analyses were conducted at 5% and 20% in order to determine the effects of alternative discount rates on the financial/economic performance of alternative forest management cases. The model allows for an infinite range of discount rates to be tested. Changing the discount rate in the

summary spread-sheet (COMPARE) will cause the NPV's to be recalculated in INFORMAN and display the new range of NPV's in COMPARE.

3. Environmental Externalities for Social Analysis

(a) Non-timber Forest Products (NTFP)

- (i) Value of NTFP in Other Regions. The value of non-timber forest products is difficult to estimate. Many studies are currently underway to estimate the quantity of NTFP that can be harvested sustainably off of a given area and to determine the market value of these products. In south America, Mr. Jim Duke, an economic botanist with the National Germplasm Resources Laboratory of the United States Department of Agriculture estimates the average annual value of non-timber products in Amazon extractive reserves is \$100 per ha - ranges of from \$12 to \$640 have been measured. The Woods Hole Research Centre of Massachusetts, USA, is undertaking comprehensive studies of NTFP values in the Amazon area of Ecuador. Preliminary results indicate annual values of non-timber forest products \$100 to \$200 per ha.<sup>1</sup>
- (ii) Value of NTFP in Indonesia. Unfortunately current studies of NTFP in West and Central Kalimantan have not yet provided data which can be used for estimation of these values. The annual value of NTFP exports from Indonesia is approximately \$300 million per year. Assuming that the net value, (market price less collection and marketing costs), is \$100 million per year, and that the net value of these products traded in domestic markets is double that exported; annual net value of NTFP is likely in the range of \$300 million. The value per unit area of forest land could be estimated by dividing by the estimated area from which these products were likely collected. Assuming that these products are only collected from populated areas where there is access by road or river and where are areas of relatively undisturbed forest. A conservative estimate of the area from which these products were collected is 10 % of Indonesia's remaining undisturbed production forest area - 30 million ha - or about 3 million ha. Dividing the \$300 million value by the 3 million ha area results in an estimated NTFP value of \$100 per ha per year which was used in the INFORMAN analyses in this review.
- (iii) Application of NTFP Value Estimate to INFORMAN. Although it can be argued that the \$100 per ha estimate is empirically weak, is the best estimate available at the time of writing. It is relatively conservative compared to NTFP values quoted for other tropical forests. The \$100 per ha per year figure was used as the value of NTFP for undisturbed forest areas. Following the initial harvest, this value was reduced to reflecting availability of these products due to removal of forest cover. Table 1 shows NTFP values used in INFORMAN to reflect differences in intensity of harvest (38 cm vs. 53 cm) and harvesting practices - current versus improved.

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<sup>1</sup> It is estimated that Net Present Value (NPV) of NTFP would be \$1000 to \$3000 per ha at 5% discount rate. This is considerably higher than comparable NPV's for alternative land uses. Intensive agriculture in the Brazilian Amazon is estimated by Florschutz (1983) to yield NPV of \$340 per ha and cattle ranching in the same area is estimated to yield NPV \$70 per ha. The NPV of traditional agriculture in Guatemala is estimated by Heinzman & Reining (1988) to yield an NPV of \$290 per ha. In Indonesia Timber yields of native species on a 70 year cycle produce an NPV at 5% of less than \$100 per ha (INFORMAN). In Sarawak NPV's at 10% for Oil Palm and Coconut are 500 to \$1000 per ha and less than zero for rubber.

Table 1: NTFP VALUES BY FOREST CONDITION

<u>FOREST CONDITION</u>	<u>NTFP VALUE (\$/ha/yr)</u>
Undisturbed Forest	\$ 100 per ha per year
Harvested to 53 cm - current practices	\$ 50 per ha per year
Harvested to 38 cm - current practices	\$ 30 per ha per year
Harvested to 53 cm - improved practice	\$ 60 per ha per year
Harvested to 38 cm - improved practice	\$ 40 per ha per year
Enrichment Planting & Dipterocarp Plantations	\$ 50 per ha per year
Forest Plantations on Grass Land	\$ 0

Post-Harvest Recovery of NTFP Values. It was assumed that the value of NTFP would gradually increase in the regenerating forest. The rate and level of recuperation, being dependent upon the period of regrowth and initial harvesting intensity and practices. For example: NTFP value would recover to \$90 per ha following 70 year regeneration period after improved practice harvest to 53 cm; but only \$60 per ha following 35 year regeneration period after current practice harvesting to 53 cm. It could be argued that although the values of presently marketed products, such as rattan will recover as predicted, other, non-traded values, such as habitat for flora (medicinal plants, fruits, nuts, etc.) and fauna (fish and game) may not be recuperated as readily. In the absence of imperial data, the estimates presented here - based on the values of marketed products - are considered to be indicative.

(b) Soil Erosion

As with NTFP, the erosion protection services of forests are difficult to quantify and value. A number of references were consulted to determine erosion rates (tons per ha per year) under a variety of vegetation and conditions, including: undisturbed forest; light, medium and heavily logged forest; forest fallow following shifting cultivation; Alang-alang grass land; and a number of agricultural land uses ranging from tree crop plantations to shifting cultivation and intensive annual crop cultivation.

Based on these references, Table 2 was constructed to show soil erosion rates (t/ha/yr) for natural and plantation forests - including erosion rates at key points in the harvest/regrowth cycle, under different harvesting intensities and practices.

The incremental soil erosion following forest disturbance was calculated by deducting the estimated soil erosion rate associated with each alternative. Soil erosion under production forestry depends largely on the extent to which ground cover is disturbed, as illustrated by the

difference between erosion under "current" and "improved" forest management. Where logged-over sites are converted to annual agricultural crops, soil erosion rates are much higher than when converted to forest plantations or perennial tree crops.

Table 2: Soil Erosion by Land Use Type

<u>Land Use</u>	<u>Annual Soil Loss</u> (t/ha)
Undisturbed Tropical Forest	0.25-0.5
Improved Forest Management	0.75
Current Practice Forestry	1.0
Shifting Cultivation - crop	25.0
- fallow	3.0
Plantation Forestry	4.0
Tree Crop Agriculture	5.5
Imperata Grassland	5.0

In valuing negative off-site effects of soil erosion over large areas of the United States, it was found that, on average, the off-site costs of soil erosion are equivalent to \$1.20 per ton of soil lost. In the absence of similar data on per ton costs of soil erosion in Indonesia<sup>2</sup> the \$1.20 per ton figure was used in the INFORMAN analyses as being indicative. Some might argue that this figure is too high, on the grounds that Indonesia's per capita income is lower standard than of the U.S.; others will insist it is too low because it ignores on-site costs of soil erosion. The authors accept that there is no empirical basis for adoption of this figure for Indonesia, but would argue that inclusion of this value in the INFORMAN analysis is more accurate than ignoring the effects of soil erosion altogether.

From Table 2 it can be seen that the difference in soil erosion rate between undisturbed forest and its replacement - forest fallow, tree crop agriculture or grass lands - is between 4 and 5 t per ha. Assuming in managing forests for timber production we prevent soil erosion of 4 to 5 t per ha per year, then the value per ton of soil saved can be derived by dividing \$5 per ha by 4 t per ha per year to arrive at a unit value of soil erosion of \$1.25 per t.

In the INFORMAN model the differences in erosion rates (t/ha/yr) at each phase of the forest management alternatives analyzed were computed and then valued by assigning a value of \$1.20 per ton of soil.

It was assumed that soil erosion rates - and costs - were highest immediately following harvesting and that they gradually diminished until they reached the undisturbed state 10 years after harvest.

(c) Ecotourism

Although it is recognized that maintenance of areas of undisturbed forest cover contribute substantially to eco-tourism in countries with tropical forest resources, valuation of these

<sup>2</sup>

Doolette and Magrath (1990) Watershed Development in Asia, estimated that off-site soil erosion costs for Java exceed \$300 million per annum.

benefits has not been included in this sector review. If the values could be quantified they would be treated as costs associated with forest disturbance - loss of natural forest cover -and would enter into the Social Analysis along with the costs attributable to reduction in NTFP and Erosion protection benefits of forest cover.

(d) Water Resources

Recent studies on the hydrological impacts of forestry and land use practices in Malaysia<sup>3</sup> shows a number of interesting effects of selective timber harvesting on water resources.

- (i) **Impact of Water Yield** - Stream flows increase sharply following removal of forest cover, probably due to the reduced evapo-transpiration due to reduced tree stocking. Selective logging with 33% to 40% reduction in forest stocking, increased water yield by 70 to 175 mm/yr. - compared to 264 to 448 mm/yr. for forest conversion. The study<sup>2</sup> concluded that: "Increase in water yield had little effect on peak flow was not likely to enhance downstream flood potential."
- (ii) The rate of erosion and sedimentation in catchments where forest cover has been reduced or removed is much higher than for undisturbed forests areas. Agriculture on steep slopes showed the highest sediment yield. Selective logging on low to moderate slopes generally results in minimum soil disturbance and show only small increases in sediment yields. However, logging on moderate to steep slopes, increasingly common as most low-land areas become logged-out, involves disturbance to a large portion of the site. Even in these areas, erosion and sedimentation amounts tend to return to normal levels 5 to 10 years following logging.
- (iii) Stream water quality (physical and chemical) under selective logging is generally poorer, containing increased levels of chemicals and turbidity/colour than those of undisturbed forest. These may have negative effects on the aquatic food chain which support downstream fisheries. However, in most cases, they do not degrade the quality of the water to a point where it is fit unfit for human consumption. Recovery periods for most water quality parameters range from 3 to 5 years. Unfortunately it was not possible to quantify the cost of water quality degradation due to forest disturbance for the purposes of the INFORMAN analyses. These costs would enter into the Social Analysis and result in a reduction of the NPV of forest land associated with selective logging.

4. Environmental Externalities for Global Analysis

(a) Biodiversity

As with Eco-tourism, it was not possible to quantify the costs of reduced biodiversity due to removal of forest cover. The fact that biodiversity value has not been included in the analysis is because these values are difficult to quantify and in some cases intangible. Their exclusion should not be seen as inferring their unimportance nor irrelevance to the analysis. If these values could be quantified their value would fall into the Global Analysis because, like carbon storage, they benefit the international community as well as Indonesia.

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<sup>3</sup> Hydrological Impacts of Forestry and Landuse Practices-in Malaysia, Yusop, Rahim, Kasran, Forest Research Institute of Malaysia (FRIM), October 1991.

(b) Carbon Storage

Carbon dioxide contributes the most of all gases to the process of global warming which might impose large costs on the global economy. International efforts are being mounted to reduce the rate of carbon emission. One means of achieving this is to reduce deforestation. The objective of including carbon storage in the Global Analyses using INFORMAN, is to examine implications of this for Indonesia.

The INFORMAN model incorporates estimates of the impact of different forest management alternatives on carbon release/storage over the harvest/regrowth cycle, and incorporates these impacts into the global analysis of forest management alternatives.

Three types of carbon storage are quantified: Biomass, Soil, and Product Carbon. These are summed to arrive at the net quantity of carbon stored at key points in the harvest/regrowth cycle of the forest management alternatives being analyzed.

(i) Biomass Carbon

Carbon stored in forest biomass was quantified by multiplying the dry biomass weight of stems, branches, foliage and roots by the portion of this weight (50%) attributable to carbon. The amount of biomass carbon released in harvesting was calculated by summing the following harvest components: commercial timber removed; plus waste, decay and breakage left on site; plus damage to the residual forest during harvest. Usually, 40% -50% of the trees in each hectare are damaged in this way; they die and decompose quickly, releasing large quantities of carbon. In the "improved" logging cases analyzed, this damage was assumed to have been reduced, thus reducing the amount of biomass carbon released.

The annual rate of carbon storage following harvest is calculated from forest regrowth rate estimates in the INFORMAN model - a regrowth rate of 1 m<sup>3</sup> per ha per year translates 1.7 m<sup>3</sup> of biomass, or a carbon storage rate of 0.5 tonnes per ha per year.

(ii) Soil Carbon

Soil carbon was calculated for the first 150 mm of soil (where the majority of soil carbon is stored) by multiplying the soil carbon percentage by soil bulk density. A number of references were consulted to obtain reliable estimates of these parameters. The quantity of soil carbon lost through forest disturbance or change from natural forest to plantation forest, was then computed by deducting the amount of carbon stored under any given alternative or phase, from carbon stored in undisturbed forest.

(iii) Product Carbon

Of the timber removed at each harvest, 50% is lost during processing, which decays and releases carbon immediately; of the remaining 50%, a portion goes into products which have a short life span, such as paper and pulp, which also decay quickly, and the remainder is used to manufacture more durable products, which, in effect, permanently store the carbon so that it does not contribute to atmospheric CO<sub>2</sub> concentrations.



Having generated the quantities of net carbon release and storage, for biomass, soil and product carbon, over the harvest/regrowth cycles of each alternative forest management system; the value of carbon was derived as described in the following paragraph.

(c) Carbon Valuation

Studies have been undertaken to estimate the costs of achieving different levels of CO<sub>2</sub> reduction by various methods, ranging from reducing emissions from power generating stations and vehicles, carbon taxes on fossil fuels, substituting fuels which release little or no carbon, large scale afforestation and geo-engineering.

Estimates range widely from \$0.10 to \$700 per ton, depending on the technology used and the level of reduction required. Indications are that initial reductions up to approximately 10% will be relatively inexpensive to achieve, at around \$5 per ton, but that costs of further reductions will be much higher. The marginal cost of a 20% reduction in carbon dioxide emissions is \$28 per ton; for a 25% reduction, \$40 per ton; rising to \$120 per ton for a 50% reduction.

