

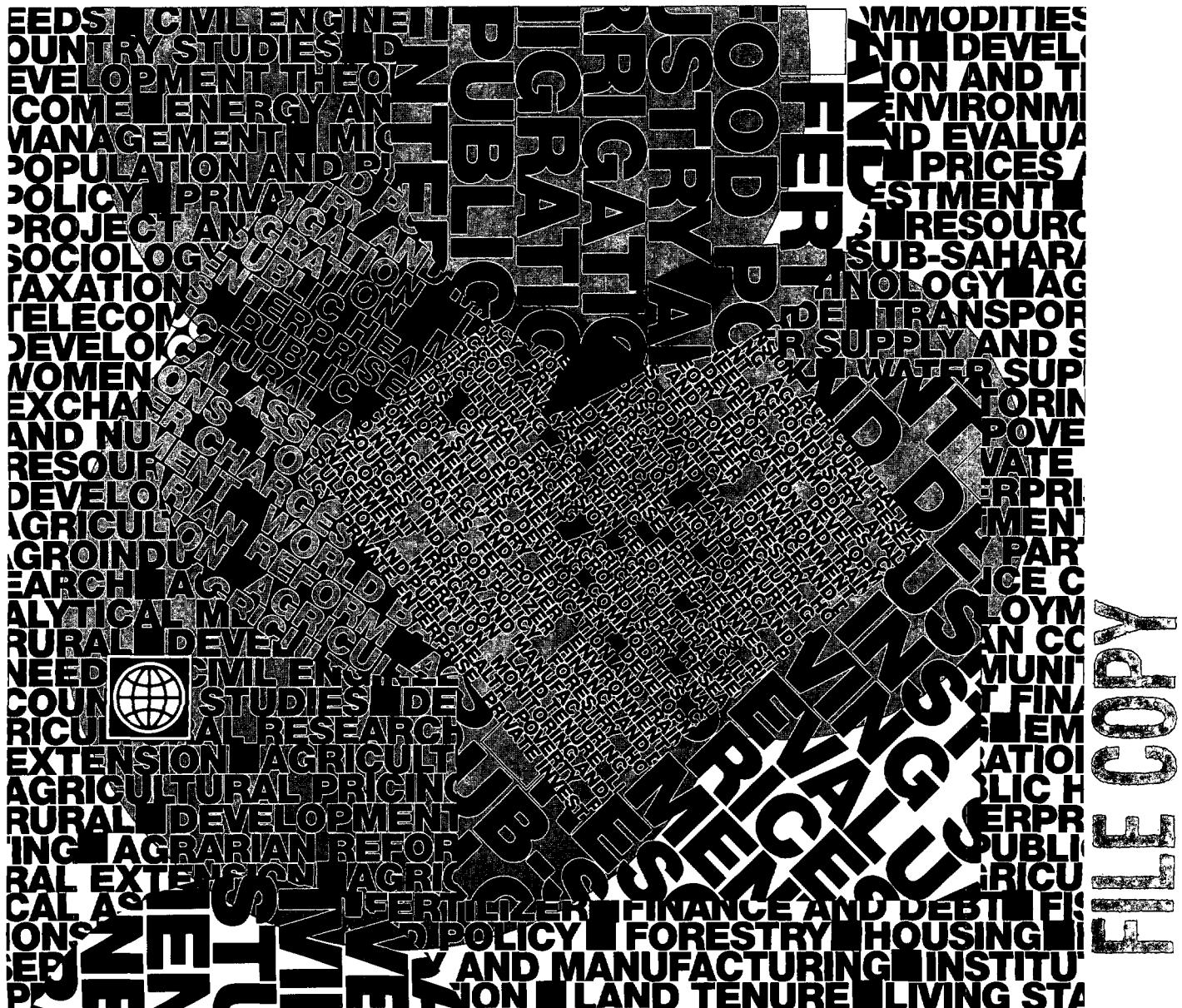
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Strategy for Forest Sector Development in Asia



Land Resources Unit, Asia Technical Department



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Strategy for Forest Sector Development in Asia

Land Resources Unit, Asia Technical Department

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Foreword

More than perhaps any other sector, forestry captures the interrelationships between economic growth, environmental preservation and poverty alleviation. For the World Bank to remain relevant to these development issues in Asia, it must continually reassess and adapt its approach to these problems. The strategy described in this paper reflects the results of just such a process of introspection. Together with the recent World Bank Forest Policy Paper and the Operations Evaluation Department Review of Forestry Lending, this paper lays out the basis for future Bank work in forestry in Asia. Its focus on strengthened and diversified institutions, policy reform and popular participation is already being reflected in Bank operation in this sector.

Daniel Ritchie
Director
Asia Technical Department

LIST OF ABBREVIATION AND ACRONYMS

FAO	-	Food and Agricultural Organization of the United Nations
FINNIDA	-	Finnish Department of International Development Corporation
ha	-	hectare
ITTO	-	International Tropical Timber Organization
kg	-	kilogram
m	-	meter
m^3	-	cubic meter
NGO	-	non-governmental organization
TFAP	-	Tropical Forest Action Plan
UNDP	-	United Nations Development Programme
UNEP	-	United Nations Environment Programme
WRI	-	World Resources Institute

Table of Contents

Foreword	iii
Executive Summary	vii
A. Introduction	1
B. Evolution of Forestry in Asia	2
Performance Indicators	2
Forest Area	2
Deforestation	4
Plantation Development	4
Environmental Services and Biodiversity	5
Wood Consumption	5
International Trade	7
Overall Assessment	7
Problem Typologies	8
Economic Externalities	9
Institutional Failure	9
Scientific Failure	10
C. Forest Policy and Resource Management	11
Goals of Forest Policy	11
Economic Goals	11
Environmental Goals	12
Social Goals	12
Global Goals	13
Constraints on Forestry Development	13
Land Allocation	13
Prices and Policies	14
Conditions in Other Sectors	16
Sustainability	16
Forest Management Technologies: Options and Prerequisites	16
Natural Forest Management	17
Plantation Forestry	19
Forest Inventories and Management Information Systems	23
Reinventing Forestry	23
D. Evolution of Bank Lending Programs and Practices	24
Development of Current Regional Portfolio	27
Unspoken Assumptions	27
Reliance on the Public Sector	29
Acceptance of Poor Technology	29
A Topical Approach	29
Choices Facing the World Bank	29

E. Strategic Recommendations	30
The Future Role of the World Bank	30
The Climate for Investment	30
Utilizing Private Sector Capability	32
Environmental Guidelines	32
Improving Market Opportunities	32
Community Based Management	33
Monitoring and Evaluation and Project Financed Research	33
Policies and Investment Outside the Forestry Sector	34
Global Transfers for International Environmental Protection .	34
Investment Requirements and Priorities	35
 References	 40
 Boxes	
Box 1 A Country Typology	8
Box 2 Protection of Forest Environments in Tree Crop Projects: Oro Smallholder Oil Palm Development	26
Box 3 Investment Priorities in the Forest Deficit Group	38
Box 4 Investment Priorities in the Forest Surplus Group	39
 Tables	
Table 1 Forest Areas and Rates of Change in Asia	3
Table 2 Apparent Consumption of Wood Products in Asia	6
Table 3 Population Growth, Agricultural Productivity and Demand for New Land in Selected Asian Countries	15
Table 4 Land Area Directly Affected by Selected World Bank- Financed Projects in Asia	25
Table 5 Total Lending and Proposed Lending to Asian Countries for Forestry Projects	28
Table 6 Projected Trends in Asian Forestry and Associated Investment Requirements (1990s)	36

STRATEGY FOR FOREST SECTOR DEVELOPMENT

Executive Summary

i. This report recommends a shift in the focus of World Bank support for forestry in Asia 1/ away from reliance on public sector institutions, acceptance of poor quality technical standards and exclusive emphasis on narrow subsectors. Instead, the paper proposes that the Bank move aggressively to improve the climate for investment and policy reform and mobilize political commitment on the need for change through an iterative process of sector analysis, policy dialogue and targeted investment. This strategy, which builds upon efforts already underway, will help the governments of the region put into place the essential institutional and decisionmaking capability to resolve forest land use and allocation problems on an ongoing basis, mobilize and deploy investment and other resources in ways consistent with overall national development priorities, and equitably resolve the conflicts which will inevitably accompany forest development.

ii. These proposals are based on a review of the forest situation in the region which show that deforestation is proceeding at a pace of over 3 million ha per year at an economic cost of over US\$8 billion, that fuelwood scarcities are becoming increasingly acute, and that loss of biodiversity is reaching unprecedented proportions. Two countries in the region, India and China, which have among the world's lowest per capita consumption of forest products, have already virtually depleted their natural forest resource. Other countries in the region, such as Thailand and Malaysia, which were once major exporters on the world market are now experiencing severe timber shortages which already threaten the viability of their export earnings and domestic processing industries. If present trends continue, within ten years the forest area of the region will have fallen to less than 50 percent of the original area and incalculable losses will have been incurred in the region's biodiversity. Above all, there is a growing crisis of confidence in the ability of existing forestry institutions to effectively and productively manage this important resource. International agencies, including the World Bank, have not proved very effective in improving this situation and need to review their approach.

iii. The report shows that this poor performance results from three basic and interrelated sets of problems; economic, institutional and scientific. Divergences between social and private costs are a central feature of forestry, virtually all environmental concerns can be characterized as examples of economic externalities. However, while management of external costs should be among the principal tasks of forestry institutions, those currently in place in Asia were designed to extract surplus from the land and to act as police forces. Finally, the scientific basis for forest management in the tropics is only just beginning to develop. Forestry lags badly behind agriculture and other sectors of the economy in producing and applying technological innovations that will allow for the sustainable utilization of the natural resource base.

1/ This report refers to countries covered by the World Bank's South Asia and East Asia and Pacific Regional offices.

iv. The report recognizes the range of goals that motivates concern with forestry and highlights the need to make choices within a highly constrained environment. Pursuit of economic, environmental, social and global objectives in the face of limited land resources, growing populations, limited employment opportunities, and constrained budgets, has historically taken place at the expense of the forest sector. The policy framework in Asia, as in much of the rest of the world, has been overwhelmingly biased against forestry. Forests, and the goods and services they provide, are systematically undervalued by users and decisionmakers. Across the region policymakers have consistently sought to use forest resources for development purposes without providing for the costs of that utilization.

v. On the basis of an improved investment climate and with greater borrower commitment, the World Bank can assist countries in the region by enabling an increased role for the private sector in resource management and investment, in expanding the application of improved technologies and environmental safeguards, improving markets and resource rent recovery and in enlarging the role of local communities in forest management. The World Bank can help governments recognize the impact of policies and investment activities outside the forest sector and has already identified critical interventions that can help to stabilize the marginal agriculture that currently threatens much of the regional forest. The Bank continues to play a major role in mobilizing and allocating international transfers in support of conservation of globally important biological diversity.

vi. Priority areas of Bank investment in forestry are resource expansion primarily in the wood deficit countries of the region, including plantations and private farm forestry, improved natural forest management and industrial plantation establishment in countries approaching the transition to sustainable forest utilization, and above all in the restructuring of forestry institutions toward a greater emphasis on development, investment performance and public accountability.

vii. Any set of actions that the governments of the region and development assistance agencies attempt to undertake will inevitably fail to satisfactorily address all the concerns of all the actors interested in the forestry sector. The World Bank's support to the sector, and its analysis of sector and related issues needs to proceed from the premise that unless the fundamental constraints described in this paper are seriously addressed, all of the goods and services provided by the forestry sector are threatened. Work also needs to proceed from recognition of the fact that the forestry sector is continuously undergoing changes and development on the basis of its internal dynamics and impacts from other sectors and external factors. Because of this, it is impossible to attempt to immediately identify and resolve all the issues constraining forest development. An ongoing, iterative process of dialogue, analysis and investment is the only path to sustainable forestry.

ASIA REGION
STRATEGY FOR FOREST SECTOR DEVELOPMENT

A. Introduction

Forests are a dominant feature of Asia's environment and its economy. Approximately 635 million ha (34%) of the gross land area of the region is considered forest land, either closed or open, and the export revenue from forest products amounts to well over US\$8 billion per year. Growing awareness of the importance of this sector coincides with significant and far-reaching changes within it. The rate of deforestation is estimated at 1% per year, and in just three countries alone the economic costs of deforestation are estimated to exceed US\$8.3 billion per year (para. 18). Once dominant exporters such as Philippines and Thailand have virtually exhausted their forests, and India, historically self-sufficient has become a major importer. The few remaining tropical forests are rapidly diminishing under heavy population pressure. Fuelwood shortages have long been acute in many areas, and the region's biodiversity, found mostly in its moist tropical forests, is disappearing at unprecedented rates.

