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Asia-Pacific Forestry Commission

State of forestry in Asia and the Pacific – 2003

Status, changes and trends

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
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FOREWORD

Forestry is a sector undergoing dynamic evolution in a rapidly-changing world. At the same time, public attention is focused, as never before, on a broad spectrum of forestry issues that is encompassed in the term *sustainable forest management*, but stretches across a range of diverse topics, initiatives and perspectives. Under these circumstances, it is imperative that information that documents the current status and key dynamics of change is readily accessible to decision-makers and stakeholders in the sector.

Since 1995, FAO has published five editions of its flagship forestry report, *State of the World's Forests* (SOFO). In partnership with its regional forestry commissions, it has also conducted a series of comprehensive outlook studies, including the *Asia-Pacific Forestry Sector Outlook Study*, published in 1998. This report, *State of forestry in Asia and the Pacific – 2003*, provides a bridge from the global focus of SOFO and across the five-years since the publication of the Outlook Study.

State of forestry in Asia and the Pacific – 2003 endeavors to present a broad summary of policy relevant information and data. Its purpose is to provide policy-makers, civil society and those who derive their livelihood from the forestry sector a comprehensive and objective view of forestry. It particularly highlights the contrasting approaches being adopted by countries across the region in addressing the most pressing challenges confronting the region; including developments in participatory forest management, forest conservation, illegal logging, promotion of sustainable management and institutional restructuring. It documents recent changes in national forest policies and forestry legislation that address these crucial issues.

The report provides a vehicle to capitalize on the willingness of countries in the region to share information and learn from the experiences of others. It is written for a wide audience, including people working in governmental and intergovernmental organizations concerned with forestry policy and programmes, research and educational institutions, private sector and community-based enterprises, and international financial or development organizations. It should stimulate open and informed debate on policy issues, as well as enhance national efforts to improve practices and promote sustainability in forestry. The publication represents an important initiative of FAO to bring about appropriate development in the forestry sector. It is my hope that the report will provide considerable value to planners, policy-makers and forestry stakeholders by facilitating comparative approaches to policy development.

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Thanks are also due to the many people who contributed to an FAO e-mail exercise to identify the most significant developments in the forestry sector in Asia and the Pacific in 2002. This initiative identified many important national developments for inclusion in the publication. The many colleagues in the region who were contacted to provide information on specific issues are also thanked for their assistance.

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ACRONYMS

ACIAR	Australian Centre for International Agricultural Research
ADB	Asian Development Bank
AFP	Asia Forest Partnership
AIC	Advanced Industrialized Countries
APAFRI	Asia Pacific Association of Forest Research Institutions
APFC	Asia-Pacific Forestry Commission
APFSOS	Asia-Pacific Forestry Sector Outlook Study
ASEAN	Association of Southeast Asian Nations
BPKP	Bolisat Phattana Khet Phoudoi
CAF	Chinese Academy of Forestry
CAS	Chinese Academy of Sciences
CBD	Convention on Biological Diversity
CBFM	community-based forest management
CIFOR	Center for International Forestry Research
CITES	Convention on International Trade in Endangered Species
CoP	Codes of Practice
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DENR	Department of Environment and Natural Resources
FAO	Food and Agriculture Organization of the United Nations
ESFM	ecological sustainable forest management
FECOFUN	Federation of Community Forest Users in Nepal
FFPRI	Forestry and Forest Products Institute
FLMA	Forest Land Management Agreements
FORSPA	Forestry Research Support Programme for Asia and the Pacific
FRA2000	Global Forest Resources Assessment 2000
FRIM	Forest Research Institute of Malaysia
FSC	Forest Stewardship Council
FWPRDC	Forest and Wood Products Research and Development Corporation
GDP	gross domestic product
GFMC	Global Fire Monitoring Centre
ICPB	International Convention for the Protection of Birds
ICFRE	Indian Council for Forestry Research and Education
ICIMOD	International Centre for Integrated Mountain Development
ICRAF	International Centre for Research in Agroforestry
IFAD	International Fund for Agricultural Development
IFF	Intergovernmental Forum on Forests
IFSP	Integrated Social Forestry Programme
IIFM	Indian Institute for Forest Management
INBAR	International Network for Bamboo and Rattan
IPF	Intergovernmental Panel on Forests
IPGRI	International Plant Genetic Resources Institute
ISO	International Organization for Standardization
ITTA	International Tropical Timber Agreement
ITTO	International Tropical Timber Organization
IUCN	World Conservation Union
JFM	joint forest management
KPHP	Kesatuan Pengusahaan Hutan Produksi, Permanent Production Forest Management
LEI	Indonesian Ecolabelling Institute
MRC	Mekong River Commission
MTCC	Malaysian Timber Certification Council
NCP	National Competition Policy

NFCP	Natural Forest Conservation Program
nfp	national forest programme
NGO	non-governmental organization
NTFP	non-timber forest product
RECOFTC	Regional Community Forestry Training Center
REFORGEN	FAO World-wide Information System on Forest Genetic Resources
RFA	Regional Forest Agreement
RFD	Royal Forest Department
RFSP	Revised Forestry Sector Policy
RIL	reduced impact logging
RILNET	Reduced Impact Logging Network
RUPES	Programme for Developing Mechanisms for Rewarding the Upland Poor in Asia for Environmental Services They Provide
SAARC	South Asian Association for Regional Cooperation
SFA	State Forestry Administration
SFM	sustainable forest management
SFMLA	Sustainable Forest Management License Agreement
SPF	South Pacific Forum
SPREP	South Pacific Regional Environment Programme
TFF	Tropical Forest Foundation
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNFF	United Nations Forum on Forests
USDA	United States Department of Agriculture
WTO	World Trade Organization
WWF	World Wide Fund for Nature

INTRODUCTION

The Asia-Pacific region is the world's most populous, home to more than 3.3 billion people – more than 55 percent of the global population. Its constituent countries include some of the world's most densely populated, such as Bangladesh and Singapore. Others, such as Mongolia and Australia, are among the world's least populated. Countries such as Japan and Brunei Darussalam are among the world's richest, while Nepal, Cambodia and several others are among the poorest. The Cook Islands and the Solomon Islands have among the highest proportionate forest cover in the world, while Pakistan and Tonga are among the countries with the least forest cover. China and Indonesia have among the world's most extensive national forest areas, while Nauru and Tokelau are among the smallest countries, with the least forest area.