At the present time reductions are still at the initial (<10%) stage, as demonstrated by costs in the range of \$5 per ton of carbon stored for tropical forestry (carbon off-set) projects being financed by electric utility companies based in the USA - Applied Energy Services, and New England Electric - and the Netherlands -Forest Absorbing CO<sub>2</sub> Emissions (FACE).

The World Bank/UNDP Global Environmental Facility's (GEF) pilot phase included a number of carbon off-setting projects. Their cost ranged from a low of \$5 per ton for elimination of flue gases to a high of \$40 per ton for solar voltaic electric generation.

Therefore, for the purposes of the global economic analyses conducted using INFORMAN, a figure of \$5 per ton of carbon released was used as the basic benefit of preventing release of one ton of carbon into the atmosphere.

This figure was used to value carbon storage for the global cost-benefit analyses undertaken using INFORMAN. The resulting NPV represents the additional cost placed on the global economy of reducing CO<sub>2</sub> emissions by the same amount as would be emitted by forest disturbance.

**PROBLEMS IN ATTAINING SUSTAINED YIELD FOREST MANAGEMENT  
UNDER A 35 YEAR POLYCYCLIC HARVESTING REGIME**

1. **Biological impediments.** Tree species of the Dipterocarpaceae family, which make up the majority of the commercial tree species in Indonesia, are climax species. Following selective logging their growth is low compared to pioneer species which respond quickly to the openings created by logging. Dipterocarp seedlings are shade tolerant and actually require a certain amount of shade to survive during the first stages of their development. They survive in the lower layers of the forest canopy for a long time and in large numbers (seedling counts in the tens of thousands are not uncommon), providing logging damage is minimized. Seedling mortality following logging is heavy, particularly if too much shade is removed and soil temperatures rise above levels which seedlings can tolerate.
  
2. Growth of residual dipterocarp trees is very modest without silvicultural operations (thinning, spacing, tending). Selective logging often results in remarkable growth rates of total growing stock (growth rates of 4-6 m<sup>3</sup> per ha per year have been measured). However, the portion of dipterocarps and other commercial species remains low for a long time, unless release treatment is applied in the early post-harvest years. Untreated stands measured 10 to 15 years following logging show that only 10 to 20 percent of stand growth (0.5-1.0 m<sup>3</sup> per ha per year) is attributable to commercial species. This percentage increases as the forest develops, reaching 35 to 75 percent of the mature stand.
  
3. **Operational Impediments** Sustainability of the TPTI system based on a 35-year cutting cycle is jeopardized by the following operational factors:
  - (a) Few concessionaires comply with regulations regarding planning and careful execution of logging operations and few undertake post-logging stand treatments. Even under ideal conditions (improved logging) the projected commercial volume at 35 years is insufficient to justify a second commercial harvest.
  - (b) Logging operations are often sub-contracted and sub-contractors tend to be less responsible in logging resulting in excessive forest degradation.
  - (c) Post logging surveys indicate rates of damage and mortality to 35-50% of the residual stands. On hilly areas where much of the present logging is taking place, as much as 50% of the site severely disturbed, 20% moderately disturbed and only 30% remains undisturbed. Post harvest growth and yield measurement indicate that the volume of trees dying from logging damage exceeds regrowth for many years -commonly there is no net increment of commercial timber until 5 to 7 years following logging due to post harvest trauma.
  - (d) Reforestation is common, because of incomplete initial logging or changes in commercial value of species and/or sizes of trees left behind during the first logging.
  - (e) Annual logging areas are not contiguously located and therefore sustained yield management on a particular forest area is difficult to achieve.
  
4. Due to a combination of the above factors, all of which indicate a paucity of pole-sized commercial trees in the residual stand, subsequent harvest may have to come from seedling/sapling sized trees which will require a much longer regrowth period to reach sufficient size to sustain commercially viable harvests. Although INFORMAN indicates that a period of 70 years will result in a second harvest of

approximately equal to the initial harvest, there is some evidence to the fact that even longer intervals may be required to attain truly sustainable timber harvests.<sup>1</sup>

5. Another strong indication of insufficient volume for a commercial harvest at 35 years can be found in the fact that a significant number of concessions have not been renewed at the end of the 20 year licence period, and are being converted to Industrial Forest Plantations (HTI). In order to qualify for HTI status, areas have less than 20 m<sup>3</sup>/ha of commercial timber volume. Other timber companies are applying for new timber concessions in Irian Jaya - where high costs and low timber yields kept interest low until recently - rather than renewing their existing ones.
6. There is evidence to suggest that the above situation is common on a large part of the approximately 10 million ha. of logged-over production forest. This is due to heavy damage to (and sometimes removal of) pole-sized residual trees (the ones that should reach commercial size in 35 years) on both government sanctioned harvest, and frequently on subsequent "unofficial", premature relogging operations.
7. **Factors contributing to the non-sustainability of TPTI.** Inadequate Supervision, Enforcement and Controls coupled with poor logging practices and non-compliance with stand treatment requirements are due to inadequate supervision, enforcement and controls in the field by MOF staff who are poorly paid, equipped and depend heavily on the concessionaires for their basic needs. The situation is compounded by inadequate enforcement and penalties.
8. **Consequences of continuing the current TPTI system.** Following the present practice of 35 year cutting cycles, the remaining unlogged forest area will be logged over in 35 years. However, as discussed in the previous paragraphs, it is unlikely that the current 10 million ha of logged-over forest - much of it heavily logged in the late 1970's and 1980's - will regenerate sufficient volume to provide a second commercial timber harvest. This will lead to a shortfall in timber yield during the 20-year period between the end of the current cutting cycle (year 2025-2030) and 2045-2050.
9. **Alternative to continuing TPTI system.** Recognizing the biological realities and operational practices discussed in previous paragraphs, one way to avoid a timber shortfall, is to extend the harvesting period for the remaining unlogged production forest from the current 35 years to 60 or 70 years - thus harmonizing the growth period and the cutting cycle into a mono-cyclic forest management regime. This will ensure that Indonesia's remaining unlogged forest area will provide a continuous, long-term supply of wood to the forest industry, until areas logged in the 1970s and 80s can support a second harvest.
10. **Implications of changing to longer cutting cycle.** An analysis of the wood supply potential of Indonesia's forests elaborated in a recent FAO study "Situation and Outlook for the Forestry Sector in Indonesia" indicated that adoption of a monocyclic harvest system for Indonesia's production forests would reduce the present sustainable allowable annual cut from 38 million m<sup>3</sup> based on 35 year polycyclic harvests; to 31 million m<sup>3</sup> based a 60 year monocyclic harvest.
11. **Adverse impacts of longer cutting cycle on timber availability for the forest industry can be partially offset by reducing the cutting diameter from the current 50 cm to between 35 and 40 cm and by improving logging methods.** INFORMAN analysis indicated that reducing minimum cutting diameter to

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<sup>1</sup> Appanah, of the Forest Research Institute of Malaysia (FRIM) and Bossels of GTZ, have modeled regrowth of dipterocarp forests and caution that although sustained volumes of commercial timber may be harvested on 70 year cutting cycles, there may be difficulty in sustaining sufficient trees in the larger size classes after about the third rotation. With cutting cycles approaching 100 years this size class distribution problem is resolved.

between 35 and 40 cm. would increase initial harvest timber yields from the present average of 56 m<sup>3</sup>/ha to 80 m<sup>3</sup>/ha. Combining this reduced minimum felling diameter with improved logging further increases initial harvest yields to 90 m<sup>3</sup>/ha. Much of this additional volume is presently lost or wasted due to current poor logging practices.

12. The following example illustrates the effect of changing to a longer rotation, on timber production from Sumatra and Kalimantan. According to the Jaakko Poyry (May 1992) the remaining unlogged production forest area of these two areas is 17 million ha. Assuming that this is managed on the existing 35 year cycle, the annual harvest area would be 486,000 ha - producing about 24 million m<sup>3</sup>/yr. If the cutting cycle were extended to 65 years, the annual harvest area will be reduced to 260,000 ha. - producing about 22 million m<sup>3</sup>/yr with improved logging methods and reduced minimum diameter cutting limit. This is only 8% less than the harvest under a 35 year cutting cycle. Due to a lack of data on the state of logged-over forests, they were excluded from the above calculations.

13. Although timber from conversion forests will add to the available wood volume in the short to medium term, declining forest area will reduce annual wood supply potential from 38 million m<sup>3</sup> in 1990 to 23 million m<sup>3</sup> in 2030. (FAO Forestry Studies)

14. In conclusion, since the basic assumptions related to the residual stand after logging are often not fulfilled, a 35 year cutting cycle is not likely not to sustain adequate volumes of commercial timber. A longer cutting cycle, such as that used in the above example, is believed to give a more realistic estimate of the sustained yield of Indonesia's natural forests. Since the polycyclic system makes high demands on both loggers and the forestry agencies who monitoring and controlling their operations, because of the need to maintain an adequate stock of young trees in the forest during logging, (a matter of less importance in monocyclic systems), these results offer a prima facie case for reconsideration of the present TPTI system.

## COMPARISON OF TIMBER AND NON-TIMBER VALUES OF TROPICAL FORESTS

(This Annex extracts from a paper prepared by K.J. Blakeney,  
a Bank Forest Management Consultant)

### Introduction

1. Several studies of non-timber forest products (NTFP) and services have concluded that potential value of these benefits exceed timber revenues. It would be interesting to explore how these values compare, over time, and forest management approach. Were values based on net or gross revenue? What would be the value of timber and non-timber products and services - based on discounted present value? What would be the combined value of timber, NTFP and environmental services from integrated management of forests for both timber and non-timber values?

2. In this paper, discounted value (NPV) of timber harvests, over a 70 year harvest cycle, are compared with the NPV of NTFP and environmental services. Assumptions upon which valuation of forest products and services are based are presented in the following paragraphs. The cost benefit analysis was undertaken from two alternative perspectives:

- (a) The first - somewhat simplistic - approach assumes that the forest is managed either exclusively for timber production, with no valuation of NTFP and environmental services; or alternatively, the forest is managed solely for non-timber benefits, with no timber harvests.
- (b) The second - more valid - approach. assumes that the forest is managed in an integrated way for production of timber and non-timber products and services. It is assumed that logging is done in a responsible manner, minimizing damage to the residual forest. Non-the-less, timber extraction, results in diminished production of non-timber products and services.

### Assumptions and Methodology for Estimating Timber and Non-timber Values

3. Timber - Initial harvest (year 1) yields 50 m<sup>3</sup>/ha of timber with a net value of \$40/m<sup>3</sup> (Sales Price of \$100/m<sup>3</sup> less production costs of \$45/m<sup>3</sup> less forest charges of \$15/m<sup>3</sup>) Subsequent harvests at year 35 and 70 are assumed to yield about 25 m<sup>3</sup>/ha of timber, resulting in a net value of \$1000 per ha.

4. Non-timber Forest Products - Forest preserved for exclusive production of NTFP and other environmental services - no timber production - are assumed to yield NTFP with net value (price less collection and marketing costs) of \$100 per ha per year. In forests where timber is harvested, annual net yield of NTFP is diminished to \$50 per year. It should be remembered that NTFP values are very site-specific - dependent upon the existence of populations motivated to collect them, and existence of, and access to, markets for these products.

5. Soil Erosion Protection - Soil erosion in undisturbed forest (0.25-0.5 t/ha/yr) or forests managed for timber production by selectively logging (1.5 t/ha/yr), are less than land under shifting cultivation, tree crop agriculture, or grass (5 t/ha). Studies of off-site damages from soil erosion have shown an average cost of \$1.20 per ton of soil lost. The value of forests in preventing soil losses can be calculated by subtracting the soil erosion costs of forest land (undisturbed or selectively logged) from soil erosion under alternative land uses. These calculations the annual erosion protection value of undisturbed forests is about \$6/ha/yr, while forests managed for timber production have an equivalent value of about \$4/ha/yr.

6. **Carbon** - It is assumed that carbon stored in forest biomass and soil in an unlogged forest is about 180 t/ha, while that of a logged forest is reduced to about 90 t/ha. Each ton of carbon stored is valued at \$5, according to the present average cost of reducing carbon emissions in industrial nations. Based on these estimates, the value of carbon stored in forests preserved for non-timber products and services is calculated to be \$900 per ha, while that of a forest managed for timber production - where forest biomass and soil carbon are removed through timber extraction and associated disturbance to residual trees and soils - carbon has been reduced, to a value of \$450 per ha. After harvesting, biomass and soil carbon levels are assumed to recover at the rate of about 1.4 t/ha/yr, or a value of \$7 per ha per year.

### Results and Conclusions

7. A summary of NPVs for timber and non-timber benefits is given in Table 1, based on a 10 percent discount rate.

8. Net present value of non-timber products and services (which could be quantified) is \$2,062/ha; similar to the NPV of timber production (\$2141/ha).

9. Integrated forest management for timber and non-timber products and services, produces an NPV of \$3,146. As illustrated in the discussion of natural forest management in Chapter 3, the bulk of benefits accrue from the harvest of logs in year 0. From the point of view of private logging operators, this will be even more the case as the NTFP, erosion protection and carbon storage benefits which are produced, will not accrue to him, but to other groups in society.

10. It should also be noted that had it been possible to accurately quantify additional non-marketed benefits of forests such as: biodiversity conservation, amenity values, option and existence values, and other environmental roles, the outcome of the foregoing analysis may have varied. Economic benefits are very site-specific and decisions in favor or against logging or complete preservation of specific forest areas must take into account a series of political, social and economic considerations that go beyond the simple cost-benefit analysis conducted here on the basis of scarce data.