While forestry was once considered a source of industrial wood and land for development, the sector is now expected to contribute to broader economic, social and environmental objectives. The institutional framework for forestry development evolved in the era following independence when management objectives were extractive, when technology was stagnant, when the needs of the poor were neglected and when the ability of the state to deploy resources for development was unquestioned. As a result of this new awareness of forestry's potential, external development assistance to the sector has grown significantly in recent years, and now amounts to over \$350 million per year. Development assistance has, however, failed to generate the capacity and commitment necessary for the sector to realize its potential to contribute to a wide range of important development objectives.

The forestry sector of Asia is marked by nothing so much as its diversity. Demands on the forest resource range from firewood, to fodder, to industrial wood, to hydrological services, to preservation of biological diversity. Asia's resources include untouched moist tropical forests, temperate forests, severely degraded pasture and wasteland, trees grown on private farms, and rubber, oil palm and coconut estates. These resources are controlled by national and local governments, by corporations, individuals and by traditional clans and kinship groups. The international community is expressing a growing interest in the management of the region's forests and is increasingly being expected to provide concessional resources for preservation and protection.

Many of the problems and opportunities, and much of the diversity, in Asian forestry are common to those found in other developing regions. Population growth, institutional problems, environmental degradation and systematic undervaluation of forest resources, have resulted in dramatic deforestation worldwide. Thus, the reforms and investments needed in Asia are not unlike those required in other parts of the world. However, the forestry sector in Asia is set apart by the size of its forest-dependent population, the location of its resources vis-a-vis rapidly expanding markets and trade

routes, the relatively larger role of forestry in its economic structure and the human resources that can be mobilized. Asia is also unique in having abundant accessible forest areas in close proximity to areas of rapid economic growth and forest scarcity. Given the level of overall development and mounting weight of demands on the sector in several key countries, the extent of reform over the next 10 years will determine the long-term viability of forestry in Asia.

This report reviews the current status of the forestry sector in Asia, proposes typologies for understanding the key problems facing decisionmakers, and analyzes a number of key issues in forest management. The report evaluates the Bank's contribution to forestry development in Asia over the past two decades and explores the assumptions, explicit and implicit, behind its investment policy. Based on the lessons learned, the report proposes a strategy for further Bank involvement in the sector and measurable indicators by which its performance can be assessed.

The proposed strategy focuses on building the institutional and decision-making capability for resolving land use and allocation problems on an ongoing basis, mobilizing and deploying investment and other resources in ways consistent with national development priorities, and resolving the conflicts that inevitably accompany forest development. Implementation of this strategy, already reflected in Bank work in Asia, will involve an expanded and ongoing program of sector analysis, reassessment of institutional mechanisms, accelerated application of existing technology, investment in new technology and long-term commitment by governments and donors.

B. Evolution of Forestry in Asia

Forests are multidimensional resource systems that cannot be adequately captured by individual measures such as area or volume. The changes now under way reflect a similarly large number of competing, complimentary and interrelated interests. Forest area, deforestation, timber use, and biodiversity, while only a few of the important aspects of the region's forests, illustrate the sector's evolution and reveal the underlying economic, institutional and technical forces that result in poor development performance.

Performance Indicators

Forest Area. Forests in Asia range from deciduous forests on the Indian subcontinent to the moist tropical forests of southeast Asia to temperate forests of northern China and Japan and contain an extraordinary range of biological diversity. By far the largest portion of the resource base is tropical, non-coniferous forest. By 1980, the area of natural closed forest and plantations was approximately 421 million ha, down from an original area of about 725 million ha. Unfortunately, these estimates remain imprecise due to different definitions, methods of analysis and infrequent inventories. Table 1, based on the most recent assessment now available (FAO, 1988), summarizes the distribution in 1980. The data from FAO's 1990 update,

TABLE 1 Forest Areas and Rates of Change in Asia
(000 hectares)

	Total Land Area	Total Natural Forest Area	Closed Forest Area	Open Forest Area	Degraded Forest Area	Rate of Deforestation (Total Closed Natural Forest)	Rate of Deforestation (%)	Plantation Area	Annual Plantation Establishment Rate
	1/	2/			3/	4/	5/	6/	6/
BANGLADESH	13,390	1,242	927		315	8	0.9	128	17
BHUTAN	4,700	2,370	2,100	40	230	2	0.1	7	1
BRUNEI	590	560	323		237	5	1.5	n.a.	n.a.
CHINA	932,640	142,777	97,847	17,200	27,730	690	0.6	12,733	4,552
FIJI	1,930	817	811		6	2	0.2	40	n.a.
INDIA	297,320	72,082	51,841	5,393	14,848	147	0.3	2,068	138
INDONESIA	181,160	158,155	113,895	3,000	17,360	400	0.3	1,918	131
JAPAN	37,643	13,690	n.a.	n.a.	n.a.	n.a.	n.a.	11,590	240
KAMPUCHEA	17,550	13,273	7,548	5,100	625	25	0.2	7	n.a.
KOREA	9,820	4,887	4,887		n.a.	n.a.	n.a.	1,628	67
LAO PDR	23,080	19,360	8,410	5,215	5,735	100	0.7	11	1
MALAYSIA	32,860	25,821	20,996		4,825	255	1.2	26	20
MALDIVES	50	1	0		1	n.a.	n.a.	n.a.	n.a.
MONGOLIA	156,500	13,863	9,528		4,335	n.a.	n.a.	n.a.	n.a.
MYANMAR	65,770	52,642	31,941		20,700	105	0.3	15	0
NEPAL	13,680	2,461	1,941	180	340	84	4.0	19	4
PAKISTAN	72,830	3,585	2,185	295	1,105	7	0.3	160	7
PAPUA NEW GUINEA	45,180	39,705	34,230	3,945	1,530	22	0.1	22	n.a.
PHILIPPINES	29,860	13,030	9,510		3,520	92	1.0	300	50
SOLOMON ISLANDS	2,750	2,480	2,423	17	40	1	neg.	17	n.a.
SRI LANKA	6,470	2,727	1,659		1,068	58	3.5	112	13
THAILAND	51,180	16,975	9,235	6,440	1,300	252	1.6	114	24
VIETNAM	32,540	21,190	8,770	1,340	11,080	65	0.6	204	29
TOTAL	2,029,493	623,693	421,007	48,165	116,930	2,319	0.5	31,119	5,295

n.a. Not Available

neg. Negligible

Sources: FAO (1988) An Interim Report on the State of Forest Resources in the Developing Countries
Data for China from Richardson (1990) and World Bank estimates, data for Japan from World Resources Institute (1992)

Notes:

- 1/ World Resources Institute (1992)
- 2/ Open and Closed Natural Forests and Degraded Forest Lands
- 3/Forest Fallows and Shrub Land
- 4/ Deforestation on Closed Forest Formations
- 5/ Recalculated from FAO (1988)
- 6/ Industrial and Non Industrial Plantations

expected to be released soon, should provide a more reliable, but still not completely accurate, picture of areas by forest type and trends in forest loss and plantation development.

Area, however, is only a crude indicator of the importance and extent of the forest resource. While India, with 72 million ha, has the third largest forest estate, much of this area is highly degraded and poorly stocked. Considering stocking rates, Indonesia, with 3,160 million m³ of standing volume, is the most well endowed country in the region.

Deforestation. By far, the most striking feature of the evolution of the forest resource in Asia over the last twenty years, is its rapid depletion. Loss of closed forest area results from conversion to agricultural use, demand beyond a sustainable level for fuel, fodder and other forest products, and to a much lesser extent, over-logging. The loss of forest area between 1981 and 1985 was estimated by FAO at about 2.3 million ha a year (Table 1). Extrapolation suggests that from 1980-1990 the area of natural closed forest may have decreased 7.5%, or 34 million ha, the decline being especially serious in India, Nepal, the Philippines, Sri Lanka, and Thailand. Preliminary estimates from FAO's 1990 update now suggest that "the rate of annual deforestation for 15 countries in the Asia-Pacific region during 1981-90 was close to 4.7 million ha per year." The World Resource Institute (1991) estimate of regional deforestation is 3.6 million ha per year. However, if it is assumed that deforestation rates held constant in those countries for which "recent estimates" were not available, the regional rate totals to about 3.9 million ha.

Although data are contradictory and are not available for some countries, it is likely that the annual regional loss of natural forest exceeded 4 million ha (1.0%). This refers essentially to closed forest with sufficient density to prevent grasses from forming a continuous layer. Other forest areas where trees are widely spaced (open forest), as well as forest fallow and shrub areas which total about 180 million ha, are also being depleted.

Plantation Development. Large scale establishment of tree plantations in Asia, as in most of the rest of the world, is a recent phenomenon, and is only now becoming an economically or environmentally significant feature of the forestry sector. Plantation area was about 7% (31 million ha) of the total closed forest area in 1980 (Table 1). Data indicate average annual plantings in the 1980s of just over 5 million ha including establishment of both industrial and non-industrial plantations. These areas do not include regeneration of old forest and may not fully cover smaller non-industrial plantations such as village woodlots. Since 1980 in India and China these have increased significantly: about 4.5 million ha per year by the mid 1980s in China; 8.5 billion trees planted on private land in India and 5.5 million ha on wasteland between 1981-1988 (Saxena, 1989 unpublished; Bhattacharjee, 1989 unpublished; Chambers *et al.*, 1989).

The increasing availability and acceptance of wood as a by-product from industrial tree crops, particularly rubber, and their fundamentally similar environmental impacts, means that areas under these crops should also be treated as forest plantation area. In Indonesia, Malaysia and Thailand the replanting of some 150,000 ha of mature rubber plantations will add 27 million m³/year to the region's wood supplies. Due to declining availability of

natural forest timber, Malaysia and Thailand have begun using rubberwood in furniture manufacture for export. Each year, Thailand replants 50,000 ha rubber and cuts 9 million m³ of mature trees, of which 1.4 million is considered useful for processing into high-quality wood. Wood from oil palm plantations, which is actually of higher value than rubberwood and more easily processed will add even more to the region's wood supply. By the end of the decade, in Malaysia alone, oil palm plantations will be yielding more than 10 million m³ per year of high quality timber.

Environmental Services and Biodiversity.^{1/} Forests also provide other ecological functions such as water and soil conservation, regulation of stream flows, stability of microclimates, recreation and tourism. China, India, Indonesia, and Malaysia are four of the 12 "megadiversity" countries of the world, in which 60% of the earth's plant and animal species are located. In addition, Papua New Guinea and the Philippines are among the countries with the highest numbers of endemic species. The greatest concentration of species is found in the rainforest complex of Southeast Asia which contains about 20-25% of the earth's plant species and the greatest number of animals in the region. Diversity is also significant in the wet forests in southwestern Sri Lanka, forests of the eastern Himalayas, and the moist deciduous forests of the Western Ghats in India. Although semi-arid forests have fewer species than moist forest lands, they are important sources of potentially valuable genetic material, having developed a variety of physical and chemical defenses against the harsh environment. Conserving some low-diversity systems may be as important as that of mega-diversity systems. Mangroves, for example, are not diverse from a species standpoint but the species themselves and the niches they provide to other species (especially aquatics), may be more important than many species in highly diverse systems.

Wood Consumption. Total wood consumption in Asia in 1988 amounted to over 1 billion m³ per year or nearly 0.40 m³/person (Table 2). In comparison to other regions, consumption of wood products in Asia is very low. In China, for example, consumption of wood products (other than fuelwood) is a mere 0.07 m³ per person per year. This translates to less than the amount of wood in 14 copies of a typical North American newspaper. Fuelwood, which accounts for 82% of consumption, is the only product category in which per capita Asian consumption exceeds that in developed countries. Another 205 million m³ of wood are consumed in solid form and the equivalent of 48 million m³ is converted to pulp and paper products.

Income growth significantly increases demand for forest products, (other than for wood energy) especially for panels, pulp and paper (Hyde and Newman, 1991). In the rapidly growing economies of Southeast Asia, this

1/ Biodiversity and its preservation in Asia is the subject of a separate report entitled "Conserving Biological Diversity: A Strategy for Protected Areas," under preparation by the Asia Technical Department, Environment Division.

TABLE 2 Apparent Consumption of Wood Products in Asia
(1988)

Country	Fuelwood		Sawlogs		Pulpwood		All Roundwood	
	m^3/capita	000m^3	m^3/capita	000m^3	m^3/capita	000m^3	m^3/capita	000m^3
	1/							
BANGLADESH	0.26	28504	0.004	467	0.001	69	0.27	29040
BHUTAN	2.10	2946	0.17	233	0.000		2.27	3179
BRUNEI	0.40	79	0.85	206	0.000		1.19	286
CHINA	0.16	177610	0.06	65967	0.008	9117	0.23	252694
FIJI	0.05	37	0.28	205	0.000		0.33	242
INDIA	0.27	240177	0.02	19319	0.001	1208	0.32	260704
INDONESIA	0.76	133989	0.21	36687	-0.004	-729	0.97	169947
JAPAN	0.01	936	0.36	43556	0.304	37314	0.67	81807
KAMPUCHEA	0.65	5110	0.01	110	0.000		0.61	5220
KOREA	0.11	4491	0.20	8384	0.010	400	0.32	13275
LAO PDR	0.76	3569	0.05	179	0.000		0.96	3748
MALAYSIA	0.35	8273	0.85	14437	0.030	513	1.37	23224
MONGOLIA	0.64	1350	0.50	1040	0.000		1.14	2390
MYANMAR	0.43	17046	0.06	2583	0.000		0.49	19629
NEPAL	0.91	16828	0.02	434	0.000		0.96	17262
PAKISTAN	0.19	22478	0.01	1113	0.000		0.22	23591
PAPUA NEW GUINEA	1.50	5533	0.67	2480	0.000		2.17	8014
PHILIPPINES	0.54	31759	0.05	3009	0.008	457	0.59	35225
SOLOMON ISLANDS	0.70	210	1.25	379	0.000		1.95	590
SRI LANKA	0.49	8169	0.01	128	0.002	31	0.50	8328
THAILAND	0.55	33602	0.05	2487	0.000		0.66	36089
VIETNAM	0.36	23248	0.03	1660	0.000	7	0.39	24915
TOTALS	0.28	765,944	0.07	205,063	0.02	48,387	0.37	1019394

Sources:

FAO, Forest Products Yearbook, 1988.
World Development Report 1990.

Note:

1/ Production

translates into potential for considerable growth in demand for industrial wood. Based on population trends over the last 10 years, regional population is expected to be 3 billion before the year 2000 and a demand for at least an additional 100 million m³ of round wood per year can be expected. In crude terms, this is equivalent to 7 million ha of plantation yielding 15 m³/ha/year.

International Trade. International trade in forest products is economically important for several countries in the region and a significant component of pressures on the resource base. The total value of wood products traded by the region exceeded US\$8.25 billion in 1988. Three countries, Malaysia, Indonesia, and the Philippines, have traditionally accounted for the dominant share (92%) of the region's log exports and revenues. All three have now restricted log exports: complete bans in Indonesia and the Philippines while the ban applies only to peninsular Malaysia. Demand for the region's exports is strong in Japan and Europe, and has increased considerably in Korea and Taiwan. In recent years, efforts to increase domestic value-added by promoting local processing have reduced the share of logs and sawnwood in total trade and increased the volume and value in veneers, panels and pulp.

Overall Assessment. By most standards the forestry sector of Asia appears to be in crisis. This extends to both surplus and deficit countries (Box 1) and requires urgent attentions. Demands on the resource are growing, while the resource is declining in both size and quality. The forestry sector, in many cases, is also unnecessarily drawing down public resources due to government investment or subsidy for reforestation programs. There is also the failure to extract full economic resource rent; and inefficient subsidy for processing. As in other regions, forest-based industrialization policies in Asia have been both expensive and unsuccessful. While methods of natural resource accounting are being refined and available data are crude, it is still possible to estimate the costs of forest depletion in Indonesia, New Guinea and the Philippines at nearly US\$50 billion in the six years between 1980 and 1985 (in constant 1985 prices).^{2/} Without major changes in forest management, wood scarcities and environmental degradation will continue and intensify. By the year 2000, if current trends continue, imports of timber and forest products will cost the region nearly US\$20 billion in foreign exchange per year. By the same time the natural forest will be about 50% of the original area and incalculable losses in biodiversity will have occurred.

2/ For a discussion of methodology see Repetto, et. al. (1989).

Box 1

A Country Typology

The diversity of forest types, problems and institutional structures is as great within Asia as it is between Asia and other regions. Within countries, there can also be enormous variations in demand for forest products, the environmental consequences of various forestry operations, and social aspects. Within the region, countries can be broadly grouped as those in forest surplus and those in forest deficit. Indonesia, Malaysia and Papua New Guinea are the most significant examples of surplus, and Bangladesh, China, India, Bangladesh, Pakistan and Nepal of deficit. Several countries notably Thailand and the Philippines, are rapidly moving into the deficit category, if they have not done so already. category, if they have not done so already. While the broad situation of these countries is well known, considerable gaps remain in understanding the needs and potential for effectively deploying investment resources in these countries.

In the face of growing populations and lack of alternate employment opportunities, forests cannot withstand the pressures for land, fuel and capital. The most obvious investment option for the sector, plantations, as discussed later in this report, while crucial, can not by itself begin to put the sector on a solid basis. Above all, there is a growing crisis of confidence, both within the region and on the part of the global community, in the ability of existing forestry institutions to manage the resource effectively and productively. This questioning of capability extends to the World Bank and other international organizations and efforts which have attempted to mobilize support for forestry in the region.

Problem Typologies

Poor performance by the Asian forestry sector derives from three basic and interrelated sets of problems: economic, institutional and scientific. Open access, pollution externalities such as increased sedimentation, and policy induced market failures typify the forestry sector in most of the world and are particularly severe in Asia. In addition, the institutional setting for forestry in Asia grew from a colonial style forestry, to a centralized and bureaucratic approach. The resulting perception of forests as marginal low-value resources, combined with an overly

centralized approach has proven incapable of promoting sustainable forest development. Finally, technological progress in forestry has been relatively slow, expensive and painstaking and its application often unrewarding.

Economic Externalities. Divergences between public and private costs and benefits are central features of forestry. Virtually all environmental concerns can be characterized as examples of economic externalities. Erosion from deforested hillslopes, releases of carbon dioxide from land clearing fires, losses of biological diversity and forest quality from forest conversion and poorly controlled harvesting, all result from undervaluation of the forest and its products. They are excessive because of inefficient markets, imperfectly defined property rights and the absence of alternate coordinating mechanisms. Forest depletion is often exacerbated by weak or inappropriate tenure and a lack of government policies to temper conflicting demands. In such circumstances, market prices fail to fully capture the social costs and benefits arising from the forestry sector and lead to persistent underinvestment and overexploitation.

The magnitude of the economic externalities varies by country and has not been reliably estimated for the region. Examples, however, suggest their policy relevance. In the Philippines, uncontrolled logging of one 7,830 ha watershed imposes net costs on the economy in excess of US\$43 million (Hodgson and Dixon, 1988) primarily because of damage caused to lucrative fishing and tourism activities immediately below the watershed. In Indonesia, off-site costs of soil erosion from degraded upland forests and rainfed agricultural land on Java may amount to US\$75 million per year. Although its global economic significance has yet to be determined, it is estimated that, although fossil fuel based emissions dominate the total, the destruction of tropical forests in the Asia region accounts for over 6% of global atmospheric loadings of carbon.

The burden of these externalities varies locally and globally, across time and generations, and between producers and consumers. The impacts of open access to forest for fuelwood collection do include lower prices for some consumers, but negatively affects future consumers by reducing the incentives for regeneration. Burning of forests, for example, benefits local land users, at least in the near term, but may come at the shared expense of those subjected to climate change and foregone alternative uses of the forest.

Institutional Failure. While management of external costs should be among the principal tasks of forestry institutions, those now in place in Asia were designed to act as landlords. On the periphery of both the economy and state concern, following independence, forest lands almost invariably came under state ownership and control.^{3/} Forestry agencies have not been mandated to involve local people in either the management or benefits of the forest resource. Instead they attempted to administer large estates as a raw material source for large industries. Their accounting systems and procedures are, in general, not appropriate to managing large economic assets, to producing and marketing output, to planning and implementing investments or to introducing technical innovations. With low levels of compensation and

3/ The only exceptions are Papua New Guinea and the Pacific Islands whose ownership is vested in clans.

limited public accountability, rent seeking became the basis of forest land administration. Despite the shrinking size of the resource, the civil service attached to forestry has grown continuously, with no apparent improvement in sectoral performance.

In many countries in the region, legislation and regulation directly and indirectly affecting forestry has proliferated. Intrusive regulations on felling of privately owned trees, log transport, pricing, land ownership and other aspects of forestry pose significant obstacles to responsible private investment. Laws and policies relating to rights of local people and forest dwellers are frequently inadequate and are often overridden by contradictory regulations. Legal obstacles to nongovernment organizations (NGO) are also common and limit opportunities to utilize important means of mobilizing popular participation.

Forestry agencies in the region have generally been unable to resist political demands for special treatment of interest groups. Forestry agencies are expected to provide low cost and reliable supplies of raw material to industry, rural employment opportunities to the landless poor and a multitude of other goods and services. Agencies lack the political support and expertise to integrate these multiple, and sometimes incompatible, functions into coherent programs. Conflict resolution and mediation were not anticipated as roles of forestry agencies. Nor was the potential importance of forestry to the achievement of overall national development objectives or the alleviation of poverty properly understood or even imagined. Finally, at the global level, there is not even an organization responsible for, or capable of, monitoring the impacts of emerging patterns of forest use.

Scientific Failure. The basis for management of the tropical forest as an ecosystem, as well as for production of timber species is only beginning to be understood. Forestry research has lagged behind agricultural research and adoption of new practices, arising from scattered experiments and trials, has been slow. In Asia, outside of China and India, it is estimated that fewer than 1,000 scientists conduct forestry research (Bengston and others, 1988). In India, annual forestry research expenditures are less than 0.01% of the value of forest products. As a result of this underinvestment, forest policy is based on a desperately inadequate understanding of the biological and physical consequences. Furthermore, the likelihood of high quality technology being systematically utilized in forestry operations is small.

Unlike agriculture, which is essentially privately owned and operated, the long term nature of forestry and the predominance of state ownership impose different constraints on adoption of improved techniques. Provenance performance evaluation takes a minimum of 10 years. Addressing the implementation of improved natural forest management systems creates uncertainty for government technical staff due to lack of background knowledge, and scarcity of experimental evidence. With uncertain career prospects, it is safer for the forester-bureaucrat to make no change. The latest technical uncertainties in forestry involve the need to more fully take into account multiple objectives, including environmental improvement and income generation for the poor. Overall, slow uptake of new technology in forestry is largely due to poor incentives in the public sector, inadequate knowledge among forestry officials at the policy level, and lack of appreciation of those foresters who do have technical capability.

C. Forest Policy and Resource Management

Forest policy in Asia, as elsewhere, has to address numerous and often conflicting goals: generating revenues and products for industry and urban development, providing land for agriculture, reducing foreign exchange commitments, meeting rising consumer demands for forest products, maintaining adequate forest reserves, poverty alleviation, environmental protection for local and global ends, conservation of unique biodiversity, and protection of the livelihoods of indigenous peoples. The relevance of the World Bank to forestry in Asia will largely depend on its ability to assist governments in adjusting to a rapidly changing economic, political and technological environment and helping them to continually reassess sectoral objectives. This chapter explores the economic, environmental, social, and global goals that shape forestry in the region, considers key constraints, and evaluates promising investment alternatives for overcoming them. Policy, especially toward wood pricing and land tenure, is the critical determinant of successful forest development. The chapter concludes by identifying the essential features of the changes that are necessary as forestry in Asia enters the 21st century.

Goals of Forest Policy

The goals proposed for forest policy in Asia are changing rapidly. Population growth and rising incomes are increasing demand for forest products. Population growth is also creating demand for agricultural land and for greater employment opportunities in the agricultural sector. Rising incomes, higher levels of environmental awareness and the growth of an urban middle class are also resulting in more widespread concern for environmental values and the distributional consequences of forest policy. Concern outside the region, regarding environmental issues and continued existence of tropical rain forests and other ecosystems, as well as global warming and treatment of indigenous peoples, place additional demands on forest policy.

Economic Goals Economic goals in forestry encompasses a broad range of objectives. The forest sector provides industrial raw material, firewood for domestic and other small-scale uses, fodder and other non-timber forest products, and recreational and environmental benefits. Many of these products, services and benefits do not enter directly into domestic cash markets or international trade, but clearly have considerable economic importance. For some countries, especially Indonesia, Papua New Guinea and Malaysia, the forest is a significant source of revenue for development and other budgetary needs.