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## THE LEGAL STATUS OF FOREST COMMUNITIES' RIGHTS TO RESOURCES AND TERRITORIES

(This Annex extracts from a consultancy report by Charles Zerner, a communities consultant)

1. In the 1990s, building on decades of success in integrating the nation, in stimulating a growing middle class, in increasing the pace of industrialization, and recently, in assuming leadership of the non-aligned nations as well as playing an important role in ASEAN, the Indonesian government has many accomplishments in the areas of social welfare, national security, and economic development to point to. Indeed, the early 1990s constitute a watershed moment in which past accomplishments may be assumed as the groundwork for further development and new policy priorities are articulated. Recent statements of the President and other high officials, as well as policy documents suggest that new development priorities are now being enunciated and a new policy landscape is being perceived.
2. In the 1990s, national leadership, at the highest levels, aspires to prioritize the needs of historically marginal, vulnerable populations by ensuring they are privileged beneficiaries of the fruits of national development. This same leadership now seeks to maximize opportunities for effective forest management at all levels, including the most local, to increase the opportunities for equitable access to and allocation of the benefits of development (pemerataan), to decentralize decision making and operational authority (desentralisasi), to promote sustainable environmental management and conserve biological diversity, and to increase governmental and private sector efforts to develop socially acceptable forms of enterprise in the historically underdeveloped eastern archipelago.
3. The passage of several recent laws, including Law Number 10/1992 concerning Population Development and the Development of Happy and Prosperous Families, a Law concerning Spatial Arrangement, a Law establishing Administrative Courts, reflect these emerging policy priorities and constitute a new legal landscape in which emerging policy priorities are grounded in the language of legal provisions and legislative intent. An analysis of these policy priorities, as reflected in new legislation, is advanced below. A review of the Agrarian Law of 1960 and the Basic Forestry Law of 1967, suggests that these previous laws are consistent and may be harmonized these recent legislative initiatives.<sup>1</sup> Recent laws, in conjunction with the Agrarian Law and the Basic Forestry Law, thus constitute a new legal landscape in which the rights of indigenous groups to their historic territory, cultural autonomy, and the right to choose their path to participation in development, are firmly established.
4. Through these laws, the Government has expressed a legal interest and policy priority in the integration and welfare of minority peoples historically on the periphery of national life. These policy priorities, moreover, embody the principle of cultural autonomy at the same time as they recognize cultural differences in law, institutions, and historic control over forest resources. The right of indigenous communities to meaningfully participate, without coercion, in the trajectory of national development, is embodied as a policy principle and a feature of positive law.

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<sup>1</sup> Law Number 4 of 1982 (Basic Provisions for the Management of the Living Environment) should also be included as a "pillar" of this emerging legal consensus, particularly in regard to its emphasis on public participation in the environmental assessment process.

Law No. 10 of 1992 concerning Population Development and the Development of Happy and Prosperous Families

5. Law Number 10 of 1992 constitutes landmark legislation in relation to the rights of Indonesia's indigenous peoples, which it recognizes as "vulnerable peoples" (masyarakat rentan). In this legislation, groups which have historically been peripheral to governmental concerns, which have been forced to change their cultures or relinquish their historic territories, and which have not benefitted sufficiently from development activities, are recognized as vulnerable peoples:

6. Vulnerable society means a population which in several dimensions does not have opportunities to develop its potential as a result of its physical and non-physical condition [Article 1, Provision 6].

7. Groups of forest dwelling peoples, particularly those which have lived in areas with limited opportunities for contact and to benefit from the last few decades of development in Indonesia are clearly within the scope and intent of provisions relating to vulnerable peoples.

8. In Article 6, Chapter II, this law explicitly recognizes several rights of indigenous peoples and situates them within the context of development. Among the enumerated rights of vulnerable peoples are the right to "utilize a customary territorial heritage." It is clear from the text of the law itself and the elucidation, that this law acknowledges the historically vulnerable position of Indonesia's indigenous peoples, recognizes their rights to lands and resources which have historically been theirs, and affirms the principle and right of cultural autonomy in choosing alternatives in development. Law Number 10 of 1992 also recognizes the rights of vulnerable groups to maintain a livelihood and to participate fully in development. This law embodies these broad recognitions by acknowledging, among others, the following rights of persons:

The right of a person as a member of society including the right to develop cultural wealth, the right to develop mutual capabilities as a group, the right to utilize a customary territorial heritage, as well as the right to preserve or develop the behavior of cultural life (Point b, Article 6, Chapter III)(Emphasis added)

The rights of a person as a citizen including recognition of equal dignity and status, the right to earn and maintain a livelihood (Point c, Article 6, Chapter III)(Emphasis added)

The rights of a person as a collectivity of quantities including the right to be considered in policies for population development and the development of happy and prosperous families in national development (Point d, Article 6, Chapter III)(Emphasis added)

9. The intent to recognize the rights of vulnerable groups to their customary heritage of land and resources, specified as "local customary heritage" are further clarified in the Elucidation of Law Number 10 of 1992. The following passages of the Elucidation also establish a legal priority for such vulnerable groups, in the event such groups are affected by development activities. Vulnerable groups such as indigenous forest-dwelling communities, are recognized as privileged beneficiaries of any development activity. Finally, the Elucidation of Article 6 recognizes and emphasizes the right of these vulnerable groups to affirmatively choose their way of life. The use of force or coercion change a peoples' way of life is strictly prohibited. This landmark legislations affirms the rights of vulnerable communities in the following passages of the Elucidation (Point b):

The rights to utilize local customary territorial heritage provides a guarantee that groups of people who have traditionally developed an area for generations will not be overwhelmed by newcomers. If such a local customary territorial heritage is developed for development

activities, the original inhabitants shall be given a priority to enjoy the enhanced value of their territory, for example through new job opportunities and so forth.

The rights to preserve and develop the behavior of cultural life, covers physical aspects (relating to land) and non-physical aspects, including socio-cultural aspects such as particular ways of life. As an example, several tribes or groups which have special ways of behavior cannot be forced to change their ways of life to conform with others. Such changes must be in accordance with the development which they themselves have chosen. (Emphasis added)

10. Several broad-reaching implications of this law are clear. Law Number 10 of 1992 recognizes the rights of historically vulnerable communities to their customary territories (land and resources). Second, it recognizes the right to freedom of choice and autonomy in relation to the impacts of a proposed development project. Third, the rights of vulnerable groups affected by development activities are recognized and legally privileged. Furthermore, this law is not limited to ethnic groups or peoples ("tribes"), but is broadly applicable to vulnerable communities or groups of persons.

#### Applying Law 10/1992 to Forest-Dwelling Communities

11. Although the implementation regulations for this broad-gauged law have not yet been drafted, several potential implications of this law for the protection of indigenous communities' rights to land and resources, as well as protection from the use of force in development programs, are clear. Article 6, for example, recognizes the rights of persons, including vulnerable communities, to affirmatively choose their own destiny, rather than being moved at the directive of government or private sector interests. This may mean that the expulsion of indigenous forest-dwelling peoples from their historically-controlled lands and resources, is illegal. These provisions may also mean that the destruction of an indigenous forest peoples' form of livelihood, or taking or damaging their environmental assets, whether by cutting-down of extensive rattan gardens in preparation for establishment of a HTI, or constructing a logging road through community territory, may also be illegal.<sup>2</sup> The widespread prohibition of rotational agro-forestry (swidden) may also be illegal as it may be construed, in the light of Law No. 10/1992, as an illegal restriction on the right to livelihood and the right to cultural autonomy.

12. Under the broad-reaching provisions of law Number 10/1992, the offer of compensation, moreover, may not be a sufficient remedy for the taking of indigenous peoples' lands or the destruction of their agro-forestry and agricultural assets, as it would constitute deprivation of their rights to livelihood and cultural choice. If, for example, it can be documented that construction of logging road was done without the consultation and consent of an indigenous community, then implementation of the logging road may be reviewed in administrative court proceedings (see below). These examples are not exhaustive, but are offered to suggest the scope of possible changes in the legal landscape in which the rights of indigenous groups are now situated by passage of Law Number 10 of 1992.

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<sup>2</sup> The Basic Forestry Law does specify certain species of compensable trees, such as tengkawang, but the scope of these provisions is extremely limited as they only specify damage to particular individual plants or trees. These laws, moreover, are frequently not implemented (see Peluso, NL, (1983) "The Ironwood Problem: (Mis) Management and Development of an Extractive Rainforest Product" Conservation Biology 6(2): 210-219).

### A Law Concerning Spatial Use Arrangement

13. A Law passed in 1991 on Spatial Arrangement establishes a new, holistic emphasis on planning in which the entire human and biological landscape must be taken into account in development planning and implementation, rather than historically narrow single sector planning.

14. The Law of Spatial Arrangement, moreover, mandates community access to planning information and consensual participation in development activities will affect communities and the varied forms of livelihood found within them. Article 8 of Chapter 1 (General Provisions) states that:

- (1) Space arrangement shall be conducted by the Government by involving the community as far as possible (Emphasis added).

15. This broad mandate for community participation is emphasized in detailed terms in Article 23 of Chapter IV (Promotion), where access to information on spatial plans affecting local communities must be disseminated through a transparent and meaningful communication process:

The Central Government, the Administration of the First Level Region and the Administration of the Second Level Region shall announce and disseminate the Space Layout Plan to the community and shall cultivate and develop community awareness and responsibilities through counselling, guidance, education, and training. (Emphasis added).

16. These general provisions establishing a priority for community participation receive even more detailed support in the Elucidation of Article 8 which states that:

Community participation constitutes a significant matter in spatial arrangement because, ultimately, the results of space arrangement are for the interests of the community. The community acts as a partner of the government in space arrangement.

17. Article 15 of the Law on Spatial Arrangement establishes the right of community members, as individuals or as a group to:

- a. know the Space Layout Plan;
- b. to participate in composing the Space Layout Plan as well as its utilization and control;
- c. to obtain compensation for any loss which he suffers as a consequence of the execution of development activities which are in line with the Space Layout Plan"

18. These positive rights are further specified in the Elucidation of Article 15, Section (2), which states that:

The right of everyone in the arrangement of Indonesian space can be realized in the form that, everyone, within certain limits, can forward any proposal, give a suggestion or forward his objections to the government in the framework of arranging the space. (Emphasis added)

19. Compensation is given to any person or right holder of space and/or land, who can prove he is directly affected with a loss as a consequence of the execution of development activities in accordance with the Space Layout Plan and by any change in the value of space as a consequence of space arrangement.

20. Article 23 extends these rights to knowledge of the development process by seeking procedural safeguards for transparency of development processes and the right to know relevant information. This article

broadly mandates the dissemination of information on planned developments to the community, open access to the planning documents, and prevention of losses to the community as a result of a shift in values caused by the planned spatial developments.

21. Although the implementing regulations of the law have not yet been issued, its implications for the involvement of indigenous, forest-dwelling communities in Indonesia's Outer Islands, as well as elsewhere, are potentially broad and far-reaching. Within the context of development and management of Indonesia's forest sector, implementation of the Law of Spatial Use Arrangement, with particular attention to its mandates for holistic planning, community rights to know, to participate, to shape and affect the on-going progress of development activities affecting them, in conjunction with the legal and policy priorities established by Law Number 10/1992, necessitate the active and consensual participation of indigenous forest-dwelling communities any development-related activities such as the planned establishment of timber concession or industrial estate plantations.

22. The planning of a logging road, the setting of boundaries for a concession or an industrial forest plantation would necessitate the informed consent, access to documents and cutting plans, and the active participation of indigenous forest dwelling communities in the planning, implementation, and monitoring of concessionaire activities. This may become an issue of central importance in the KPHP process (see paras - - to -- in the review).

23. The Law on Spatial Arrangement includes the principle that a single-purpose use of forest land, a mono-focal, non-participatory planning process which disadvantages and marginalizes indigenous communities, is not acceptable. If negative effects on indigenous communities can be demonstrated, a lack of access to information, or significant and consensual participation in planning and implementation, then the holistic, participatory spatial arrangement planning and implementation mandated by this law has not been properly conducted.

#### A Law Concerning Administrative Courts

24. The recent passage of a Law which established Administrative Courts, also has policy implications for the rights of, and protections afforded to Indonesia's indigenous forest-dwelling communities. Since the creation of Indonesia's Administrative courts, all regulations, including those of the Basic Forestry Law, may be reviewed and potentially invalidated by the courts. The existence of administrative courts creates a window of legal redress, through review of regulations, for indigenous communities. For example, if it were found that a concessionaire planned and constructed a road through community-owned rattan concessions without consulting with the indigenous owners of these gardens and without obtaining their consent, the application of Forestry Law regulations, at least in a particular case, may be invalidated.<sup>3,4</sup>

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<sup>3</sup> Administrative review is now limited to review of the application of particular regulations. It is not yet clear whether regulations per se can be invalidated through the administrative review process. Moreover, review is limited to regulations. Judicial review of national laws is a controversial topic that is currently a matter of scholarly and governmental discussion.

<sup>4</sup> These developments mean that any group with a legal interest in protecting the rights of vulnerable peoples may bring actions to Administrative Courts to get the regulation revoked or its application in a particular case judicially reviewed.

25. Taken as a whole, these recent legal developments constitute a new horizon and consensus on development in which the rights of historically vulnerable, indigenous peoples are recognized, articulated, and raised to the status of a legal priority in the context of any development activity.