Historically, however, the major contribution of forestry to economic growth has been to provide land for conversion to other uses. While experience in many government-sponsored settlement programs and spontaneous settlements suggest that only relatively small areas of high-quality agricultural land remains under forests, considerable areas of forest land are suitable for marginal agriculture. The forest estate continues to be seen as a vent for expanding populations and as a site for food and cash crop development. There has, however, been a marked change in thinking about the nature of forestry's contribution to economic development in the last 15 years. Starting with recognition of the role of fuelwood in the energy economy, and more recently with research on the economic significance of nonwood forest products, there is a greater awareness of the real economic

contributions of the forest and the implications of this diversity for forest management.

Environmental Goals. Forestry policies in the region formally recognize the environmental values of forests, in protecting watersheds, fragile soils and wildlife habitat, and in providing visual amenity and recreation areas. In response, most countries have established forest reserves, national parks and protected areas. The total area designated as forest reserve in the region is 19 m ha, or 4.7% of the region's closed forest. While several countries in the region, notably India (30%), Thailand (40%) and China (20%) have formally adopted percentage goals for the proportion of their land area to be covered by forests (compared with 18, 18 and 12, respectively, at present), in practice these goals have proven difficult to realize.

Environmental concerns, while moving to a position of greater prominence on the forest policy agenda, are themselves developing to have multiple and sometimes conflicting dimensions. They include desires to maintain land in its natural state, to avoid monocultures in industrial plantations, and desires to restrict the use of particular silviculture techniques. They are enunciated by forestry officials, the concerned public (both local and international), scientific experts and political activists, often in ways threatening to conservative and often underqualified, forestry bureaucracies.

Social Goals. Until the 1970s, the forestry sector was not expected to contribute directly to such broad goals of social policy as poverty alleviation and income distribution. However many projects initiated since this time were designed to deal with the problems of increasing forest degradation and shortages of forest products, especially fuelwood, needed by local people and particularly by the poor. Similarly, recognition that traditional systems of exploitation have become unsustainable due to population growth and the expropriation of land by outsiders, and that important elements of traditional systems can be adapted for better forest management, accelerated interest in the social aspects of forestry.

In many ways, this new emphasis reflects the unique potential of forestry to provide goods, incomes, services and homes to low income people, many of whom have been pushed to the margins of society or otherwise left out of the development process. This is particularly true for the 100 million forest dwellers in Asia who hold traditional rights in forests through customary law. It also reflects a dissatisfaction with, and rejection of, conventional development strategies and the failure of those strategies to equitably distribute development benefits.

From a different perspective, recent programs view social forestry as an instrument for the achievement of other forestry objectives, such as the increased supply of industrial products, better management of natural forests, or generation of greater revenues through promotion of non-timber products. These projects attempt to involve local people more directly in the planning and implementation of activities, recognizing that this leads to better performance and enhanced sustainability. For example, devolving responsibility for forest management in state forest lands to local users is becoming recognized throughout the region as an important means to reduce the

burden of protecting the forest from local and commercial pressures, while also utilizing the forests for non-timber as well as timber forest products.

Global Goals. A unique challenge to Asian forestry in the 1990s is the international constituency now involved in the policy process. There has been a revolutionary change in the way in which tropical forests are viewed by the global community and in the extent to which these views are being brought to bear on national level policymakers. International interests in forestry are as widely varied in objective and approach as are the advocates of the more conventional domestic interests discussed above.

Until recently international interests in tropical forestry, other than for extraction, were confined to a small group of scientists and sportsmen who limited their demands on policymakers to the allocation of relatively small areas for protection, research and tourism. The costs of these allocations and other nonwood uses of the forest by the international community, such as collection of genetic material and medicinal plants, were insignificant. Now advances in biotechnology may be dramatically increasing the value of the genetic material existing in the tropical forest, affecting both the incentive to charge for its exploitation and the demand for its preservation. Moreover, within the last ten years, increased environmental awareness, doubts about the performance of development assistance, and the emergence of new global environmental threats, especially the loss of biodiversity and the possibility of global warming, have brought an entirely new and international set of actors into forestry. The political environment in which many of these international interests operate has led, variously, to calls for increased development assistance to developing country forestry through such mechanisms as the Tropical Forest Action Plan (TFAP), to calls for curtailment of international development assistance to the forestry sector based on the premise that it abets exploitation, and even to demands for prohibitions on international trade in tropical forest products.

Constraints on Forestry Development

Development of the forest sector, like other sectors, takes place in the face of limited resources and in the context of an overall national development process. Constraints of particular importance in forestry are availability of land, the framework for mobilizing resources, and the overwhelming way in which policy has neglected the capital value of the forest resource. Finally, while sustainability has always been an implicit concern of forest policy, translating the current emphasis on sustainability into practice is increasingly a major issue.

Land Allocation. Forestry competes with essentially every other sector of the economy for land resources. As noted above (para. 32), historically, the forest sector has been, and will continue to be a source of land. Within the Asia region the strongest demands for forest land in the next 20 years will come from agriculture. Table 3 provides a simple analysis of demand for selected Asian countries. Based on recent rates of increase in yields of major cereal grains, which have been high in much of Asia and will be difficult to sustain, and current estimates of population growth, unless there are significant changes in the share of grain consumption obtained from international markets, a demand for an additional 9.1 million ha of

agricultural land can be anticipated.^{4/} In addition, degradation of the currently cultivated land base, if allowed to continue, will further accelerate demand for forest land conversion. Of this, a considerable amount will need to be released from the forest estate. This demand can be offset to some degree by improving agriculture on areas adjacent to the forest.

Prices and Policies. A fundamental constraint on forest development in Asia, one shared with essentially every country in the world and for many other natural resource sectors, is the overwhelming way in which policy ignores the opportunity cost of exploiting natural capital. Across the region, and particularly in the resource rich countries of southeast Asia, development policymakers have sought to utilize forest resources for development objectives without providing for the costs of that utilization. Repetto and Gillis (1989) and others have shown that forest based industrialization policies in Indonesia, Malaysia and the Philippines have been based on systematic underpricing timber to domestic processors. In Indonesia alone the costs of this underpricing, and the inefficiency it condones, amount to nearly US\$500 million annually.

Policies, such as timber export bans and concessional timber pricing, that lower the perceived economic value of the forest, have impacts on both the resource owner and on the consuming industry. Artificially depressed prices reduce the incentive for forest management and replanting, and, in the case of the public sector, ultimately lead to underfunding of forestry agencies. While possibly promoting industrial investment and growth, low raw material prices are also weak incentives for investment and growth in processing efficiency. Inefficient industries, in turn, subsequently put inordinate pressure on the resource base.

In addition to direct intervention in timber markets, a wide range of trade, fiscal and monetary policies can influence results in the forestry sector. Tariff protection is a frequently used device to promote deepened domestic processing. As shown by Repetto and Gillis (1989) tariff protection is analogous to underpricing of timber in terms of promoting processing is analogous to inefficiency. Similarly, restrictions on exports of unprocessed or semi-processed products, common trade measures in the region, lead to inefficient

processing and reduce returns to the resource. Policies toward other sectors, perhaps most importantly tree crops and livestock, also frequently impose costs on the forest sector. Low or zero fees for grazing on public lands, which sometimes benefit subsistence herders, also benefit absentee owners of large herds. Similarly, although localized increases in the cost, especially in terms of women's labor, have been widely observed, increases in fuelwood prices are constrained by the growing availability, often at subsidized prices of commercial, fossil fuels.

One of the contradictions of the deforestation crisis is the modest impact that deforestation seems to be having on industrial timber prices. In real terms, the delivered price of high quality Malaysia hardwood, delivered to Japan, has risen at an annual rate of approximately 3 percent over the last 20 years. High quality sawnwood prices have risen only about 1 percent per

4/ The analysis assumes that land brought into production will be of lower

Table 3: POPULATION GROWTH, AGRICULTURAL PRODUCTIVITY AND DEMAND FOR NEW LAND IN SELECTED ASIAN COUNTRIES

	Population 1988 millions	Population growth rate 1988-2000 (%)	Average cereal yields (1986-87) (Kg ha)	Annual rate of growth of average cereal yields (1976-1988) (%)	Agricultural area (1987) (000 ha)	Required Incremental area by Y 2000 (000 ha) /a
Bangladesh	108.9	2.4	2,177	1.6	9,164	1,319
Bhutan	1.4	2.4	1,591	1	103	27
China	1,088.4	1.3	3,945	5.1	96,976	
Fiji	0.7	1.6	2,181	0.9	240	30
India	815.6	1.8	1,627	2.5	168,990	
Indonesia	174.8	1.7	3,573	4.5	21,220	
Lao PDR	3.9	2.9	5,723	6.6	901	
Malaysia	16.9	2.2	2,670	0.2	4,380	1,697
Myanmar	40	2	2,810	5	10,060	
Nepal	18.0	2.5	1,600	-0.3	2,339	1,334
Pakistan	106.3	3.1	1,733	1.9	20,760	4,593
Papua New Guinea	3.7	2.2	1,546	0.5	386	125
Philippines	59.9	1.9	1,880	2.8	7,930	
Solomon Islands	0.3	3.9	4,000	3.2	57	7
Sri Lanka	16.6	1.1	2,973	4.9	1,887	
Thailand	54.5	1.3	2,052	1.3	20,050	
Vietnam	64.2	2	2,647	3.4	6,470	
Total	2,574.1			371,913	9,133	

/a Assumes constant rate of growth of population and cereal, and that land brought into cultivation is 70% as productive as average land now in production.

Sources: World Bank (1990)
World Resources Institute (1992)

year during the same period. These price trends reflect both the under-evaluation of governments and the gradual drawdown of old growth resources, combined with the gradual introduction of lesser used species and the "back stop" effect of supplies of nontropical timber supplies in the United States, Canada, Scandinavian and other exporters (Hyde and Newman, 1991).

Conditions in Other Sectors. Forestry is not the highest development priority of most countries of the region. Other pressing concerns divert the attention of policymakers and dilute the commitments that must be made to long term investment in areas such as forestry. More importantly, development, or its absence, in other sectors helps to create or mollify the pressures that degrade the forest resource. Growth in agriculture and industry determines opportunities for landless laborers and hastens their pursuit of land for cultivation along forest boundaries. Similarly, rapidly growing populations, low levels of education and the marginalization of the poor, all make progress in the forestry sector more difficult. Vibrant and robust national economies are a prerequisite for sustainable forestry.

Sustainability. Forestry is committed to some form of sustainability in a way that is unmatched by almost any other discipline (see for example, Faustmann, 1849, Pinchot, 1947, Davis, 1966). Unfortunately, experience has shown that, in developing countries, sustainable yield management is rare (Poore, et al 1989).

The World Commission on Environment and Development (1987), Pearce, Markandya and Barbier (1989), Daly and Cobb (1987) and numerous others have discussed and promoted the notion of sustainable development. While definitions and approaches vary, all substantive approaches to sustainable development involve nondeclining consumption paths and, in some cases, nondeclining capital stocks as well. The possibility of sustainability and the policy framework(s) that might lead to it are the subject of considerable ongoing debate and research but little progress has been made toward developing operational results. For example, the relationship between the sustainability criteria of maintaining the aggregate level of assets and other economic criteria has not yet been fully developed (see Pezzey (1989)).

Withholding investment in forestry until such analytical difficulties are resolved is not an option. The fact is, for most accessible forested areas in Asia, sustained yield forest management is the only alternative to destructive logging and conversion. The option of merely preserving large areas of forest does not exist. Accelerated development efforts in the sector cannot await a final answer on the question of what should be sustained: based on current trends, most accessible remaining natural forest cover will disappear.

Forest Management Technologies: Options and Policy Prerequisites

Forest management is an inherently capital-intensive process. The standing stock of forest represents a heritage of foregone consumption, and any action to augment or alter the growth of the forest stock is, by definition, investment. Historically, in Asia, most forest activities have constituted disinvestment, either through the conversion of forest land or through extraction. Currently investment in the Asian forestry sector is

substantial and increasing^{5/} principally in intensified natural forest management, inventory work and establishment of management information systems, tree planting and plantation establishment, human resource development and research. The viability of these efforts, and scope for expansion depend largely on the extent to which policy reforms are instituted to ease the constraints discussed above.

The technical feasibility of sustained yield tropical forest management is subject of considerable debate, due to the importance and multiplicity of management objectives, uncertainty over biodiversity and the role of non-timber forest products. Plantations on the other hand, are imperfect substitutes for natural forest from both economic and ecological perspectives. Rather than exploiting existing stocks, building up a plantation diverts investment from other sectors or forest subsectors. While technically, the viability of plantation establishment on particular sites can be readily established, their environmental and social impacts can be varied and difficult to predict. Depending on the condition of the land, forested, agricultural, degraded, claimed or abandoned, management and other conditions on adjacent lands, plantations can be environmentally or socially beneficial, damaging or of little consequence. Economically, forest products prices are difficult to predict and the long gestation period of plantations inhibits private sector investment (just as they reduce the likelihood of private sector involvement in natural forest management). Prerequisites for efficient sectoral development are a pricing framework that enables rational allocation of investment between various investment options, and tenure institutions that protect investors and mobilize participation.

Natural Forest Management. Of the total forest estate of the region, approximately 70% is closed forest. All countries in the region have some reserves of natural forests, but just four countries - Indonesia, Malaysia, Myanmar, and Papua New Guinea - account for two-thirds, or nearly 200 million ha, of the resource. While sustained management is an objective in all countries, ITTO estimates that in Asia only about 1 million ha is under genuinely sustainable yield management.

Technically, success in natural forest management depends upon adequate site information, understanding of plant communities and associations, inventory data, and logging methods that preserve and enhance soil quality, nutrient availability and regeneration. Combined with adequate areas of forest under preservation and conservation management, sustained yield management for commercial forest areas is a technically viable option. ITTO (Poore, *et al*, 1990) concluded that for most tropical forest types, systems of management are available that can ensure sustained production. If performed carefully, selective logging can have minimal impacts on the ecosystem and damage from roading and log skidding can be effectively localized (Bushbacher, 1990). Known and tested management systems include ones dependent on significant canopy opening followed by intensive silvicultural treatment to ensure effective regeneration (the Malaysian Uniform System); and strip clear felling methods which leave areas of forest virtually intact between strips heavily logged and regenerated.

5/ Although as noted in para. 15, depletion of natural capital in only 3 countries amounts to nearly US\$8.3 billion/year.

The Bank's forest sector review for Malaysia, showed that with adequate tenure security and access to credit, sustainable forest management is preferable to liquidation, even according to narrowly defined economic criteria. Although technically and economically possible, much of Asia's commercially accessible forest area is not managed under genuinely sustainable systems because political, institutional and market factors militate against such management. For example, as noted (para. 24), forest management agencies often lack the commitment, political strength and presence needed to control concessionaires and other users of the forest. Illegal logging occurs frequently and violence is not uncommon. In Bangladesh, India and the Philippines forestry officials have been killed and foresters are frequently exposed to physical violence in other countries.

Production management models that take into account nonwood products and services have not reached the same level of development as timber management systems. The economic contribution of nonwood products is virtually unknown and the importance of medicines, foods and other outputs used routinely by local people is even less known or appreciated. Furthermore, models based on a few forestry products are simpler than those integrating a multitude of nonwood products. Individual nontimber products may not have a significant effect on the choice of the most economically desirable management system. Collectively, however, their contribution can be important.

Lack of employment and income-generating opportunities for rapidly growing populations also complicates forest management. Poor performance in other sectors increases demand for agricultural land and in several countries has subjected large areas to damage. In some cases, otherwise well planned forestry operations have been thwarted: for example, construction of logging roads improves access to forest areas and logged areas are most easily converted to agriculture. These intersectoral impacts affect all forms of forest management, but are particularly problematic in natural forests due to the large and difficult to patrol areas involved and the traditional view of natural forests as frontiers to be tamed.

From the point of view of soil protection and stabilization of stream flow, intact natural forests are one of the most effective land uses owing largely to ground cover from undergrowth and leaf fall. The economic value of this protection, and the cost of disruption, is highly site-specific and a function of human activity and investment in adjacent downstream areas. It is feasible that alternative land uses including plantations (forest or tree crop), and even annual agriculture, can provide many of the same protective watershed functions. The substitution of alternatives for natural forest can, from a soil conservation point of view, be nearly perfect, provided careful attention is given to well known and accepted land use practices, including contour operations, maintenance of continuous ground cover, and protection of buffers along watercourses. Commercial timber harvests of forests in steeply sloping watersheds can also be consistent with preservation of hydrologic properties as long as similar methods of resource husbandry are employed.

Global environmental benefits from tropical forests are the most difficult to replace with alternative land uses. Tropical forests are major global sinks of carbon. Releases of carbon into the atmosphere result from burning and decomposition. In a climax state carbon flux due to decomposition

is balanced by fixation due to growth so that a climax forest makes no contribution to global climate change. In this sense, retention of biomass in tropical forests is equivalent to measures taken anywhere else to control the release of greenhouse gases. The Bank's analysis of natural forest management in Malaysia not only clarifies the options for owners of tropical forests, but also helped quantify the nature of financial transfers which the international community may wish to consider, to produce and maintain biodiversity and achieve sequestration.

Use of the forest for wood production will release a certain amount of carbon, in decay of biomass destroyed in the logging process, and in whatever carbon is eventually released by the forest products made from logs taken. However, regeneration of the forest will begin the carbon-sequestering process, and the net result will be lower carbon release than under deforestation.

Multiple use management of forest around protected areas offers excellent opportunities for extending the range of biodiversity and can generally enhance the conservation value of the protected areas themselves. Isolation of protected areas, as "islands" amid intensively used production forests, plantations, agricultural land and human settlements can result in a progressive erosion of biological diversity within the protected areas as a result of barriers to mixing and outbreeding. A number of countries have forest working plans that include zoning and silvicultural practices that encourage dispersal from core protection zones. These include maintenance of natural forest strips along streams and water courses and along migratory routes, species, selective thinning that favors the more rapid emergence of the species structure of the natural forest, staggered harvesting to suppress weed growth, strict observance of cutting intervals and preservation of selective old growth stands. Many of these, as noted above (para. 57), are also consisted with protection of soil and water resources. Unfortunately, as yet, few countries actually follow these practices to any extent.

It is often difficult to identify discrete investment opportunities in natural forest management because expenditures are intimately linked with revenue-generating harvests. Prospects are improving, however, for identifying a range of investment options in natural forest management. These include support for new, low-impact harvesting methods, improved multipurpose inventory work, preparation of management plans, and improved supervisory systems for management investments in modernized harvesting and processing plants and equipment could also assist in maximizing the efficient of use of industrial raw materials.

Plantation Forestry. Plantations account for only a small portion of the Asian forest, expanding from 28 million ha in 1980 to 82 million ha in 1990 (see Table 1). Five countries, China, India, Indonesia, Japan and Korea account for most of the forest plantation area of the region. In the 1970s and 1980s plantation establishment accelerated for fuelwood and other community uses. Small-scale plantings on farms and areas outside the forest are increasingly common throughout the region as rural people adapt to increasing scarcities. The rate of establishment has now reached an estimated 5.6 million/ha/year.

Plantations can easily achieve twice the growth rates of natural forest ($10\text{ m}^3/\text{ha/year}$ compared with $5\text{ m}^3/\text{ha/year}$). Actual regional growth

rates are in the 6-35 m³/ha/year range. In addition, output is more uniform from plantations than natural forests which facilitates processing. However, plantations should not be seen as a direct substitution for natural forest. For example, the species for which plantation production is economically or technically viable is still limited to a relatively small, albeit increasing, number. The financial constraints on plantation management also encourage management for short rotation, small diameter products. Commercial production of large-diameter raw material, such as veneer logs, has yet to be demonstrated as viable on a large scale for all but a very small handful of species.

In developed countries the transition from exploitation of old growth forests to plantation forestry has also often been associated with major geographic shifts in the sector and considerable lags between exhaustion and achievement of steady state supply (Hyde and Newman, 1991). Optimal plantation investment involves predicting the timing of the exhaustion of old growth,^{6/} the mix of products that will come into short supply, the costs of idle processing capacity or imported raw material and a host of other considerations. Risks can be minimized by choosing species with alternative uses depending on age of harvest, by selecting those species with processing characteristics complementary to the existing resource (for example, fiber length, wood density and disease resistance), and opportunities competitive in international markets. The role of plantations in addressing deforestation and forest degradation is likely to be secondary to efforts in the natural forest. Forest cover has receded to such an extent in much of the region that watershed protection and other environmental motivations can be a significant factor driving national tree planting programs.

Recent estimates of potential economic returns illustrate the scope for successful plantation forestry in the region. Analysis of plantation economics in China (World Bank, 1990) showed rates of return of 15-30% based on currently available technology in commercial conifer and broadleaf plantations. In India, plantations of eucalyptus for fuelwood yield up to 20 m³/ha/year with economic returns of about 15% provided appropriate technology is applied. Small-farmer response to these opportunities is encouraging; in nine states, between 1982 and 1990, smallholders established the equivalent of nearly 800,000 ha of plantation, according to the number of seedlings distributed (which may overstate the area). In Uttar Pradesh about 4,000 ha of poplars are planted annually as intercrops on irrigated farms. There are no reliable data on plantation survival rates but field observations in India, for example, indicate survival rates at 30-40%. With improved extension and better quality planting material, even higher planting rates can be anticipated.

The actual success of plantation investments has not been measured, but has been impeded by weak technology and poor planning. Over the past two decades site preparation and species site-matching have improved significantly, the latter due to identification of seed provenance and the inception of clonal planting stock. Though important, these practices have yet to become widely applied and the introduction of improved practices can

6/ Exhaustion can be determined by physical, economic or administrative criteria.

mean the difference between plantation success and failure. Experience shows that all too often a tolerant species is retained because it produces adequate rather than optimal growth, whereas another species, perhaps more difficult to establish, would provide significantly higher yields and profits. Systems of identifying provenances and seed certification, similar to those used for agriculture crops, are needed as well as increased production of clonal planting stock.

Available or foreseeable technologies can significantly improve returns to plantation establishment. Australian experience indicates that use of imported high-quality planting material can add 2% to overall rates of return to plantation establishment. Use of other innovations such as root trainers, clonal propagation, more intensive culling of seedlings, better site preparation, possibly tissue culture and embryogenesis will become increasingly common over the 10 years. These are mainly simple technologies, using low cost facilities and materials or labor-intensive practices. Individually, or in combination, they have the potential to revolutionize forest nursery and plantation practices.

Despite ambitious planting programs by some countries in the region, particularly China and Indonesia, economic prospects for significantly expanded industrial plantation development in the region can only be described as mixed. The region has significant areas suitable for plantation development and reasonably good access to important markets, particularly Japan and Korea. Competition from maturing plantations outside the region, particularly in Chile and New Zealand, however, may constrain large-scale plantings. Also, the enormous natural timber resource of the former USSR (total 535 million ha, conifers 406 million ha) is expected to become available at relatively low cost and will soon influence the Asian market.

Often classed separately, woodlots and tree planting activities promoted by social and community forestry programs have the same important investment characteristics as traditional plantations, but generally better economic prospects. While greater efforts are typically required in organizing the provision of planting materials to support large numbers of independent planting decisions, demand in rural areas for small dimension wood is strong through the region. Establishment of small woodlots and farm forest plantings requires much better and more homogeneous seedlings than normally used in government-sponsored plantations.

Due to the limited area currently planted, the environmental impact of plantations has been negligible in the region. Forest plantations are at best, imperfect replicas of natural forest. In plantations the species, age distribution and spacing are designed to meet the objectives of the investor. Plantations for fast-growing pulp wood will be different from plantations established to protect a watershed. Concerns have been raised about the local environmental impact of large-scale monoculture plantations, particularly eucalyptus and other exotic species. While plantations (especially eucalyptus) may consume more water than other crops or natural forests, they do not require substantially more water to produce a unit volume of wood than other forest types. Large areas of a single species, especially exotic species, run the risk of insect and disease attack as experienced with many agriculture corps and this must be guarded against through plant breeding, hygiene, use of multiple species and other well known measures. Many tree plantations established for reservoir protection actually increase erosion

hazards due to diminished ground cover. Better application of site preparation technologies and species choice, including use of shrubs would help resolve these concerns while also lowering costs and improving returns. Environmental pressures, similar to those favoring enhanced protection of natural forests, favoring establishment of large-scale plantations on bare areas have recently emerged due to the possibility of using trees to sequester carbon. Justification for plantation investment on the basis of a greenhouse abatement has yet to be made, although there have been several examples in other regions of creative financing, in which carbon fixation benefits have been considered.