#### Implications for the Basic Forestry Law

26. The Basic Forestry Law of 1967 constituted a legal instrument facilitating commercial access to and development of income streams from legal rights to forest resources. Law Number 10 of 1992, as well as the Law on Spatial Use Management of 1992, attempt to broaden the treatment of cultural and communitarian interests in resource decisions. Like the Law Number 4 of 1982 concerning the Basic Provisions for Management of Living Resources, these new laws may be seen as constraints on industrial and investment access to Indonesia's forest resources and territories. The new laws act as screens or filters, stating that the interests and rights of vulnerable groups have to be given priority in considering, planning, and implementing any development activity. These laws embody an awareness of the necessity of participation in planning by all concerned and affected groups. They also give legal form to the realization that failure to involve local groups productively, and in a significant, non-coercive manner, may undermine the success of the planned project. If involved from the very beginning, local participation can often make the difference between success and failure. These laws suggest a new national consensus is emerging, in which all kinds of human factors have to be taken into account in the development process, and in which national interests must be redefined and broadened to include these new concerns, including the rights of historically vulnerable populations.

27. These legal intentions and initiatives are, moreover, consistent with the provisions of the Agrarian Law and the Basic Forestry Law. The Agrarian Law of 1960 creates the legal grounds for recognition of community customary (adat) and territorial rights (hak ulayat) through its broad-gauged enumeration of a diversity of rights of ownership, use and management. Although The Agrarian Law's broad list of land-related rights has not yet been operationalized through implementing regulations, provision for these rights constitutes a legal opportunity for the documentation and recognition of indigenous peoples' rights. The Agrarian Law's general guidelines for ownership rights are avenues for the recognition and integration of a diversity of indigenous peoples' resource management practices and territorial rights.

28. Recognition of these rights under Agraria depends on a program of legal education, so that local people are prepared and positively positioned to translate their rights into national rights, under BAL of 1960. Such a process will be consonant with national goals of equitable distribution of the benefits of development, as well as the goals of sustainable forest development and management. Documentation and registration of indigenous peoples' lands will bring politically and economically disadvantaged and marginalized groups into the mainstream of national political life, thereby lowering the possibility of political destabilization, forest degradation, and acts of intentional destruction.

29. The Basic Forestry Law<sup>5</sup> does not invalidate customary rights nor does it invalidate rights created in Agraria. It is, in principle, harmonizable with program of recognition, documentation, conversion,

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See Barber and Churchill (1987), (cited footnote 6 below) and Zerner (1990) (cited footnote 7 below) for other analyses of the provisions of the Basic Forestry Law and the Agrarian Law in relation to customary community territorial rights. See also Moniagas (1991) "Towards Community - Based Forestry and Recognition of Adat property Rights in the Outer Island of Indonesia" in Voices from the Field: Fourth Annual Social Forestry Writing Workshop. East-West Center.

and registration of these rights under Agraria.<sup>6</sup> When the Basic Forestry Law asserts governmental jurisdiction over lands classified as forests (kawasan hutan), it qualifies this broad assertion by stating that forest areas are lands that are not owned. Article II of the BFL states that the "State Forests consists of all forest areas which are not privately owned forests (Article 2, point 1)." State forest, therefore, is not and may not be established on owned land. The question, therefore, becomes one of determining what constitutes ownership. At least a decade of agro-ecological research supports the assertion that significant areas of forest have been, and currently are managed and controlled by indigenous communities practicing under customary law and resource management practice regimes. These areas, may not qualify as State Forest. The Official Explanation of Article 2 of the Basic Forestry Law states that:<sup>7</sup>

30. In article 2 the term State Forest is used to designate all forests which are not Private Property (Hutan Milik). With this understanding, State Forests cover forests based upon Decrees as well as Customary Law which are under the control of Customary Law Communities (Masyarakat Hukum Adat). The control by Customary Law (Hukum Adat), which is commonly called community territorial rights (hak ulayat) is recognized (diakui) by the Agrarian laws, but only in so far as it still exists. (Author's translation) (Emphasis added).

The Elucidation continues:

In connection with the inclusion of forests which are under the control of customary law communities within the designation State Forest, this does not annul (tidak meniadakan) the respective rights of the customary law community as well as its member to make use of or to obtain benefits from the forest as long as those rights, in reality, still exist. (Emphasis added) (Author's translation).

31. In sum, the intent of the Basic Forestry Law was not to abolish the claims and rights of communities which continue to implement customary law. Indeed, these rights are recognized, as long as the customary system is still practiced and its implementation is not in conflict with national law.

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See Barber C.V. and G. Churchill (1987) Land Policy in Irian Java: Issues and Strategies GOI - UNDP - World Bank report; for a detailed analysis of the processes by which inchoate, customary rights may be documented and converted into possessory rights under the Agrarian Law.

See Zerner (1990), Community Rights, Customary Law, and the Law of Timber Concessions in Indonesia's Forests: Legal Options in Designing the Commons. FAO Studies (cited on page 29); particularly Chapter 4, for a detailed consideration of these provisions.

**WOOD PROCESSING SECTOR - A SPREADSHEET MODEL FOR  
ASSESSING CHANGES IN VALUE ADDED AND EMPLOYMENT ARISING  
FROM SHIFTING LOG ALLOCATION AND INCREASING RECOVERY RATES**  
(This model was developed by Akihiko Nishio, a Bank economist)

1. In the Review, an argument has been made to promote development of secondary wood processing, which offers higher value added and creates more employment than the plywood industry per unit volume of logs used. The unavailability of high quality logs in the sawmilling industry and consequently of good sawnwood for use by the secondary processing sector has been identified as a major constraint for further growth of secondary processing. A simple spreadsheet model was prepared to provide a broad assessment of the magnitude of incremental value added and employment on an annual basis, to be derived by shifting logs from the plywood industry to secondary processing. An assumption made here is that log extraction cannot be increased, due to conservation concerns. The model was also used to compare these benefits with a case involving only an increase in recovery rates for sawmilling and plywood production, without changing raw material allocation from the base case.
2. Most of the parameters used were directly taken or derived from data provided by the Ministry of Industry (MOI), including a 1987 report prepared for MOI under World Bank financing by Atlanta consultants. They are as listed at the bottom of the table: they include US\$90 per cu.m. of logs of plywood quality (US\$80 per cu.m. of logs for sawnwood quality) and recovery rates of 54 percent for plywood and 50 percent for sawmilling. It should be noted, however, that the prices (especially log prices) are known to fluctuate widely. The value added and employment per cu.m. of logs used were calculated by using 1989 data provided by MOI and the Central Bureau of Statistics (BPS).
3. The model is as shown in the Attachment. Three scenarios have been provided: scenario A, with 20 percent of the available logs shifted from the plywood sector (which is using 46 percent of logs extracted in the base case) to woodworking and furniture industries in the form of more sawnwood inputs; scenario B, with a 40 percent shift in the similar direction; and scenario C, which assumes no changes in log allocation but what seems to be a reasonable and realistic increase in recovery rates, from 54 percent to 60 percent for plywood manufacturing and 50 to 55 percent for sawmilling.
4. With scenario A, when 20 percent of logs are shifted to secondary processing, the incremental value added from wood processing as a whole is about 10 percent of the base case (or about US\$370 million/year), while the incremental employment is 11 percent (or about 66,000 people/year). With twice the volume of logs going into secondary processing in scenario B, the incremental figures are proportionately higher, at 21 percent (or about US\$750 million/year) and 22 percent (or about 130,000 people/year). With higher recovery rates, the incremental figures are about 10 percent (or about US\$360 million/year) and 3 percent (about 17,000 people/year).
5. It should be noted that these scenarios only illustrate the linkages between raw material allocation and gross increases in value added/employment; do they not take account of investment costs accruing from the changes in the structure of the wood processing sector. No attempt was made to take these investment costs into account with this model, since very little data is available and therefore an array of assumptions would be needed. In fully assessing the net benefits to be derived from an expansion of secondary processing or from higher recovery rates, the cost of investments would need to be incorporated into the analysis.
6. There are several conclusions which can be drawn from the above scenarios. First, there are fairly substantial gains from shifting resources into secondary processing, and away from plywood production: the gains would be higher if residues from sawmilling and then from secondary processing can be productively



and economically used. At present, the relatively low recovery rate from sawmilling and secondary processing on a round log basis, as opposed to plywood's, has depressed incremental gains to be realized from the shift of logs. The recovery rate in sawmilling may already be increasing as the prohibitively high export taxes on sawnwood are forcing many inefficient sawmills out of business. If logs of higher quality are made available to sawmills, this will also exert an upward pressure on the recovery rate.

7. Second, the reasonable amount of incremental benefits from raising recovery rates in sawmilling and plywood production to realistic levels would be fairly high in terms of value added, but low in terms of increased employment. Given the technological and economic constraints in raising recovery rates beyond a certain point, it would seem unrealistic to assume that the recovery rates for sawmilling and plywood production will exceed 55 and 60 percent, respectively.

8. The scenarios A/B and C are not mutually exclusive: in fact, the ideal scenario for the development of the wood processing sector would be to have both a shift in resources to secondary processing, and an improvement in the recovery rates of the different industries in the sector, provided that log availability remains constant.

**SCENARIOS FOR DEVELOPMENT OF WOOD-BASED INDUSTRIES**  
(ALL FIGURES ON AN ANNUAL BASIS)

Product	Log Use (mill.m3)	Value Added (US\$ mill.)	of Which Wages (US\$ mill)	Employment (Nos.)
<b>Base Case (business as usual)</b>				
Sawnwood	18.3	419.5	102.8	107,691
Plywood	17.1	997.5	181.5	160,244
Fancy plywood	1.3	161.3	29.4	13,720
(total primary processing /1)	36.8	1,578.3	313.7	281,655
Woodworking	9.9	1,202.0	480.8	250,795
Furniture	4.3	848.0	279.9	76,130
(Total secondary processing /2)	14.2	2,050.1	760.7	326,926
<b>TOTAL /3</b>		<b>3,628.4</b>	<b>1,074.3</b>	<b>608,581</b>
<b>Scenario A (with 20% of logs shifted from plywood to woodworking/furniture)</b>				
Sawnwood	21.7	498.1	122.0	127,851
Plywood	13.7	798.0	145.2	128,195
Fancy plywood	1.3	161.3	29.4	13,720
(total primary processing /1)	36.8	1,457.3	296.6	269,767
Woodworking	12.3	1,491.6	596.6	311,204
Furniture	5.3	1,052.3	347.3	94,468
(Total secondary processing /2)	17.6	2,543.9	943.9	405,672
<b>TOTAL /3</b>		<b>4,001.2</b>	<b>1,240.5</b>	<b>675,439</b>
(percentage change from base case)		10.3%	15.5%	11.0%
<b>Scenario B (with 40% of logs shifted from plywood to woodworking/furniture)</b>				
Sawnwood	25.2	576.6	141.3	148,012
Plywood	10.3	598.5	108.9	96,146
Fancy plywood	1.3	161.3	29.4	13,720
(total primary processing /1)	36.8	1,336.4	279.5	257,879
Woodworking	14.7	1,781.1	712.4	371,613
Furniture	6.4	1,256.6	414.7	112,805
(Total secondary processing /2)	21.1	3,037.7	1,127.1	484,418
<b>TOTAL /3</b>		<b>4,374.1</b>	<b>1,406.7</b>	<b>742,297</b>
(percentage change from base case)		20.6%	30.9%	22.0%
<b>Scenario C (with higher recovery Rates: 60% for plywood and 55% for sawnwood)</b>				
Sawnwood	18.3	461.5	113.1	107,691
Plywood	17.1	1,108.3	201.7	178,049
Fancy plywood	1.3	161.3	29.4	13,720
(total primary processing /1)	36.8	1,731.0	344.1	299,460
Woodworking	9.9	1,322.2	528.9	250,795
Furniture	4.3	932.9	307.8	76,130
(Total secondary processing /2)	14.2	2,255.1	836.7	326,926
<b>TOTAL /3</b>		<b>3,986.1</b>	<b>1,180.9</b>	<b>626,386</b>
(percentage change from base case)		9.9%	9.9%	2.9%

## Footnotes:

/1 Based on the assumption that, regardless of the scenario, total log volume extracted would stay the same.

/2 Log use for secondary processing is actually the sawnwood used.