Many of the environmental concerns raised about eucalyptus and other exotic species such as pines, acacias, prosopis and leucaena actually reflect concern about the social and distributional consequences of plantation development. Changing prices and investment opportunities sometimes result in efforts to establish plantations on land that was previously available, often to the landless, for purposes such as grazing of scrub cattle. Displacement of agricultural crops by less labor-intensive tree plantations may also result in resentment due to opportunities lost when alternative employment is not available. It is crucial, from both ethical and practical perspectives, to distinguish between social and physically-based environmental issues in the design and implementation of plantation projects to ensure that appropriate ameliorative measures are in place.

Although negative environmental impacts of plantations are not yet widely evident, studies are needed to compare production and product value, of indigenous and exotic species, in both human and environmental terms. Frequently exotic species are the only plants that can grow on severely degraded soils. When returns to tree planting are attractive, competition with other crops is inevitable. However, unless policy interventions manipulates relative prices, it is difficult to see a justification for policies to control farmer adoption of tree planting.

Plantations could eventually become a major source of pulp wood and fuel and, depending on technological progress in processing, solid wood products. Development of small wood technology is likely to have a widespread effect in the next decade. Processes already developed and commercially available allow for the use of small logs as raw material for wood substitute materials. This will greatly improve the financial viability of certain plantations, and especially trees grown on farms. For the foreseeable future, high-quality veneers and specialty hardwood will continue to come from natural forests.

While economically and technically similar, the institutional arrangements needed to support widespread tree planting by small farmers are quite different from those needed for large-scale commercial plantations. The different factor endowments of smallholders and commercial organizations imply a need for different technological packages. Support services for farm forestry and agroforestry, such as marketing intelligence, extension, credit, and input supply, are more similar to the services usually provided in conventional agricultural projects than for large-scale plantations. The NABARD/WIMCO poplar planting project in north India required creation of an administrative group to assist farmers with arranging Bank loans. Because of the long production periods in forestry, the usual distinction between seasonal and long-term credit is not relevant to forestry.

Forest Inventories and Management Information Systems. Natural forest inventories are carried out periodically in China, India, Malaysia, Philippines and Thailand and have been started in Bangladesh, Indonesia, Papua New Guinea and Sri Lanka, but for the most part, there simply are no reliable data on the status of the forest. The absence of reliable data on forest resources in the region makes management difficult nearly to the point of impossibility. Inadequate data on the potential of forested lands leads to poor decisions on land use, conversion of forest to unsustainable uses, and prevents monitoring of program implementation. In those countries, such as China and India, with continuous inventories, data can not be used to influence decisions due to weak data management. In several countries, for example, India, remote-sensing data, which could be invaluable in analyzing the evolution of forest and environmental processes, are handled as military secrets and are inaccessible to resource managers.

Often work plans for timber-harvesting operations are poorly prepared and give inadequate attention to environmental safeguards, especially post-harvest treatment and management. Developing local capacity, preferably in the private sector, to plan forestry operations, while not expensive, should be a high priority in the Region. In Indonesia, the Bank is financing the planning of concession areas totaling 50 million ha (at a total cost of US\$7.5 million).

Only recently has the economic significance of nontimber forest products started to be recognized. Existing inventories of nontimber products and the methodologies for data collection and fieldwork are rudimentary. The financial cost of the training, research preparation and introduction of the basic elements of good forestry practice in the region are easy to minimize. In addition to large amounts of high quality technical assistance and equipment, there is an overwhelming need for commitment to confront the basic forces that drive poor results in the sector.

Reinventing Forestry. The most important set of investments needed in the Asian forestry sector involve the continued reorientation of forestry away from mechanical application of silvicultural treatments toward an emphasis on development, investment performance, and public accountability. Efforts to apply expertise from other disciplines--ecology, economics, sociology--to problems in the forestry sector need to be accelerated. The broad demands now being placed on the forest sector--environmental protection, protection of forest dwelling people, balancing global environmental concerns--need to be matched with changes and improvements in the skills available to support the sector.

Furthermore, earlier legislation emphasizing conservation may not address current pressures on forests. If countries began to support institutions to ensure the continuation of stocks of productive assets--assuring the rights of future generations to natural and other assets--the depletion of forest assets without replacement would no longer be efficient. If local communities had clearer control over the diverse forest products, and forest concessionaires held longer-term timber contracts (under a pricing structure which rewarded careful operation), sustainable management would be more efficient than depletion. In the tropical forestry sector of Asia the reality is that most development work remains to be done in the areas of policy and institutional reform.

Forestry education in the region is changing and needs to continue to change to equip foresters, particularly those dealing directly with communities, with the social and environmental skills now needed. The assumption that professional forestry training is a prerequisite for employment in forestry agencies also needs to be relaxed. Expertise in nontraditional areas such as, minor forest products, public administration, law and other fields needs to be developed within the sector or brought in from outside. A major effort is required to use well-adapted, scientifically sound techniques for man-made forest development, as well as better understanding of biophysical interactions within natural forest ecosystems.

The dominant role of the state in forestry also needs to be challenged. In some countries of the region the tradition of public ownership of forests and government involvement in tree management on private land is starting to weaken. Given the constraints on the capacity of forest agencies it may be more constructive to contract out field management and supervision to private firms enabling governments to focus on legislative and policy reform. The record suggests that measures aimed at improving the performance of stumpage markets should be the basis for linking the resource sector with the processing sector. In much of Asia, the future role of the government will be in providing regulatory, policy development and services such as extension and research to the private sector.

D. Evolution of Bank Lending Programs and Practices

Bank involvement in the Asian forest sector has only recently become significant. Impeded by a general neglect of natural resource management and the extractive approach to the sector, borrower receptivity to external involvement in forestry has, until recently, been low. With the emergence of a poverty focus to the Bank's rural development activities and the perception of severe stress on low-income groups from fuelwood and energy shortages in the 1970s, the Bank moved to the forefront of donor involvement in community and social forestry. Increasing recognition of the sector's ineffective contribution to economic development has at the same time increased borrower interest in Bank participation.

In fact, Bank operations outside of the conventional forestry sector have actually been a key factor in its impact on the forestry sector itself. Bank support for land settlement, tree crop development, power and infrastructural development have actually impacted a larger area of forest land, an estimated 5.9 million ha, than all its forestry projects combined (Table 4).^{7/} Greater awareness and sensitivity to the environmental problems and potential benefits of investments outside of the sector is now resulting in significant changes in the design of such projects Box 2 illustrates the kinds of safeguards now being built in to Bank projects with measures to protect an endangered butterfly species in the vicinity of an oil palm project in Papua New Guinea.

7/ The total area of plantation establishment ever financed by the Bank, is Asia for example, is less than 2 million ha.

Table 4: LAND AREA DIRECTLY AFFECTED BY SELECTED
WORLD BANK-FINANCED PROJECTS IN ASIA

	Ha
<u>Hydroelectric and Irrigation Reservoirs (1978-89)</u>	<u>3,700,800</u>
<u>Agriculture Settlement</u>	
Indonesia Transmigration	1,861,500
Malaysia	
Nepal	18,600
<u>Tree Crop Development</u>	
Indonesia	201,500
Malaysia	129,567
Papua New Guinea	4,580
Sri Lanka	1,800
West Samoa	<u>1,240</u>
Subtotal	<u>338,687</u>
Total	5,919,587

Box 2

Protection of Forest Environments in Tree Crop Projects: Oro Smallholder Oil Palm Development.

Although efforts have long been taken to site tree crop projects on environmentally robust areas and degraded areas, the Bank has supported conversion of tropical forests to make way for alternative land uses. An example of recent efforts is the Oro Smallholder Oil Palm Development Project. This project will finance the establishment of 6,500 ha of oil palm by 3,250 poor smallholder families in Eastern Papua New Guinea while seeking to preserve the habitat of the endangered Queen Alexandra Birdwing butterfly (QAB), Ornithoptera alexandrae, the largest butterfly in the world.

The QAB Conservation Program is based on the principle that local landowners will ultimately determine whether or not the QAB survives. In rural PNG, development is usually translated as "making money," hence to be successful, conservation of the butterfly must be implemented in such a way as to "make money" for people taking part. The project's conservation officers, with the assistance of NGOs, will develop and encourage income generating opportunities to provide landowners with alternatives to oil palm development.

Potential oil palm blocks are located on degraded grasslands or secondary forest used by QAB. Under the project, no primary forest will be accepted for conversion to oil palm. A screening process has been designed to assess the potential QAB habitat value of proposed land for oil palm development. On sites assessed as "prime habitat," or as "potentially useful," landowners will be encouraged to develop oil palm elsewhere or undertake other income generating activities. Should they decline, they will be asked to allow the removal of the butterfly's foodvines to alternative sites. If negotiations fail, project authorities will decline to assist the landowners. This would be used as a last resort option, as, in the "payback" society of PNG, landowners could retaliate against both vines and butterflies.

The conservation program would also include other activities such as research, to improve knowledge of the butterfly and its ecological requirements; development of income generating alternatives to plantation crops for landowners; and education to raise public awareness of the butterfly and its conservation needs. These other activities, which are important for the long term survival of the butterfly, would be closely coordinated with the project's conservation activities described above.

Development of the Current Portfolio

World Bank forestry lending to Asia started in 1955, with support of the Karnaphuli paper mill in Bangladesh (then East Pakistan). Later, support was provided to timber extraction projects, followed by land settlement, in Malaysia and Nepal. An additional early project, included support for sawmill and logging operations and technical assistance in Myanmar. Several rural development projects in the region, notably in the Philippines and the Republic of Korea, included components that set the tone for the Bank's early work on social and community forestry.

Bank involvement stepped up in the late 1970s with a series of social forestry projects in south Asia, starting with projects in Gujarat and Uttar Pradesh States in India, later in Nepal and ultimately through a multi-state national social forestry project in India. From 1980 to 1992, total regional forestry lending was US\$1.9 billion, of which nearly 52% was for social forestry (see Table 5 for a summary of the region's portfolio of projects since 1980, including those under preparation).

Lending to China for plantation development began in the 1980s, as did additional lending for watershed management, including projects in the Philippines and India. The Indian watershed management projects were heavily oriented toward agricultural development and included introduction of soil conservation, fuelwood plantations and fodder development. The Bank has made few investments in natural forest management in the region. It has supported forest inventory work and, in several projects, road construction and saw milling. It has also supported improved management of existing forests through changes in harvest techniques and cutting cycles in the Nepal Hill Forestry Project which expects to increase output of wood and, forest fodder.

While generally limited to area-specific investments and special purpose projects such as community forestry, in the last five years Bank lending in the region has begun to tackle a broad range of sectoral issues and policies. The Bank's forestry operations are constrained by the implicit acceptance of several critical assumptions about how the sector should operate.

Unspoken Assumptions

In many crucial ways the Bank has been an unquestioning and passive participant in its forestry portfolio. It has largely accepted the institutional structure of clients' forestry sectors and, due partly to its own lack of technical expertise, has not challenged its borrowers level of technology. Internally, the Bank, as in other sectors, has employed a target-driven style in forestry project processing. With few exceptions, the Bank has emphasized a supply side orientation to the sector and has been too willing to accept poorly conceived, and sometimes completely unstated, sectoral development strategies. Although, on the whole, the portfolio has been judged satisfactory, the weakness of this passive approach is reflected in slow disbursement, delays in implementation, and, more importantly, the negligible impact of Bank investments on borrowers' overall forestry sector.

**Table 5: TOTAL LENDING AND PROPOSED LENDING TO ASIAN COUNTRIES FOR FORESTRY PROJECTS a (US\$ million)
1980-1995**

	<u>1980-95/b</u> Total	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993/b	1994/b	1995/b
Bangladesh	89	11						28							50		
Bhutan	12					6				1					5		
China	1,191						47		40	57		300			147	150	450
India	1,043	37	30	29	134	58	197					150		158		125	125
Indonesia	251						11			34		20	16		100	70	
Lao PDR	12														12		
Malaysia	46						7		9					30			
Myanmar	92	35	32			25											
Nepal	91	17				18					31					25	
Pakistan	64					21									43		
Philippines	250				26							224					
PNG	10														10		
Solomon Islands	5										5						
Sri Lanka	29									20							
Thailand	20														20		
Overall Yearly	3,205	100	62	29	143	154	262	28	49	92	51	475	240	238	264	398	620
Totals/a																	

a Includes Watershed Management Projects.

b Projected.