/3 Grand total does not include total log use, to avoid double-counting for sawnwood used for secondary processing

Assumptions made for each industry (based on available data, mission findings, etc.)		
	Value added per cu.m of logs used	Employment per cu.m of logs used
Sawnwood	22.9	0.00588
Plywood	58.2	0.00935
Fancy plywood	121.0	0.01029
Woodworking	197.9	0.01776
Furniture	313.9	0.02524
<b>Prices (per cu.m) of:</b>		<b>Recovery Rate:</b>
Logs	90.0	
Sawnwood	140.0	Sawmilling 50% of round logs
Plywood	330.0	Plywood 54% of round logs
Fancy plywood	525.0	Fancy ply 48% of round logs
Woodworking	1165.3	Woodworking 56% of sawn timber
Furniture	1805.6	Furniture 50% of sawn timber

**INDONESIA FORESTRY SECTOR INSTITUTIONS AND PERSONNEL**  
 (This Annex was written by Mohammed El-Rasheed, a human resources consultant,  
 and Charles Maguire, a Bank human resources specialist)

The Ministry of Forestry (MinFor)

1. **Function.** The Ministry of Forestry was elevated to Ministry status in 1983, having previously been a Directorate General of Forestry in the Ministry of Agriculture (MOA). The organizational structure of the Ministry of Forestry is, in common with other Indonesian Ministries, based on the design laid down in Presidential Decree Number 44 of 1974. The Decree specified leadership, administration, operational services, and institutional control as common constituents of each ministry. Responsibility for the four areas is given to a Minister, Secretary General, Directors General and an Inspector General, respectively. Later a fifth area, research and development, was added.
2. **Administratively,** the Secretariat General is divided into specific bureaus; the Inspectorate General into Inspectorates, the Directorates General into a Secretariat and numerous Directorates (which are further subdivided into Sub-directorates and Sections); and Research and Development into specialized centers and regional research units.
3. **The Jakarta headquarters** of the Ministry of Forestry (Figure 1) comprises the Minister, Secretary General, Inspector General, four Directorates General - DG Forest Utilization (PH), DG Reforestation and Land Rehabilitation (RRL); DG Forest Protection and Nature Conservation (PHPA), and DG Forest Inventory and Land Use Planning (INTAG); and the Agency for Forest Research and Development (LITBANG).
4. **Staffing.** The Central Headquarters employed, in 1992, a total of 3,387 civil servants. This figure represents 10.75 percent of total civil servants under the command of the Ministry of Forestry. About one fifth of the 3387 civil servants is employed by the Agency for Forestry Research and Development, followed by the Secretariat General with 19.81 percent, and the four Directorates General with an average of about 12.0 percent. The two Training Centres and the Inspectorate General employ, at the Centre, 181 and 152 persons respectively.
5. **The composition of civil servants by educational qualifications** shows that university graduates (Sarjana level and above) account for 34.01 percent of total employment. The number of forestry degree holders is 688 person and those with non-forestry degrees are 464 person. Employees with high secondary school qualifications represent 42.31 percent of total employment, while the relative share of those with some forestry qualifications is only 1.36 percent. Further details of staff distribution by educational qualifications are given in Table 1.
6. **Civil servants are also grouped into 4 ranks and 17 grades.** Each rank is divided into four grades, a, b, c and d except for rank IV which has a fifth grade e. The lowest rank and grade is Ia and the highest is IVe. The ranks and grades reflect the length of service and corresponding basic salary, and to some extent the level of education particularly upon recruitment. Allocation of staff by rank is given in Table 3 for each of the Central Organization Units. The majority of staff is in rank II which accounts for 50.81 percent of total employment. The relative share of rank I is 10.19 percent and that of rank IV is 6.76 percent.

**Table 1: DISTRIBUTION OF CIVIL SERVANTS AT THE CENTRAL HEADQUARTERS OF THE MINISTRY OF FORESTRY BY EDUCATIONAL QUALIFICATIONS AND ORGANIZATION UNIT - 1992**

Organization Unit	Level of Education								TOTAL		
	** a		b		c		d	e	F	NF	Total
	** F	NF	F	NF	F	NF					
1. Secr. General	105	146	6	36	7	310	22	39	118	553	671
2. Inspec. General	56	10	-	7	3	65	3	8	59	93	152
3. DG Forest Utilization	135	27	14	18	9	110	10	43	158	208	366
4. DG Reforest./Rehab.	82	77	26	17	6	171	12	33	114	310	424
5. DG Forest Protect./ Nat. Conserv.	72	58	14	34	15	229	25	48	101	394	495
6. DG Forest Invent./Land Use Plng.	76	34	17	20	4	203	16	40	97	313	410
7. Agen. Forest Res./Dev.	113	88	-	52	-	247	48	140	113	575	688
8. Educat./Training Centres	49	24	2	13	2	52	7	32	53	128	181
<b>TOTAL</b>	<b>688</b>	<b>464</b>	<b>79</b>	<b>197</b>	<b>46</b>	<b>1387</b>	<b>143</b>	<b>383</b>	<b>813</b>	<b>2574</b>	<b>3387</b>

Source: Bureau of Personnel, Ministry of Forestry, 1992

a= Bachelor Degree (SARJANA)+; b= Diploma (SARMUD); c= Senior High School (SMTA);  
d= Junior High School (SMTP); e= Elementary School (SD)  
F= Forestry; NF= Non Forestry

7. Out of a total of 1152 university graduate civil servants in the 9 Central Organization Units, 973 (84.46%) are undergraduates, 156 (13.54%) are Master Degree holders and 23 (2.0%) are Ph.D Degree holders. The main employers of the Master Degree holders are the Agency for Forestry Research and Development, the Directorate General of Reforestation and Land Rehabilitation, and the Forestry Education and Training Centres with relative shares of 32.90, 18.42 and 17.76 percent, respectively. On the other hand, almost three quarters of the Ph.D. Degree holders are employed by the Agency for Forestry Research and Development. The distribution of employed university graduates by level of education and main organization unit is illustrated in Table 2.

**Table 2: UNIVERSITY GRADUATES DISTRIBUTION BY LEVEL OF EDUCATION AND ORGANIZATION UNIT 1992**

Organization Unit	Level of Education			TOTAL
	S-1	S-2	S-3	
1. Secr. General	234	14	3	251
2. Inspectorate General	63	3	0	66
3. DG Forest Utilization	151	9	2	162
4. DG Reforestation/Rehab.	130	28	1	159
5. DG Forest Protection/Nat. Conserv.	117	13	0	130
6. DG Forest Inventory/Land Use Plng.	98	12	0	110
7. Agen. Forest Research/Dev.	134	50	17	201
8. Edn./Training Centres	46	27	0	73
<b>TOTAL</b>	<b>973</b>	<b>156</b>	<b>23</b>	<b>1,152</b>

Source: Bureau of Personnel, Ministry of Forestry, 1992.

\* S-1= Bachelor (Sarjana) Degree; S-2= Master Degree; S-3= Ph.D Degree.

**Table 3: CLASSIFICATION OF CIVIL SERVANTS by RANK AND ORGANIZATION UNIT - 1992**

Organization Unit	R A N K				TOTAL
	I	II	III	IV	
1. Secr. General	41	347	243	40	671
2. Inspectorate General	10	60	57	25	152
3. DG Forest Utilization	40	154	146	26	366
4. DG Reforestation/Rehab.	37	214	152	21	424
5. DG Forest Protection/Nat.Conserv.	49	288	138	20	495
6. DG Forest Inventory/Land Use Plng.	29	244	119	18	410
7. Agen.Forest Research/Dev.	109	349	187	43	688
8. Educat./Training Centres	30	65	50	36	181
<b>TOTAL</b>	<b>345</b>	<b>1721</b>	<b>1092</b>	<b>229</b>	<b>3387</b>

Source: Bureau of Personnel, Ministry of Forestry, 1992.

8. Officials in charge of organization/work units occupy structural positions reflecting levels of responsibility in the hierarchy. There are five main levels (Echelon) ranging from VA, VB; to IVA, IVB; IIIA, IIIB; IIA, IIB; and IA, IB in ascending order. As Table 4 shows, there are at present, 566 positions in the Central Headquarters including 6 advisors to the Minister of Forestry. Senior positions denoted by Echelons I and II are concentrated in the Centre. Employees in Echelons III and IV account for 22.44 and 68.90 percent of total officials in structural positions, respectively. There is no Echelon V in the Central Headquarters of the Ministry.

**Table 4: CIVIL SERVANTS DISTRIBUTION BY LEVEL OF RESPONSIBILITY (ECHELON) - 1992**

Organization Unit	E C H E L O N										TOTAL
	I		II		III		IV		V		
	A	B	A	B	A	B	A	B	A	B	
1. Secr. General	1	-	7	-	28	-	82	-	-	-	118
2. Inspectorate General	1	-	5	-	19	-	58	-	-	-	83
3. DG Forest Utilization	1	-	5	-	18	-	58	-	-	-	82
4. DG Reforestation/Rehab.	1	-	5	-	18	-	56	-	-	-	80
5. DG Forest Protection/Nat.Conserv.	1	-	5	-	18	-	57	-	-	-	81
6. DG Forest Inventory/Land Use Plng.	1	-	4	-	14	-	45	-	-	-	64
7. Agen.Forest Research/Dev.	1	-	3	-	6	-	20	-	-	-	30
8. Training Centre Pers.	-	-	1	-	3	-	7	-	-	-	11
9. Training Centre Priv.	-	-	1	-	3	-	7	-	-	-	11
10. Minister's Advisors	-	6	-	-	-	-	-	-	-	-	6
<b>TOTAL</b>	<b>7</b>	<b>6</b>	<b>36</b>	<b>0</b>	<b>127</b>	<b>0</b>	<b>390</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>566</b>

Source: Bureau of Personnel, Ministry of Forestry, 1992.

### Regional Level

9. **Function.** The Ministry of Forestry is represented at the regional level by 27 Regional Forestry Offices (KANWIL KEHUTANAN) which coordinate and supervise field activities, including those under the Provincial Forestry services. Administratively the KANWIL are divided into divisions (secretariat, program development, forest utilization, reforestation and land rehabilitation, and forest protection and nature conservation). Each division may be divided into three to five sections. The head of the Regional Forestry Office, who has a similar status as Director, is responsible directly to the Minister of Forestry.

10. **Staffing.** With 2014 employees in 1992, Regional Forestry Offices are regarded as relatively well staffed quantitatively, but there is an evident lack of professional personnel. Employment of civil servants in the Regional Forestry Offices represents 6.39 percent of total employment of civil servants in the public forestry sector, and 10.26 percent of employment in field forestry in the provinces. There are 751 university graduates in the Regional Forestry Offices representing 37.29 percent of total employees. The number of employees with diploma (Sarjana Muda) qualifications is 117, those with high secondary school certificates are 1035, junior secondary school graduates are 63 and those with elementary school certificates are 48 persons. The relative shares of these categories of personnel are, respectively, 5.81, 51.39, 3.13, and 2.38 percent of total employment. University graduates with forestry qualifications (563 persons) account for 74.97 percent of total employed graduates.

11. Classification by rank reveals that a little over one half of the total employees are in rank II and about one third in rank III. This reflects a similar pattern to the situation in the Central Headquarters of the Ministry. But classification by level of responsibility (Echelon) is, to some extent, different due to the size of the workload or range of functions involved. Accordingly, there are Regional Forestry Offices type A, B and C corresponding to large, medium and small forestry functions per province. The pattern of distribution by Echelon and type of office is depicted in Table 5. It can be seen that there are 696 official in structural positions in the 27 Regional Forestry Offices. This number represents 33.27 percent of total personnel in structural positions in the Ministry of Forestry, excluding Provincial Forest Services and the State Forest Enterprises.

**Table 5: DISTRIBUTION OF REGIONAL OFFICES PERSONNEL  
BY LEVEL OF RESPONSIBILITY - 1992**

Regional Office	E C H E L O N										TOTAL
	I		II		III		IV		V		
	A	B	A	B	A	B	A	B	A	B	
Type A	-	-	15	-	90	-	315	-	-	-	420
Type B	-	-	9	-	45	-	162	-	-	-	216
Type C	-	-	-	3	-	12	-	45	-	-	60
TOTAL	0	0	24	3	135	12	477	45	0	0	696

Source: Bureau of Personnel, Ministry of Forestry, 1992.

### Technical Implementation Units (UPTs)

12. **Function.** There are 172 Technical Implementation Units in the provinces. These are specialized field units designed to implement specific field programs in the provinces. They are organized and managed technically by the Central Directorates General and Agencies, while their activities are supervised and coordinated

administratively by the Regional Forestry Offices. The activities of the Technical Implementation Units cover many forestry aspects such as rehabilitation and soil conservation, inventory and forest mapping, training, research, and forest products information. The number and types of unit are listed in Table 6.

13. **Staffing.** The different Technical Implementation Units employ 12,839 civil servants as at 1992. This figure represents about two thirds of total employment of field staff including Provincial Forest Service. Nearly three quarters of the staff of the Implementation Units are from high secondary schools, but only 11.67 percent of them have some forestry training. University graduates make up 7.50 percent of the total and those with forestry degrees account for 5.05 percent. All Regional Forestry Offices and Technical Implementation Units employ together 1715 University graduates including 10 with Master Degrees and no Ph.D. Degree holders.

**Table 6: TYPES AND NUMBERS OF TECHNICAL IMPLEMENTATION UNITS - 1992**

Types of Implementation Units	No. of Units
1. Forest Products Information and Certification Centre (BISHH)	10
2. Rehabilitation and Soil Conservation Centre (BRLKT)	11
3. Rehabilitation and Soil Conservation Sub-Centre (SBRLKT)	40
4. Watershed Management Technology Centre (BTP DAS)	1
5. Seed Technology Centre (BTP PERBENIHAN)	1
6. Reforestation Technology Centre (BTR)	3
7. Natural Silk Centre (BPA)	1
8. Natural Resources Conservation Centre (BKSDA)	8
9. National Parks (TN)	10
10. Inventory and Forest Mapping Centre (BIPHUT)	10
11. Inventory and Forest Mapping Sub-Centre (SBIPHUT)	31
12. Forestry Research Centre (BPK)	4
13. Forestry Training Centre (BLK)	8
14. Senior Forestry High School (SKMA)	5
15. Seed and Inspection Centre (BPPB)	3
16. Natural Resources Conservation Sub-Centre (SBKSDA)	26
<b>TOTAL Number of Implementation Units</b>	<b>172</b>

Source: Bureau of Personnel, Ministry of Forestry, 1992.

14. In terms of salary/length of service ranks, 81.25 percent of the 12,839 employees are in rank II. The other three ranks, I, III and IV, have relative shares of 10.73, 7.61 and 0.41 percent, respectively. Officials who occupy structural jobs are 830 persons, representing 6.46 percent of total employment. Those in the lower Echelons of V and IV account for 91.56 percent of total staff in structural jobs, as detailed in Table 7.