Reliance on the Public Sector. A central problem among borrowers has been their overreliance on existing government forestry bureaucracies. While repeatedly recognized by Bank staff as a constraint to forestry development, efforts to improve institutions have been limited to staff training and civil works. The fundamental issues of accountability and delineating responsibility in forestry agencies, although recognized, have been ignored. The Bank's past reliance on area-specific projects has limited the extent to which these systemic issues can be addressed. Apart from private farm forestry and social forestry projects that have, to some extent, escaped public sector management, the Bank has not identified mechanisms for developing effective private sector involvement in forest management.

Acceptance of Poor Technologies. The Bank and other international development agencies, have not been sufficiently adamant about the need to improve technical performance in forestry. Unlike tree crops and agriculture projects, the Bank has not ensured the use of high quality planting material; poor nursery practices and use of poor genetic material are common. High quality technology and proper standards of nursery operations are not incompatible with small-scale, labor-intensive application, even in remote social forestry sites. In fact, when trying to interest small farmers and communities in tree planting and sustainable forest management through the supply of planting materials, there is a strong need for quality control. In many other ways, including its emphasis on quantitative targets, the Bank has promoted a neglect of quality considerations.

A Topical Approach. The size and scope of the forestry portfolio owe much to the emphasis on social forestry and to forestry as a component in an integrated approach to rural poverty alleviation. However, this approach has restricted the Bank's ability to address the full range of sectoral issues. Implicit has been low priority on other aspects, especially international trade, industrial raw material, rational exploitation of existing forests, efficient utilization of forest revenues, and environmental concerns. Without diminishing its efforts in social forestry, the Bank needs to, and can, move aggressively toward a more catholic approach to the sector.

Choices Facing the World Bank

The World Bank is heavily involved in the forestry sector of most countries of the region (lending US\$100 million annually). The Bank has revised its overall policy in the forestry sector and the Operations Evaluation Department (OED), in its 1991 review, heightened attention to policy and institutional reform. The Bank's new forest policy paper reaffirms its commitment to using forestry to support poverty alleviation in rural areas, to the development of additional wood energy resources and to protection of fragile lands through afforestation and introduction of improved farming practices. It also commits the Bank to working with NGOs and requires thorough environmental assessment of future forestry lending. The policy prohibits direct Bank support to logging in primary tropical moist forests and calls for adoption of policy and institutional reform as conditions for Bank involvement in all but environment and poverty targeted forestry projects. In this context, regional Bank operations could continue their standard approach to forestry projects and even expand lending in the context of the existing economic, institutional and technological environment. While higher levels of lending could be achieved, the basic problems in the forestry sector would remain unresolved and outside the boundaries of Bank-financed projects,

deforestation would continue to accelerate, environmental degradation would worsen and the sector would become increasingly unsustainable.

Alternatively, the Bank can address the underlying defects and priority issues in each country's forestry sector. Recent projects in China, Indonesia, Malaysia, Sri Lanka have adopted this strategy and are attempting to advance policy reform and implement priority investments simultaneously. While the potential benefits of this alternative are obvious, there are also significant costs and risks. Governments of the region may not be willing to, or capable of implementing the necessary reforms. Less strongly conditioned assistance from other sources may weaken the incentive to adopt Bank recommendations. Rapid processing of projects conflicts with the time and other resources required to identify and prepare integrated policy reform and investment packages. The pressures of population and poverty in the meantime continue to erode the forest resources of the region. Nevertheless, borrower receptivity, the undeniable importance of comprehensive reform, the availability of a few high return technological opportunities, and the Bank's visible role, point to this strategy as feasible and desirable.

E. Strategic Recommendations

Progress in the forestry sector will depend on mobilizing commitment and resources to resolve the interconnected web of economic, institutional and policy failures. Given the diversity of the sector, and the need for indepth country analysis, the World Bank will adopt a forestry strategy based on sector-wide analysis and reform simultaneously linked with large-scale investment. In addition to pursuing the specific policy reform and investment opportunities described below, the Bank has an important role in promoting the environment conducive to investment and in mobilizing commitment among client governments and donors.

Future Role of the Bank

The Climate for Investment. Forestry is a politically charged sector, perhaps more so than any other in which the World Bank operates. Strong conflicting interests in the sector could easily lead to a halt in sectoral investments. Cessation of Bank forestry lending has, in fact, been advanced as a serious proposal by some environmental groups. Other proposals, not aimed at the Bank, are equally disconcerting. There have been serious call for bans on the importation of tropical timbers into developed country markets and for prohibition of logging in moist tropical forests.

Among regional policymakers, this climate has created great uncertainty about the viability and value of efforts to preserve and manage the remaining tropical forest resource. In fact, unless the forest resource is viewed as a valuable asset, that can be used to fuel economic development, poverty alleviation and pursuit of other social objectives, destruction of the resource is assured. Bans on trade and blanket restrictions on certain management practices are based on the premise that natural forest utilization inevitably results in degradation. On the contrary, as discussed above, use including commercial utilization, within an integrated framework of resource planning and continuous assessment, is an essential element of a sustainable forestry sector.

The Bank, through involvement with other donors, the FAO, ITTO and other international groups, can play an important role in improving the climate for forestry investment. Its involvement in the design and implementation of sector-wide forestry development programs can ensure that the tradeoffs and consequences of alternative policies are considered, that full advantage is made of technological and marketing opportunities, and that environmentally well-conceived and executed programs are acknowledged and supported. The Bank can help mobilize commitment to forestry development by raising forestry issues at high levels with both donor and borrower governments and by ensuring that forestry issues are given prominence at assistance coordination meetings.

As noted, with Bank support many countries in the region have already taken some of these steps. Nepal has committed itself to a program of converting vast areas of the government forest estate to community management. Indonesia is embarking on a trial policy of concession management involving private sector auditing of contract compliance. China has established a highly motivated plantation system to provide the infrastructure for technical assistance and financing, and to reward good performance. Additional steps for these and other governments in the region include greater emphasis on pre-investment work and more serious consideration of forestry in macroeconomic and sectoral planning for agriculture. Project pipelines in forestry are weak in most countries and do not reflect full and creative examination of options and constraints. The quality of sector plans, including some of those prepared with donor assistance by international consultants, has also been weak. The Bank will encourage governments to be more demanding consumers of technical assistance and to require analysis that develops linkages with the related sectors of agriculture and energy and which involved broad local consultation. The Bank's primary emphasis should be on quality and intellectual leadership to support this kind of analysis and not on lending or implementation targets.

Across the region, procedures for financing forestry are inadequate. Budgetary allocations for forestry are treated de facto as recurrent annual expenditures, not as investments. Investment oriented planning and budgeting procedures will be an indispensable step toward improving accountability. The Bank, through its country economic dialogue, will seek to encourage Ministries of Planning and Finance to play a stronger and more active role in monitoring and evaluating national forestry development strategies.

Terms and conditions of employment of foresters need to be revised. Salaries and allowances are inadequate to motivate staff to accept and perform well in postings in remote and difficult areas. In comparison to the value of the assets they manage, compensation of government foresters in Asia is woefully inadequate. Promotion criteria that tend to favor generalists can generate personnel equipped for managerial positions, but discourages the specialization needed for research and staff positions. The Bank through its reviews of public sector expenditures will encourage revision of civil service codes to allow multiple career streams and realistic posting allowances for forestry staff.

The central lesson learned from the Bank's efforts in forestry is that investments need to evolve from comprehensive analysis of sectoral constraints, opportunities and mechanisms for policy reform. Emphasis on discrete, area-specific investments, such as plantation establishment, will

not mobilize the sector nor solve the basic institutional and scientific problems or address externalities. While a sector based approach is essential, it is equally important to focus on key issues in the context of an ongoing program of investment support and dialogue. The following examples illustrate the potential of this approach.

Utilizing Private Sector Capability. A common problem for governments attempting to manage commercial exploitation of tropical forests is the limited capability of the forestry agency to effectively monitor and oversee the activities of concessionaires and others utilizing the forest. The conventional response of donor agencies has been to attempt to expand the capability of the forest agency through the provision of training, equipment and civil works. In Indonesia, the Bank is now supporting an alternative strategy that attempts to utilize private sector expertise to improve monitoring on a contract basis. This is expected to increase government revenues from forest concessions, while at the same time ensuring better compliance with environmental guidelines and other conditions. This work has established the possibility of separating the administrative, managerial and regulatory functions of the state using private sector expertise to supplement the public sector. More intensive efforts to encourage private sector involvement, including NGOs, will increasingly be part of the Bank's forestry program. Additional mechanisms to be explored include utilizing lines of credit, underwriting private sector investments and developing joint ventures.

Environmental Guidelines. In China's National Afforestation Project environmental guidelines for plantation management address species mix, soil conservation, pest and fire control and biodiversity. The special significance of these guidelines is that, although the Bank will directly finance only about 13% of the government's overall afforestation program, they will be applied to the entire 8 million ha, 10-year program. The possibility of playing such a catalytic role in other countries and in other aspects of the sector, such as conservation and land-use planning, is one of the more exciting opportunities for the Bank. Other practices that enhance biodiversity conservation within a framework of multiple use of natural forest areas, such as ones discussed above (para. 60), will also be promoted by the Bank. Intensive project preparation and supervision, and a willingness to enforce project conditionalities, will be essential if this potential is to be achieved. In addition, thorough analysis of technologies and policies as an ongoing part of the Bank's program will be needed to ensure continuous flow of new ideas and approaches to the Bank's borrowers.

Improving Market Opportunities. Analysis of international markets for tropical timbers shows that market distortions, fragmentation in the marketing chain, and collusive practices, severely affect export revenues. Evidence from countries, such as Malaysia, Papua New Guinea, and the Philippines, suggest that these distortions are widespread and costly. These also negatively affect incentives for forest management and reduce the scope for applying low impact logging technologies and other sound management practices.

Following an internally funded study, the Bank with support from FINNIDA, is now conducting a detailed study of the feasibility and implications of structural changes in the forest products trade. More generally, this work will be part of a new focus on the demand side of forest production, including efforts to better relate forestry investments to

industrial and energy policy. Wood saving technologies, such as improved wood burning stoves, manufacture of structural wood products from small-scale timber and reconstituted wood products could significantly reduce industrial demands on the forest resource base. Efforts in market reform will focus on trade liberalization and promotion of competitive environments for both production and consumption activities (see Binkley and Vincent, 1990).

A critical message emerging from the social forestry experience in India is the need for careful attention to market development. Although largely based on the need to supply wood for domestic fuel, experience under social forestry projects has shown that farmers are more responsive to opportunities to produce poles and small timbers. Projects promoting widespread tree planting appear to have destabilized local timber markets in some areas, leading farmers to uproot plantings and abandon investments. Skills in assessing and forecasting markets for wood products are rare and experience in the forestry sector is difficult to locate. Bank analytic work on forestry will more seriously consider marketing prospects and more realistically assess farmer motivations for forestry investment.

Community-Based Management. While experience with social and community forestry products has been mixed, a clear finding is the viability of community-based management and the ability of rural people to respond privately and collectively to opportunity and incentives. Without governments in a dominant and, usually distorting, role in tree planting and forest management, communities can effectively coalesce around forestry activities.

Open access is a well known and very real contributor to forest degradation. Less widely recognized is the possibility of mobilizing community participation and self governance over forest resources. The key external input to this process is community organization and not seeds, seedlings or even technical assistance. Methods of converting financial resources into investments by local communities will be increasingly refined through Bank work. In Nepal, for example, continuation of support to user-group forestry is now being tied to performance and to gradually increasing cost recovery and local contribution.

Bank support for tree planting by smallholder agriculturalists and forestry activities by rural communities is increasingly becoming a normal part of rural development and agriculture lending. Bank work on rural credit will wherever possible, attempt to minimize exclusion of forestry activities from eligibility. Nonetheless, it needs to be acknowledged that smallholder tree planting is most likely to be viable only in areas suffering from wood deficits and accordingly will be a weak defense against large scale deforestation due to shifting agriculture and commercial mismanagement.

Monitoring and Evaluation and Project-Financed Research. Regional lending operations, especially for social forestry, have included provisions for monitoring and evaluation. Unfortunately, these efforts have not been sufficient to generate a reliable understanding of conditions that lead to project success or failure. Despite a decade of experience, the factors that lead farmers to adopt tree planting practices or encroach on forest areas are still poorly understood. Similarly, the value of incremental wood supplies as firewood and building materials or other forest products to beneficiaries are not clearly known. Emphasis on high quality socioeconomic research work is needed in the forestry sector. Adequately funded, long-term studies, with

input from local and, international researchers and consultants, are required and can be funded directly through Bank operations. Long-term ecological and environmental studies, forest management and silvicultural research and monitoring work also merit much higher priority.