#### Provincial Forest Services

15. **Function.** The main functions of the Provincial Forest Service (Dinas Kehutanan) are supervision and control of most forestry activities at the field level. There is a Provincial Forest Office in each province except for three provinces in Java where forestry activities are undertaken by the State Forest Enterprise (Perum Perhutani). The head office of each Provincial Service is organized into one Bagian or administrative division, and five Sub-Dinas or technical divisions. Each Bagian is divided into five Sub-Bagians, and each Sub-Dinas into 3 to 4 sections. Also each Provincial Forest Office has different territorial offices within the province ranging, in descending order, from the Forest District (Cabang Dinas Kehutanan,



CDK), to the Forest Sub-District (BKPH), and the Forest Resort (RPH). The Ministry of Forestry provides technical advice to the Provincial Services, and each Provincial Office reports directly to the Provincial Governor.

Table 7: CLASSIFICATION BY LEVEL OF RESPONSIBILITY - 1992

Work Unit	Ech.III		Ech.IV		Ech.V		TOTAL
	A	B	A	B	A	B	
1. Forest Products Information and Certification Centre (BISHH)	10	-	30	-	-	-	40
2. Rehabilitation and Soil Conservation Centre (BRLKT)	11	-	73	-	142	-	226
3. Watershed Management Technology Centre (BTP DAS)	1	-	2	-	1	-	4
4. Seed Technology Centre (BTP PERBENIHAN)	1	-	2	-	1	-	4
5. Reforestation Technology Centre (BTR)	2	-	4	-	2	-	8
6. Natural Silk Centre (BPA)	1	-	3	-	-	-	4
7. Natural Resources Conservation Centre (BKSDA)	8	-	58	-	244	-	310
8. National Parks (TN)	10	-	30	-	-	-	40
9. Inventory and Forest Mapping Centre (BIPHUT)	10	-	61	-	62	-	133
10. Forestry Research Centre (BPK)	5	-	5	-	5	-	15
11. Forestry Training Centre (BLK)	8	-	16	-	-	-	24
12. Senior Forestry High School (SKMA)	-	-	5	-	5	-	10
13. Seed and Inspection Centre (BPPB)	-	3	-	6	-	3	12
<b>TOTAL</b>	<b>67</b>	<b>3</b>	<b>289</b>	<b>6</b>	<b>462</b>	<b>3</b>	<b>830</b>

Source: Bureau of Personnel, Ministry of Forestry, 1992.

16. **Staffing.** Employees of the Provincial Forest Services come from two sources of supply, secondment by the Ministry of Forestry and local recruitment by the Provincial Governor. Seconded personnel are transferable anywhere within the Ministry of Forestry, and those recruited locally are transferable within the Province. The size of personnel seconded to the Provincial Forest Service, as at June 1992, is 4,4772 persons, or 15.15 percent of the total civil servants of the Ministry of Forestry. This figure also represents about a quarter of total Ministry civil servants in the field, and about one third of the total employees of the Provincial Forest Service.

17. The composition of seconded provincial employees by education shows that 5.76 percent or 275 persons are forestry graduates (university level) and those with university degrees in other disciplines make up 1.57 percent. But over half the total employees are from high secondary schools and those with some forestry background constitute only 7.82 percent. University graduates are composed of one Ph.D. Degree holder, four Master Degree holders and 345 Bachelor Degree holders.

18. More than three quarters of total provincial personnel are concentrated in the lower basic salary level/length of service reflection ranks numbers I and II. The senior rank number IV accounts for only 0.61 percent of total personnel. On the other hand, there are 882 officials in structural positions, representing 18.48 percent of total seconded civil servants in the Provincial Forest Service. Distribution of the 882 officials by level of structural position reveals that also over three quarters are in the lower Echelon number IV, 16.33 percent in echelon III and 2.72 percent in Echelon II. Besides those mentioned, there are many other locally recruited officials in Echelon V and large numbers of general employees including wage-paid workers.

### State Forest Enterprises (BUMNs)

19. **Function.** At present, there are six State-Owned Forest Companies in the forestry sector. They are Perum Perhutani (mainly in Java and Madura) and PT Inhutani I, PT Inhutani II, PT Inhutani III, PT Inhutani IV and PT Inhutani V in specified locations in the Outer Islands. The six companies are owned by the Government through the Minister of Finance who delegates their administration and technical management to the Minister of Forestry. They are established to operate as profit-oriented business enterprises, but they also have additional obligations such as social services, provision of employment, and to give greater attention to sustainable forestry operations.

20. Perum Perhutani combines the functions of the Kanwil and Dinas offices in Java. It manages extensive forest plantations, processes wood and non-wood forest products, and markets the goods produced. In order to meet local needs for logs, periodical auctions of logs are conducted by Perum Perhutani in different parts of Java. Log transportation is carried out on a contract basis.

21. Perum Perhutani is reputedly among the best managed state-owned enterprises, despite its multifarious functions, including services for social welfare. It endeavours to improve the life of the village people, to enhance their skills and to provide income earning opportunities from the forest through the so-called prosperity approach projects, such as beekeeping and natural silk production.

22. Perum Perhutani has a Board of Supervisors and a Board of Directors. It is headed by a President Director who has a team of four Directors in charge of Production, Marketing, Finance and General Affairs. The Directors, in turn, are supported by heads of Divisions and Sub-divisions. There are 12 Divisions at the Headquarters in Jakarta and two training centres in Cepu and Madiun. Figure 2 depicts the organizational structure of Perum Perhutani.

23. At the field level, there are three regional units in Java, each headed by a Chief and Vice Chief. Unit I covers Central Java, Unit II East Java, and Unit III West Java. Each of the regional Unit Offices has nine Bureaus -- for Planning, Forest Establishment, Production, Industry, Marketing, Techniques and Equipment, Safeguard and Agraria, General Affairs and Finance. The Bureaus are further sub-divided into sections.

24. The Regional Units are further divided into several smaller operations units of Forest Districts, each headed by an Administrator. Units I, II and III are composed of 24, 25 and 15 operational units, respectively. The Administrators are assisted by assistant administrators. The Forest Districts are further divided into forest resorts or sections. The General organizational structure of regional units of Perum Perhutani is given in Figure 3.

25. PT Inhutani companies are actually concession companies owned by the Government and are expected to operate and manage their concession forests as any other concession holder. However, being state-owned, they are less single-minded about profit generation and should serve as model units of profitable but responsible forest harvesting and management. Their organizational structure at the Head Offices in Jakarta is similar to that of Perum Perhutani, but the operational units are structured somewhat differently. Under the President Director of the enterprise, there are three Directors in charge of Production, Development and Finance, and the Directors are supported by Heads of Bureaus.

26. **Staffing.** The six State-Owned companies had a combined total seconded staff of 8,489 person in 1992. Those are civil servants from the Ministry of Forestry, and represent about 55 percent of the total employees in the six companies. Daily paid or contractual labor engaged by the enterprises is not included in the figures mentioned. The main employer is Perum Perhutani which accounts for 95.37 percent of the total seconded personnel, while the five state owned concession companies together employ 4.63 percent. The

formation of employees by level of education is, to an extent, different from the situation in the other main work units of the public forestry sector, as 45.24 percent of total personnel have elementary school education only. Forestry trained personnel consist of 3.98 percent university graduates, 1.08 percent Diploma holders, and 7.66 percent high secondary school graduates. This shows that 87.28 percent of all employees have no forestry education. University graduates on secondment to the State-Owned forestry enterprises are 507, consisting of one Ph.D., 5 Master, and 501 Bachelor Degree holders.

27. Grouping of seconded employees by the four civil service ranks indicates that 91.28 percent are in ranks I and II, with the former alone accounting for 58.82 percent. The relative share of the top rank number IV is 0.67 percent. Grading of officials by level of responsibility is hampered by lack of clear and complete echelonization in the State Forest Enterprises. Moreover, there are other data deficiencies in this connection.

#### Total Civil Servants in the Public Forest Sector

28. In general, there are four categories of employees in the public sector. These are Pegawai Negeri Sipil (PNS) or civil servants, Calon Pegawai Negeri Sipil (CPNS) or temporary civil servants, honorer or honorarium paid personnel, and upah harian or daily paid workers. Accordingly, the number of civil servants in the Ministry of Forestry does not represent total employment in the entire public forest sector. This fact is more conspicuous in organization units such as the Provincial Forest Service, the Technical Implementation Units, and the State Forest Enterprises, where there are many locally recruited employees. As such total employment of civil servants in the Ministry of Forestry accounts for approximately, two thirds of total employment in the public forest sector, excluding daily paid workers.

29. Some highlights of total employment of civil servants in the Ministry of Forestry are presented in the tables below. The presentation depicts total number classified by main work units and level of education (Table 8), work units and employed university graduates (Table 9), and work unit and civil service ranks (Table 10).

**Table 8: TOTAL EMPLOYEES IN THE MINISTRY OF FORESTRY  
BY LEVEL AND TYPE OF EDUCATION - 1992**

Work Unit	Level of Education								TOTAL		
	a		b		c		d	e	F	NF	TOTAL
	F	NF	F	NF	F	NF					
1. Central Headquarters	688	464	79	197	46	1387	143	383	813	2,574	3,387
2. Regional Offices	563	188	48	69	173	862	63	48	784	1,230	2,014
3. Techn. Impl. Units	648	316	219	287	1152	8716	714	787	2,019	10,820	12,839
4. Provincial Offices	275	75	30	30	373	2403	1425	161	678	4,094	4,772
5. State Forest Enterprises	338	169	92	205	650	1728	1467	3840	1,080	7,409	8,489
<b>TOTAL</b>	<b>2512</b>	<b>1212</b>	<b>468</b>	<b>788</b>	<b>2394</b>	<b>15096</b>	<b>3812</b>	<b>5219</b>	<b>5,374</b>	<b>26,127</b>	<b>31,501</b>

Source: Bureau of Personnel, Ministry of Forestry - 1992.

**Table 9: TOTAL EMPLOYED UNIVERSITY GRADUATES IN  
THE MINISTRY OF FORESTRY BY LEVEL OF EDUCATION - 1992**

Work Unit	Level of Education			TOTAL
	Bachelor Degree (S-1)	Master Degree (S-2)	Ph.D. Degree (S-3)	
1. Central Headquarters	973	156	23	1152
2. Regional Offices and Techn. Impl. Units	1705	10	0	1715
3. Provincial Offices	345	4	1	350
4. State Forestry Enterprises	501	5	1	507
<b>TOTAL</b>	<b>3524</b>	<b>175</b>	<b>25</b>	<b>3724</b>

Source: Bureau of Personnel, Ministry of Forestry - 1992.

**Table 10: CLASSIFICATION OF TOTAL EMPLOYEES BY  
CIVIL SERVICE RANKS - 1992**

Work Unit	R A N K				TOTAL
	I	II	III	IV	
1. Central Headquarters	345	1,721	1,092	229	3,387
2. Regional Offices	105	1,066	717	126	2,014
3. Techn. Impl. Units	1,378	10,432	977	52	12,839
4. Provincial Offices	1,572	2,654	517	29	4,772
5. State Forest Enterprises	4,993	2,756	683	57	8,489
<b>TOTAL</b>	<b>8,393</b>	<b>18,629</b>	<b>3,986</b>	<b>493</b>	<b>31,501</b>

Source: Bureau of Personnel, Ministry of Forestry - 1992.

### The Private Sector

30. **Forest Concessions.** As at February 1991, there were 578 forest concessions covering an estimated area of 60 million hectares, over 18 of the 27 provinces in the country. Concessionaires are responsible for: preparation of management plan; photography and inventory; delineations of concession boundaries; logging and management under rules and contract conditions; submission of log production, transport, processing and sales returns.

31. Organizational structures in the private forestry sector are variable among the very large number of small, medium and large-scale timber companies. The main employment units in most of these companies are those related to logging, sawmilling, plymilling, and administration.

32. Organizational structures of small (less than 60,000 ha) and medium (60,000-150,000 ha) concession management systems are illustrated in Figures 4 and 5.

33. **Forest-Based Industries.** Forest-based industries in Indonesia consist of 2,700 reporting sawmills of different sizes (and some 800 informal sawmill units), 110 plywood mills, 54 block board mills, 7 particle board mills, and 38 pulp and paper mills. In addition to these major industries, there are many small-sized facilities manufacturing chopsticks, safety matches, toothpicks, toys, pencils, moulding, furniture and other downstream products.

34. **Forest Industry Associations.** Forest industry associations are a major driving force in influencing forest policy and its implementation. Despite frequent references to management inefficiencies, under-utilization of industrial capacity, and widespread failure of concession management, forest-based industrial development in Indonesia has been quite remarkable. The commitment and the discipline of the forest industry associations are primarily responsible for the successful international market penetration of Indonesian forest products.

35. The principal associations related to forestry are the Indonesian Loggers Association (APHI), the Indonesian Wood Panel Association (APKINDO), the Indonesian Sawmillers Association (ISA) and the Indonesian Furniture and Handicrafts Production (ASMINDO). Highly disciplined and tightly run, the associations exercise close control over the activities of the members. They are linked under the umbrella of the Indonesian Forestry Community (MPI), together with the Indonesian Flora and Fauna Trade Association (IFTA), the Association of Formalin and Thermosetting Adhesives Industries (AIFTA) and the Forestry Consultants Association of Indonesia (HIKKINDO).

36. The most influential of the Associations is APKINDO. Its major influences have been in the area of pricing and export flow controls based on a cost plus pricing policy providing enormous profit incentive to the industry. The marketing system was first developed by APKINDO, which in 1984 established joint marketing boards with support from the Department of Trade; subsequently, the ISA and ASMINDO established similar (but not identical) structures.