Adequate design of these studies during project preparation is costly and requires specialized expertise. Implementation of studies will often require international technical assistance and the development of local expertise. Use of private sector consultants and revised personnel standards to develop adequate skills within government agencies will be needed. Management planning and policy analysis, linked operationally to investment, will also be promoted by the Bank.

Policies and Investment Outside the Forestry Sector. Recent analyses of deforestation and other forestry problems show the crucial impact of external factors on the forestry sector. Unfortunately, this recognition exceeds our ability to prescribe and introduce reforms. The fundamental problems of underdevelopment--overpopulation, poverty, and inequity--are not unique to the forestry sector, and a continuing challenge will be striking an appropriate balance between efforts to achieve progress on these broad issues and in the forestry sector.

Forestry issues should take higher priority in Bank economic and sector work, with the goal of identifying forestry-related policy reforms that can be promoted through structural adjustment operations or in association with nonforestry sectoral adjustment projects. Steps to further the overall processes of agricultural intensification are essential to the forestry sector. Identifying the need and scope for policy reform and integrated projects, especially in the areas of agricultural productivity and expansion of employment opportunities, is increasingly a central theme of sector work in the Asia region. Sector work on the Philippines, for example, emphasized the linkages among forestry, fisheries and agricultural resource management; a joint Asia Technical Department and Environment Department review of watershed development further developed linkages between intensifying marginal agriculture and environmental remediation. The focus of regional work on soil and moisture conservation and fertility management is aimed precisely at stabilizing the marginal agriculture that directly threatens the remaining natural tropical forest.

Global Transfers for International Environmental Protection. Until recently there was no mechanisms for the international transfer of resources on concessional terms in support of environmental protection. Starting with small debt for nature swaps, first involving threatened forest areas in Bolivia and later in other countries, including the Philippines, a variety of innovative financing experiments have been suggested and tried. Recognition of transboundary pollution from acid rain and carbon emissions and the worldwide significance of biodiversity has resulted in the establishment, under the auspices of the World Bank, UNDP and UNEP, of the Global Environment Fund. Somewhat earlier, the Japanese Environmental Grant Program enabled the Bank to accelerate preparation of environmentally oriented projects and components.

Concessional finance for environmental preservation activities remains an experimental and controversial area. The extent to which governments are willing to recognize international concerns over the

management of domestic resources, and to enter into financial arrangements which can be interpreted as restricting their sovereign rights, has yet to be fully determined. In this area the World Bank can play an important role in keeping governments aware of the availability of concessional resources and opportunities to employ these resources in support of national environmental and development priorities. On behalf of donors, the Bank has a similar responsibility to seek to maximize the use of environmental fund as additions to conservation efforts that recipients would be expected to make in response to domestic self-interest.

Investment Requirements and Priorities

Without prejudging the results of the required sector analysis and project planning, it is clear that massive investments are needed to augment the region's existing forest resource. These include efforts in plantations and farm forestry, improved natural forest management, including increased emphasis on nonwood forest products and low-impact harvesting, and the expansion and improvement of the region's protected areas. Because of the magnitude of these needs, recent Bank experience has shown that it is possible to move ahead rapidly with simultaneous development of both an agenda for policy reform and targeted high priority investments.

With respect to the need for incremental establishment of new plantations, and the equivalent area in smallholder tree farming, calculations summarized in Table 6 illustrate the magnitude of the investment requirement. On the basis of recent rates of deforestation and plantation establishment, it is estimated that by the year 2000, the total natural closed forest area of the region will stand at about 370 million ha, a decrease of about 50 million ha (10%) from 1980, while some 50 million ha of plantations (nearly 45 million in China) will have been added. Even with optimistic assumptions about the sustainable yield of natural forests, and plantation growth rates, a shortfall in wood production equivalent to 12 million ha per year of high-yielding plantations will result. Assuming a low estimate of the cost of plantation establishment, US\$600/ha, the total investment requirement amounts to more than US\$3.7 billion.

Nearly two thirds of this investment requirement will be needed in the wood-deficit countries of South Asia and hence primarily in afforestation (see Box 3). This will largely take the form of private farm and community forestry aimed at the provision of wood and tree fodder and other forest products directly to rural participants. Targeted industrial plantation development, largely to supply existing industries, will also be supported in the context of suitable policy frameworks.

Roughly one quarter of the proposed investment program will be in the countries that currently have a surplus of wood or are nearly in balance (see Box 4). These investments will support both large- and small-scale plantation development in anticipation of a transition from depletion of old growth forests to sustained yield forestry. Private sector involvement, by providing additional incentives for the adoption of high-productivity technology, is essential for the success of these efforts. A parallel objective of this work is to facilitate conservation of existing natural forests by making available adequate supplies from intensively managed areas. Accordingly, appropriate investments in conservation area development and protection will be necessary.

It is more difficult to estimate investment requirements in other parts of the forestry sector in Asia, but some of these may be quite large. The introduction of low-impact harvesting technology, if it proves economic and is accepted on a wide scale, could involve considerable capital replacement: given the scale of logging operations in countries such as Indonesia and Malaysia, it is reasonable to project a need for of \$500 million for these countries alone. The contracting of private sector capacity to take on certain management roles will also require significant initial financing. Application of the system throughout Indonesia might, for example, involve outlays in the first five or ten years of up to \$200 million. In addition, making privatization work effectively would still require considerable improvement in the capacity of the state forestry agencies to work with the contractors on preparation of management plans. Investment in national marketing efforts, to improve the position of resource owners in the international markets may, if it proves feasible at all, require considerable underwriting support, as well as technical inputs. More generally, if countries with significant resources are to make the necessary commitments to sustainable development, structural and sectoral adjustment lending may need to rise. Given these possibilities, it is feasible to project investment in natural forest development on the order of US\$1 billion in the medium term.

Any set of actions that the governments of the region and development assistance agencies attempt will inevitably fail to satisfy all interested actors. The Bank's sectoral support, and its analysis of sectoral and related issues, should proceed from the premise that unless all the constraints described in this paper are seriously addressed, all of the goods and services provided by the forestry sector are threatened. Work also needs to proceed from recognition of the fact that the forestry sector is continuously undergoing changes and development on the basis of its internal dynamics as well as impacts from other sectors and external factors. Because of this, it is impossible to identify and resolve all the issues constraining forest development immediately. An ongoing, iterative process of dialogue, analysis and investment with committed governments is the only path to sustainable forestry.

Box 3

Investment Priorities in the Forest Deficit Group

The group is defined not merely by low per capita domestic wood supply, but by constraints on any solution other than creating more domestic wood supplies. Restrictions on foreign exchange apply in most, which mitigates against importing wood and, in addition, most wood consumed in these countries goes for low value uses such as fuel and building materials. Most Bank lending for forestry in Asia to date has been in the deficit countries, and this is unlikely to change in the near future.

India has a per capita forest area of only 0.05 ha. Although a pioneer in social forestry, forest resources are still declining: FAO estimates a deforestation rate of 0.3% per year but combined with severe degradation of forested area, is undoubtedly faster. An inappropriate policy framework and weak institutions are the major constraints to reforestation in India. The sector has been affected by population pressure; below market pricing of public timber; and command style investments in the processing sector. Government of India's official ban on the further use of natural forests may devalue the resource and hasten its demise. These policies have created a stand-off between forestry agencies and rural communities which must be corrected. The Bank will continue to assist with institutional reforms and developing systems to channel funds and expertise to "grass-roots" organizations.

The Bank Project in Maharashtra, for example, will deal with state-wide policy and institutional reform. Investments are linked to: (a) changes in policies and regulations related to land allocation, ownership of trees, transit fees, cutting restrictions, and below market prices which are constraining the sector; (b) reform of public administration and establishment of the framework for local participation; and (c) improved technologies.

Sri Lanka is already far advanced in sector reform. A master plan identified the following areas for investment: staff development and institution building; resource information; and forest management planning. Subsequent Bank investment has focussed on intensification of management, including upgraded environmental awareness and biodiversity. Problems remain regarding performance of public institutions and a policy on marginal lands. Future lending will focus on these issues, expansion of the resource base, and further improvements in natural forest management.

Bangladesh also has many of the sectoral problems as India. Current lending supports a comprehensive resource data base; reassesses demand for forest products; helps reform policies and institutions and to improve sectoral decision-making.

Nepal has major land-use problems in the middle hills region due to erosion and land degradation. Past lending in Nepal has concentrated on community forestry and under new policy guidelines passes control of the forest resource to local communities. Future lending will focus on the Terai, where displacement of forest by farming communities has become a serious problem. Institutional development, as well as direct investment in community forestry, will be critical to this program.

Pakistan, like India and Bangladesh, faces the need for significant reforms in institutional structure. Intensified agricultural development in areas near the remaining forest resource will be essential to relieving demand for forest land.

China. Wood shortages are severe and a major constraint in the construction sector. After several failed attempts in the early and mid-1980s, the government launched a massive plantation establishment program. By 1988, this program, supported by a Bank was establishing 4.5 million ha of plantation annually, combined with a major research program focussed on productivity of commercial species. In addition the institutional setup has been designed to implant a small and efficient organization into the forest administration at national, provincial and county levels.

Further investments in China will be based on sector reviews and studies initiated in three provinces under the Bank-supported National Afforestation Project. The country needs assistance in strategic planning and economic analysis of forestry issues and in restructuring sectoral processing and marketing. In addition harvesting systems and infrastructure need to be modernized, to channel funds and expertise into the sector, regulatory constraints need to be removed and incentive systems revamped. If the investment climate can be improved, substantial funds and expertise will encourage international investors to engage in expansion of plantations and processing industries. Joint ventures would greatly facilitate access to foreign capital and know-how.

Box 4

Investment Priorities in Forest Surplus Group

Seven countries--Fiji, Indonesia, Malaysia, Myanmar, Lao PDR, Papua New Guinea, and the Solomon Islands have significant areas of primary tropical rainforests remaining and are capable of exporting wood in significant quantities. Bank involvement in these countries will focus on maximizing the area retained as functioning forest cover and on preserving adequate areas for biodiversity, habitat, catchment and traditional populations.

Countries with large forest tracts will continue to use large areas of tropical moist forest for production. The Bank will assist replacing wasteful and destructive practices with more sustainable and environmentally sound ones. This will be done in the context of the Bank Forest Policy guideline which precludes the Bank from any direct investment in logging in primary tropical moist forest. However, it will involve participation in the design and management of environmentally sound harvesting systems in areas which are to be managed on sustained yield principles.

All countries in this group share some basic management problems:

- (a) poor compliance with logging concession terms and conditions, due to lax control, if any, over logging operations in areas designated for production;
- (b) inappropriate incentive, pricing and institutional policies that impede forestry agencies from planning and managing the resource sustainably;
- (c) inadequate commitment and capacity to define and manage protection and conservation areas;
- (d) unresolved problems of land-use classification and jurisdiction; and
- (e) weak coordination of forest industry and trade policies.

In some cases, these problems are exacerbated by a lack of effective mechanisms to involve local communities--tribal owners, shifting cultivators or encroaching agriculturalists--in managing their resources.

The most recent Bank-assisted project in Indonesia bridges a detailed sector study and a larger-scale investment. It assists with a plantation development plan, definition and establishment of conservation areas, specific inputs and research and management planning. Unlike the conventional alternative of expanding government forestry agencies to handle these tasks, if successful, it could demonstrate the use and effects of privatization.

Major features expected of Bank investment in countries with tropical moist forest are:

- (a) Price and Revenue Policy Reform. Significant changes are required in the methods of wood pricing, marketing and sale to ensure full revenue and rent recovery as means to encourage environmentally sound use of the resource. This requires the redesign of revenue-sharing formulae to ensure that governments and forest communities develop interest in sustainable management.
- (b) Inventories and Planning Management. Even when market signals and incentives encourage sustainability, constraints on implementation remain and will be addressed: inventory work resource data analysis and management planning and monitoring capacity will be featured in Bank lending.
- (c) Conservation and Preservation. Developing processes for identifying areas for conservation or preservation, and in resolving the inherent political conflicts has been slow. The Bank should continue to assist directly during project preparation, through coordination of grant funding for area definition, and in lending for conservation. Resolving conflicts and achieving consensus on policy can be helped by including policy conditionalities in lending.
- (d) Involvement of Local Communities. Deforestation in the tropical moist forest will not abate unless communities with interest are involved effectively in sustainable management. In Indonesia and Malaysia, specific communities have disrupted forestry activities.
- (e) Research. The Bank will assist, through national and international efforts, in expanding the scientific basis for management of mixed tropical hardwoods and for high yielding plantation establishment and management.

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