37. APKINDO is the type example. It has a Council appointed by its members and approved by the Department of Trade. The Council in turn appoints Executive Presidents to each of the seven Joint Marketing Boards (JMB), five of which are geographic (USA, Europe, the Middle East, China and "new markets"); the other two are concerned with domestic markets and "new products." Membership of a JMB is compulsory for all producing companies, but members may select the board which they wish to join. The JMB exercises control over export contracts, volumes, prices and other terms. Each Joint Marketing Board has 15 to 24 members appointed by the Association Council and the Department of Trade.

38. The biggest 15 mills (in terms of market share) are appointed by the Council as the Price Stabilization Team. The Department of Trade, on the advice of the Council, sets an upper limit to the annual export production level, which is then divided up by the Board among the Association members on the basis of market share. The Marketing Boards set the "rules of the game," including penalties for failure to comply. The Executive Presidents are responsible for the implementation of all aspects of trading to the Council, which derives its mandate from the Association membership. Control is exercised by the JMB which may advise the Department of Trade to withhold the export license required for shipments. Similarly, the JMB is aware of the origins of letters of credit and can monitor (and guard against) transfer invoicing (and pricing).

39. The marketing mechanism depends on the market country. In Europe, traditionally, wood products are sold through agents and, after testing alternatives, the associations have reverted to their use. In addition, five trading companies have been established to promote international markets for panel products. Trading companies are Association subsidiaries, the shares of which are held by the Association (APKINDO) members. It seems likely that the APKINDO method of operating will be attempted by ISA and ASMINDO.

40. The associations state as objectives the furtherance of member interests and the improvement of business climate. All refer in some way or another to fostering a community spirit ("esprit de corps"). This is a more important feature in Indonesia than in most other countries; it enables cooperation between competitors and the resolution of conflicts of interest. The solidarity which the associations have inspired has been an important stimulus for forest industry development in Indonesia, which is not amenable to economic evaluation.
41. The expanding pulp and paper industry in Indonesia has its own association which is not a part of the MPI. Its members conduct their affairs through plenary meetings directed by a chairman and four vice-chairmen. Each of the vice-chairmen looks after particular "Working Groups." There is also a Secretariat and a special working group for paper converters, which is limited to Java. The Working Groups are for marketing, industrial relations, industrial development, and research, development and training. Each has members with particular interest within a general field. Thus in marketing there are specialist members for different types of paper; in industrial relations there are specialists on protection, taxation and finance, licensing, and labour relations; industrial development is divided by productivity and efficiency, investment guidance, industry structure, and data bank; while the Working Group on research, development and training has members concerned with training, standardization, evaluation and application of technologies. The Association produces a "state of the industry" report annually. It serves clients abroad as well as locally.
42. While an important objective of all the associations is to improve business and product markets, other related objectives include improvement of technology, improved management of enterprise, control of product quality and human resource development. Accordingly, the associations have an important role to play in supporting industry-related training and education. The associations can also play a major role in furthering the concept of Bapak Angkat (foster parent) by providing training to local youth to be employed in the forest-based private enterprises.
43. The associations draw their professional personnel from many fields of expertise, including retired officers from the Armed Forces and foresters and other experts from government agencies.
44. **Forestry Consultancy Firms.** Forestry consultancy firms are rather new in Indonesia, and only a few of them are reportedly of high professional standard. No special efforts are underway, either on the part of the Ministry of Forestry or the forest industry associations to enhance the quality and scope of the consultancy firms in forestry. Unlike the government agencies related to public works, the forestry agencies carry out most of the technical and legal activities directly.
45. The consultancy firms draw their experts and support personnel from universities, pensioners, forestry school students and new graduates. Consultancy firms in Indonesia are organized into a loose organization known as INKINDO (Indonesian Consultants' Association). Forestry consultancy firms have formed themselves into a separate association -- HIKKINDO. As already indicated, the HIKKINDO is also a member of the Indonesian Forestry Community (MPI), a federation of forestry associations.
46. Competent consultancy firms and private firms carrying out forestry works on contract can play a major role in supporting forestry development -- especially in such areas as reforestation and plantation establishment, logging operations, forest road construction, forest management, parks management, environmental impact assessment, forest industries development, and improving marketing arrangements.
47. According to regulations, foreign companies have to join national companies to be able to participate in forestry activities in Indonesia. The national company in such a joint enterprise is required to own at least 51 percent of the shares. However, a national company can hire expatriate experts provided that the expertise hired is not available in the country.

48. **Staffing in the Private Sector.** The data reported below are drawn from FAO/GOI Forestry Studies data base of 1988/89 as updating work is still continuing. According to preliminary figures obtained, there is no marked difference in the overall picture of employment portrayed by the old and new figures. The conclusions drawn from the two sources of information, despite the difference of some two years, are similar.

49. Due to variations in data sources, besides collection and reporting aspects, the total level of employment in the Private Forest Sector was quoted as 218,181 and 201,383 person in the same document by the FAO/GOI Forestry Studies. Both figures do not include employment in non-concession mills, casual and contract labour, as well as small scale non-wood forest products collection, processing and marketing activities.

50. As mentioned above, the formal private forest sector employed, in 1989, a total of 218,181 persons distributed over 19 provinces as shown in Table 11. The province of East Kalimantan had the highest level of employment with about one fifth of total employees. This is understandable as East Kalimantan has vast areas of production forests and large timber processing capacity. The other provinces of West and Central Kalimantan, besides Riau in Sumatera had relative shares of 15.27, 12.95 and 11.59 percent, respectively. Table 11 also illustrates the number of concessions per province. The number of concessions reported was 557 in 18 provinces. More than half the number of concessions was in the Island of Kalimantan. The size of a forest concession ranged from 20,000 hectare to over 500,000 hectare. The total forest area covered by all concessions was estimated as 60 million hectare.

**Table 11: DISTRIBUTION OF TOTAL MANPOWER IN THE PRIVATE SECTOR  
BY PROVINCE AND CONCESSION: 1989**

PROVINCE	Total Employment		Concessions	
	Number	Percent of Total	Number	Percent of Total
D.I. Aceh	7,403	3.38	16	2.87
North Sumatra	9,692	4.44	16	2.87
West Sumatra	5,008	2.30	11	1.97
Riau	25,296	11.59	60	10.77
Jambi	14,559	6.67	31	5.57
South Sumatra	8,963	4.11	23	4.13
Bengkulu	652	0.30	5	0.90
Lampung	2,132	0.98	3	0.54
West Nusa Tenggara	306	0.14	-	-
West Kalimantan	33,321	15.27	64	11.49
Central Kalimantan	28,265	12.95	108	19.39
South Kalimantan	16,753	7.68	13	2.33
East Kalimantan	46,723	21.42	107	19.21
North Sulawesi	2,179	1.00	14	2.51
Central Sulawesi	581	0.27	13	2.33
South Sulawesi	1,729	0.79	9	1.62
Southeast Sulawesi	119	0.06	2	0.36
Maluku	14,076	6.45	32	5.75
Irian Jaya	424	0.19	30	5.39
<b>TOTAL</b>	<b>218,181</b>	<b>100.00</b>	<b>557</b>	<b>100.00</b>

Source: Compiled from FAO/GOI Forestry Studies, UTF/INS/065/INS Project Database 1989.

51. The main activities conducted by forest concession holders are logging and forest management, sawmilling and wood-based panels production. A fourth type of activity, recently encouraged by the Government in anticipation of eventual depletion of natural production forest, is industrial forest plantations. A national target of establishing 4.4 million hectares of new industrial plantations was set for the period 1984-2000. The Fourth Five Year National Development Plan target (Repelita IV) was 1.5 million hectares. But as there were no specific employment data on this fourth type of activity, the figures given below, apparently, exclude industrial forest plantations. However, the forest management and logging activity may incorporate some workers on industrial forest plantations.

52. Total employment in the Private Forest Sector by level of education and main type of activity or type of industry is given in Table 12. Employees were classified into three categories (professional, technical and vocational) according to level of education. University graduates were grouped as professional, some high secondary and post high secondary school graduates as technical, and high, junior and elementary schools graduates as vocational. The most striking feature of Table 12, is the very small proportion of university graduates (0.40 percent) in relation to total employment of 201,383 person. Also the technical category accounts for only 2.12 percent. However, the highest levels of university graduates were in forest management and logging (58.21 percent) followed by wood-based panels (29.35 percent) and sawmilling (12.44 percent). More details are shown in Table 12.

**Table 12: EMPLOYED MANPOWER DISTRIBUTION IN THE PRIVATE FORESTRY SECTOR  
BY LEVEL OF EDUCATION AND TYPE OF INDUSTRY - 1989**

LEVEL OF EDUCATION	TYPE OF INDUSTRY			Grand Total
	Forest Management and Logging	Sawmilling	Wood-based panels	
University graduates (Professional)	468 (58.21%)	100 (12.44%)	236 (29.35%)	804 (0.40%)
Sarjana Muda	752	127	460	1,339
Senior High School	993	437	1,506	2,936
Total (Technical)	1,745 (40.82%)	564 (13.19%)	1,966 (45.99%)	4,275 (2.12%)
Senior High School	18,874	8,307	28,609	55,790
Junior High School	23,142	9,511	25,444	58,097
Elementary School	26,247	17,013	39,157	82,417
Total (Vocational)	68,263 (34.78%)	34,831 (17.74%)	93,210 (47.48%)	196,304 (97.48%)
Grand Total	70,476 (35.00%)	35,495 (17.62%)	95,412 (47.38%)	201,383

Source: Compiled from FAO/GOI Forestry Studies, UTF/INS/065/INS, Project Database 1989.

#### Total Employment in The Forest Sector

53. Total reported employment in the Forest Sector consists of those employed by the public and private components of the sector, and excludes employment by faculties and departments of forestry in



universities as well as casual labour and those involved in non-forest concession and non-wood forest products activities. As explained in sections 2.6 and 3.1, it was necessary to resort to 1988/89 data due to lack of more recent information on a number of Public Sector agencies and the entire Private Sector. At that time, total employment in the Forest Sector was estimated as 248,445 person, with the public sector accounting for 47,062 persons or 18.94 percent.

54. Categorization of total employees by level of education in the public and private parts of the sector and in the sector as a whole unveils marked imbalances in employment, particularly for persons with professional and technical qualifications. In general, skill gaps throughout the sector and at all levels are enormous. Moreover, the employment situation reflects ad hoc response to recruitment needs, wide variation in the number of employees utilized for similar activities, and extensive range of educational qualifications specially in the Private Sector where the ability to do a job, rather than education background, is apparently the prime criterion for employees selection.

55. Sector employees with forestry training were estimated as 70.40 percent of university graduates, 42.20 percent of Diploma holders and 7.10 percent of Senior Secondary School graduates. Of the total number of 248,445 employees, about 2.00 percent were classified as university graduates, 1.30 percent Diploma holders, and 33.10, 26.10 and 37.5 percent as Senior Secondary, Junior Secondary and Elementary Schools graduates, respectively. Similar details for the public and private components of the sector are presented in Table 13.

**Table 13: CLASSIFICATION OF EMPLOYMENT IN THE FORESTRY SECTOR BY LEVEL OF EDUCATION, 1989**

Level of Education	Public Sector		Private Sector		TOTAL	
	Employees	%	Employees	%	Employees	%
University Graduates	4,190	8.9	804	0.4	4,994	2.0
Sarjana Muda	1,961	4.2	1,339	0.7	3,300	1.3
Senior High School	23,627	50.2	58,726	29.2	82,353	33.1
Junior High School	6,651	14.1	58,097	28.8	64,748	26.1
Primary School	10,633	22.6	82,417	40.9	93,050	37.5
<b>TOTAL</b>	<b>47,062</b>	<b>100.0</b>	<b>201,383</b>	<b>100.0</b>	<b>248,445</b>	<b>100.0</b>

Source: FAO/GOI Forestry Studies Data Base, 1989.

## SUSTAINABILITY AND FOREST MANAGEMENT

(This annex extracts from the first chapter of a book on sustainable forest management commissioned by the Bank and ITTO)

### The Idea of The Forest

1. Until very recently, most people regarded the forest simply as a wild place where trees grew. In a limited, local way, rules were made and enforced for the preservation of forest game or minor forest products, and for safeguarding the flow of water from the woodlands. It is now increasingly realized that the value of forests is greater than the sum of its parts. Forests cannot be thought of simply as a resource to produce timber and other marketed outputs: much of what they produce - non timber products, important downstream soil and water value, 'global' goods such as biodiversity and carbon storage - have no clearly defined ownership and markets, but are no less valuable for that.
2. The greater part of deforestation has been caused by conversion of forest lands to other uses, rather than overlogging. Today, no longer is it taken for granted that clearing trees for farmland or plantations is necessarily an improvement.
3. This book draws widely on the knowledge of foresters, and applies to it the disciplines of economics and environmental concerns. We consider and evaluate the costs, opportunities and benefits of managing natural forests as productive economic resources, while at the same time ensuring that they can renew their growth as a habitat for living creatures (including mankind), and as the source of many benefits, some of them intangible, for the local and global environment. The term for this is sustainable forest management. A crucial question - and one which has frequently been answered in the negative in the popular press (see Time 1991) - is: can sustainable forest management be done?
4. This book will argue that, under most biological conditions where tropical forests occur, some form of sustainability is technically possible. Actual outcomes, however, depend more upon the economic viability of sustainable management, under the policy and institutional arrangements that apply.
5. A key factor in sustainable management is that of incentives. The incentive to cut timber is the money paid for it. Incentives, in the form of subsidies or fines, can be devised for replanting trees or safeguarding water flows. But rewards or punishments that would encourage preservation of the environmental and global benefits obtained from forests are much more difficult to devise. The task we set ourselves in this book is to quantify the costs and the economic returns involved in managing forests, and from this to suggest policies for the future.
6. The world's great surviving forests are in the tropics, in nations that are populous and hope to become prosperous. It is unrealistic to expect that the peoples of those nations will simply leave the forests undisturbed. They are an important source of employment and of potential wealth, for individuals and for the governments that generally own them. We therefore consider whether it is possible to use the value of the standing forest, while leaving it capable of sustaining its own characteristic natural existence. Sustained forest management has been successful in, for example, Queensland in Australia, in Costa Rica, in Peru and in Belize, where the problem has been given enough money and care (Poore et al. 1989). But can it work in the real world, where resources are inevitably limited? More specifically, can it work in the tropical moist forests of Asia and the Pacific where the wood values of the forests are very high, and the pressures for conversion - because of the very high population densities in much of the area - are so great. We shall be trying to answer that question, in both its biological and financial aspects.

7. Location is crucial, both for managed forests and for plantations of commercial timber. From the economic point of view, forests are subject to the same physical constraints as farms, mines or any other form of investment in natural resources. Soil quality, steepness and rainfall must be taken into account. Since timber is bulky and heavy, transport forms a high proportion of its cost; a remote forest is less likely to be a profitable one. However, this less true than it used to be. Until a few decades ago, manual cutting and haulage by beasts of burden limited the possibility of bringing even the most valuable trees to market. Chain-saws, tractors and bulldozers have changed all that. Instead of selective cutting of only the most valuable and accessible trees, wood of all qualities can be hauled out of steep and remote sites, with the best timber going for industrial use, while low-grade production from a mixed forest (and all natural forests contain a vast diversity of vegetation) can be sold for pulp.

8. Under these circumstances, the need for intelligent management is all the greater, and all too often lacking. Rising prosperity in the industrialized countries that buy timber and pulp has vastly increased the pressure on the forests, and made it more than ever necessary to consider the techniques, and the economics, of managing them sustainably. A deal of controversy has arisen because different interest groups interpret the concept of sustainability in widely varying ways. We need to begin our analysis, therefore, with some discussion of the concept.

#### Sustainability and Management

9. For millenia mankind has known how to manage natural resources sustainably; the Bible describes sustainable herding systems more than 3,000 years ago. The barons of medieval Europe managed forests for game, fuel and building timber in ways that ensured supplies for coming generations. Tropical peoples have practiced shifting cultivation sustainably for centuries - a tradition newly endangered by rising populations. Everywhere young animals are protected in their infancy, reared to maturity and harvested when the time is ripe. Diversity of production is central to this process; meat may be the main product, but milk, hides, haulage, fertilizer and fuel are integral parts of the hoped-for harvest. The sustainable management of forests should be no different: timber is just one forest product, to whose value that of other forest products must be added.

10. Sustainable management of natural resources implies human intervention to obtain a steady output that continues indefinitely, without compromising the long-term productivity of the system. Mortality is part of all nature; harvesting can be managed so as to mimic natural mortality, which maintains minerals and nutrients in the soil, flows and stocks of water, and genetic complexity. Herds, fisheries, pastures and forests can all, under skilful management, maintain their productivity while contributing their surplus for the use of humankind. In tropical forestry, this has traditionally been thought of as the transition from old growth to managed even-aged forests. Such a transition typically occurs as the forest evolves from an unmanaged natural forest inherited from nature, to a "regulated forest" in which a sequence of even-aged blocks are represented. These are to be harvested on optimum rotation cycles, which are determined by either biological or financial considerations. These rotations are to provide a constant level of annual harvest, or what is referred to as a steady-state harvest flow. The level of this steady-state harvest, the sustainable yield, may also involve considerations of appropriate silvicultural practices to promote and/or ensure regeneration of desired species, as well as to promote growth of usable outputs. It can include measures to protect and preserve selected biodiversity and other environmental values.

#### Concepts of Sustainability

11. Concern is widespread that mankind may be misusing natural resources, and abusing the natural legacy of future generations. Unsustainable development is clearly recognized. But the idea of sustainability has still to be clearly defined. The word has in recent years been used to support many propositions, not least in forestry. A well-informed commentator has suggested that some definitions are "so broad that (they are

almost devoid of operational significance" (Ruttan, 1991). Greberg and Johnson (1991) argue that the debate about sustainability has become so confused that they can identify eight rival definitions or "perspectives" presented by various parties to it; some are based on traditional concepts of economic or biological "sustained yield", or on notions of sustainable multiple use, while others emphasize economic scarcity, or the stability of communities, or the inherent or potential productivity of a forest or the soil it grows on.

12. Thus, even where definitions of sustainability are precise, they often conflict with each other. New refinements and preconceptions keep being loaded on to the term. Where once it implied sustaining the supply of specific resources (such as timber), it is now used to cover the maintenance of entire socioeconomic and ecological systems.

13. The basic idea is clear enough: The Brundtland Report on the environment and development (1987) defined sustainable development as that "which meets the needs of the present without compromising the ability of future generations to meet their own needs". Robert Repetto (1986), a vice-president of the World Resources Institute, offers a more flexible definition: for sustainability, he says, "current decisions should not impair the prospects for maintaining or improving future living standards... This implies that our economic systems should be managed so that we live off the dividend of our resources, maintaining and improving the asset base". However, he points out that this does not demand "the preservation of the current stock of natural resources or any particular mix of human, physical and natural assets. As development proceeds, the composition of the underlying asset base changes."

14. David Pearce (1987), an environmental economist, suggests that development may be regarded as sustainable if it is "subject to a set of constraints which set resource harvest rates at levels no higher than managed or natural regeneration rates."

15. Most definitions agree that current consumption should take only a "dividend" of the resource base, without consuming the base itself. Gardner Brown (1991) challenges the notion of sustainable development as "too vague and blunt", and identifies three rival concepts: natural equilibrium; maximum sustainable yield; and economic optimum. In a natural system with several outputs, maximizing the sustainable yield of one output almost invariably affects (and usually reduces) the yield of others. Obviously, this is not possible if the sustainability of the whole system is the objective. Thus, these definitions of sustainability are inconsistent and even mutually exclusive.

### The Idea of Sustainable Forestry

16. The Yokohama Forestry Declaration of Senior Foresters (1991), stated that: "...with the wide range of expert opinions, it is impossible to blend all the criteria cited to achieve 'absolute' sustainability. By some measure sustainability will never be achieved." The foresters continued: "A comprehensive definition of sustainability must include the maintenance of vital ecological functions rather than only a continuous yield of timber". The conference concluded: "The tropical forests can be brought under sustainable management for industrial timber as well as for non-timber products, biodiversity conservation and other environmental and human values." (ITTO, 1991).

17. This broadens the traditional view, which has usually been taken to mean sustaining timber production by the management of natural forests, by harvesting timber at a rate, and by techniques, matching those of natural mortality. This means taking timber while encouraging the forest to renew itself, as opposed to timber-mining, which consumes the forest. But even within this narrow definition ambiguities lie concealed. A logging operation that simply "cuts and runs" might appear to constitute timber-mining, violating the criterion of sustainability. But some types of forest in some places can regenerate themselves even after heavy logging clearance; in them, clear-felling might be regarded as "pulse" harvesting, renewable and sustainable over a very long period (Vincent and Binkley 1992, Vincent 1992). By this account,

sustainability is implicit in the productive and regenerative capacity of the forest land. Depending on what is defined in the list of goods to be sustained, this definition is compatible with one ecologist's definition of sustainability; Jerry Franklin (1992a) defines it as the "maintenance of the potential for our land and water ecosystems to produce the same quantity and quality of goods and services in perpetuity". The operative word seems to be "potential", the definition does not seem to rule out a change in the mix of goods and services to be obtained from forest land.

18. If forest land is converted to, say, farming, sustainability of the forest is of course lost. The question that matters is whether, after the timber has been taken out, the land is allowed to regenerate back into forest or converted permanently to an other use. Shifting cultivation (or slash-and-burn) is certainly not sustainable forestry, but can nevertheless be considered as a form of sustainable agriculture (Pingali, Bigot and Binswanger 1987). Even where there is a permanent change of land-use, it is possible to claim that the basic resource is the land itself, and that its productive capacity is sustained if it is passed on with its fertility unimpaired, so that future generations can choose to use it for agriculture or for tree crops - or even to allow it to revert naturally to woodland. However that may be, the loss of a natural forest is a permanent and irreplaceable loss of biodiversity.

19. It is hardly surprising that, usually, economists, ecologists and natural resource managers have different attitudes to sustainability. Toman and Crosson (1991) identify three key issues where these arise: intergenerational equity; the composition of social capital; and the scale of human activity.

20. Intergenerational equity concerns the passing on of resources from one generation to another. Measuring the value of long-term assets and investments in economic terms involves judgement on the extent to which future benefits should be discounted in comparison to current available benefits. The lower the discount rate applied, the longer the period over which an investment is expected to pay for itself, so a low discount rate might be regarded as favoring investment in slow-growing forests. Yet a low discount rate also favours long-term investments in, for example, dams and reservoirs, which may damage forests.

21. In assessing intergenerational equity, economists might allow for a reduction in the amount of natural resources to be bequeathed, if their value were offset by passing on large amounts of productive assets such as physical, human or intellectual resources. Many economists will argue that this is the trade-off mechanism by which the high standards of living prevalent in developed economics have been achieved.

22. Ecologists take a quite different view, described by Toman and Crosson as "organistic"; it emphasizes the safeguarding of the evolutionary processes which contribute to human survival, and prescribes the protection of entire natural systems, ecological and human, without much regard for discount rates. (or, as economists may put it, applying an implicit discount rate of zero).

23. This leads us to the second issue: the composition of social capital. Ecologists say that natural resources and natural systems need special protection against irreversible change; that there can be no trade-off between ecological and other components of social capital; and that technical innovation does not necessarily increase social capital. Economists tend to focus on the size of the stock of social capital; ecologists emphasize its composition.

24. The third issue - the scale of human activity - arises from concern that mankind may have brought the world close to its global carrying capacity. Economists note that a similar fear was voiced by Malthus two centuries ago, and has not yet proved justified. Modern economics (and, for that matter, Malthus himself) tend to support the argument that "carrying capacity" is not fixed through time, but can be increased by good management and particularly by social or technological change. Empirical evidence suggests that, for most resources, economic scarcity has indeed declined over time (Barnett and Morse 1963). However,

most economists acknowledge that the sustainability of ecosystems and the protection of biodiversity may be exceptions to their general rule (Smith 1979).

25. In forest management, there obviously can be a trade-off between the protection of some areas and the intensive management of others. Higher production from intensively managed forest may allow lower or no production from larger areas set aside as forest reserves, whereas lower intensity production throughout may cause the price of all timber to rise, increasing the pressure to get more from virgin forests. A global approach to conservation should consider carefully whether to accept intensive, even ecologically disruptive harvests in some places, as a cost for more benign practices elsewhere. In the real world, a balance must be found between this view, and the one that holds that forests should be preserved even if preservation is not justified on financial or social grounds.

26. This balance must be sought in the knowledge that in this real world, the timber-miners are more likely to get their way than the advocates of total preservation; few ecologists operate Third-World logging companies, or have access to the networks of financial and political power which grant profitable timber concessions. Some market power may accrue to environmental groups which can convince consumers not to purchase timber from unacceptably managed areas, but this is a double-edged sword: the result may well be wholesale conversion of forest areas to alternative uses, not preservation. There is also a moral, equity issue involved here: practically every industrialized country cut down its forests many generations ago; that is one of the means by which they developed their industries. It is a morally and politically dubious proposition that the governments of relatively poor nations should deny their people a source of revenue and of employment based on the natural resources of their own soil.

27. This is the reason that sustainable management, rather than wholesale preservation, is the analytical playing field selected for this book. It will present two arguments which are potentially of great significance for the world's tropical forests. One (see chapter 7) is technical: it may prove easier (and cheaper) from the viewpoint of forest owning nations in Asia to ensure future supplies of valuable dipterocarp timber than has generally been supposed. The other (see chapter 6) is global; sustainable management of tropical forests may be the most profitable way of using them.

28. However, this is so only if all the goods and services a forest produces - not just timber - are reckoned into the long-term account, alongside the costs that would be incurred if the forest were damaged beyond hope of recovery. Although the potential value of biodiversity preservation maybe very high, it is as yet unquantifiable. More quantification is possible for the other major global forest value - carbon storage - and when this is done, the values prove to be very large. Carbon is released to the atmosphere by the burning, rotting or decay of organic matter. Increasing the volume of carbon in the atmosphere is presently believed by many climatologists and others to be a major factor in the rate of global warming. There has in recent decades been a sharp and measured rise in the amount of carbon in the atmosphere, most of it contributed by the burning of fossil fuels for industry, transport and domestic use.

29. A stable tropical forest stores an enormous amount of carbon. Cutting the forest, burning part of what is cut and allowing much of the rest to decay, releases this stored carbon. Managing the forest so that it retains its natural life and growth ensures either that it stores carbon or that it absorbs significant levels of carbon in the process of regenerating itself.

30. The world as a whole benefits, and it can be argued that it is the richer nations of the world who should pay for such benefits, since they are the major source of the damaging carbon and other greenhouse gas emissions. It will take imagination, and political determination, to work out a system whereby the world community shares the cost of sustaining the tropical forests equitably. This book contributes to the debate by showing why such a system of international transfers is needed, and how much it may cost.

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