The forests of Asia and the Pacific constitute an immense renewable resource and make a vital contribution to the environment, societies and economies of the region. The countries of the region all advocate commitment to principles of sustainable forest management (SFM), although many are struggling to translate this commitment into meaningful action. Several Asia-Pacific countries are leaders in implementing participatory forest management. Many have recognized that very high population pressures mean that effective SFM can only be implemented if communities and key stakeholders are strongly involved in forest management and decision-making. At the same time, rigid cultural and bureaucratic structures invoke considerable inertia in the face of otherwise rapid change. Institutions and groups that have historically controlled forest management have generally been loath to give up the economic benefits, power and prestige that accompany these responsibilities.

The Asia-Pacific region is, consequently, characterized by diversity – in cultures, in politics, in economies, in ecologies and environments, and in the key national challenges to be faced. But, at the same time, the countries of the region are strongly linked through the aspirations of their people and through recognition that globalization requires a unified Asia-Pacific community, in order to maximise prosperity and ensure the perspectives of the region are clearly heard.

During the past decade, FAO has produced a biennial publication, *The State of the World's Forests*, which reports on the status of forests, recent major policy and institutional developments and key issues concerning the forestry sector. FAO is also collaborating through its regional commissions to produce a series of regional outlook studies originating with the *Asia-Pacific Forestry Sector Outlook Study (APFSOS)* published in 1998. The foreword to the APFSOS notes that:

For some time, FAO had been concerned that, while the forestry situations in selected countries were well documented and global analyses regularly assessed the forestry situation at macro levels, many of the complex relationships at regional levels were being overlooked and under-appreciated. Consequently, understanding of many of the more subtle – though no less important – dynamics of the sector was being affected.

The objectives of this *State of Forestry in Asia and the Pacific* are, consequently, to review and update the status, trends and changes in forestry in the region, as well as to present an Asia-Pacific perspective on major issues affecting the forestry sector. It also seeks to link analysis of national and global dynamics – as envisaged in the APFSOS study.

The Asia-Pacific Forestry Commission (APFC) meets in formal session every two years. The nineteenth session of the Asia-Pacific Forestry Commission was held in Ulaanbaatar, Mongolia in August 2002. Preparatory to the meeting, member countries were asked to submit national reports documenting status, trends and key changes in forestry. This document has been prepared on the basis of information contained in these national reports, complemented by FAO reports and statistics and information from other sources.

FOREST RESOURCES

Overview

The Global Forest Resource Assessment 2000 (FRA2000) (FAO, 2001) estimates the total area of forests in the Asia-Pacific region[1] to be slightly less than 700 million hectares. Thus the region has around 25 percent forest cover and constitutes 18 percent of the global forest estate. An additional 507 million hectares is classified as "other wooded land", comprising low shrubs or forest fallow.

Table 1: Forest cover change in the Asia-Pacific region 1990–2000

Sub-region	**Total forest 1990 (1 000 ha)**	**Total forest 2000 (1 000 ha)**	**Annual forest cover change 1990–2000**	
			Area (1 000 ha)	**Rate of change (%)**
South Asia	77 644	76 665	-97	-0.1
Insular SE Asia	147 442	131 018	-1 642	-1.2
Continental SE Asia	87 761	80 896	-686	-0.8
North Asia	171 171	188 583	1 741	1.0
Advanced industrialized countries	188 962	186 566	-240	-0.1
Pacific Islands	36 356	35 138	-122	-0.3
Asia-Pacific region	**709 336**	**698 866**	**-1 046**	**-0.1**

Data source: FAO, 2001

The most extensive forest areas in the region are in North Asia and the Advanced Industrialized Countries (AIC) (Table 1), with China and Australia dominating forest area statistics in these sub-regions. However, both of these countries have extensive areas of relatively sparse forest cover. The dense forests of Insular Southeast Asia have a total biomass that is 50 percent greater than forests in AIC countries and 68 percent more biomass compared with North Asia. The Pacific Islands, with 65 percent forest cover and Insular Southeast Asia (53 percent) have the highest proportion of land under forest, while the AIC (22 percent), South Asia (19 percent) and North Asia (17 percent) have relatively low forest cover.

[1] The Asia-Pacific region is defined in this publication as the area bounded by the member countries of the Asia-Pacific Forestry Commission. The region extends from Pakistan in the west to the International Dateline in the east, and from China, Mongolia and Japan in the north to Australia and New Zealand in the south.

Total forest area in the Asia-Pacific region declined by 10.5 million hectares during the 1990s, with an annual rate of change of -0.1 percent. Nine countries in the Asia-Pacific region reported annual deforestation rates greater than 1 percent for the period 1990–2000. In percentage terms, forest cover loss was most severe in several smaller countries such as Micronesia, which lost almost half its forests in the past decade, and Samoa, where forest cover declined by an average of more than 2 percent per annum.

Insular Southeast Asia was the sub-region with the highest rate of forest area loss, with major forest fires and clearance for agricultural purposes the most significant contributors to deforestation. Continental Southeast Asia also experienced substantial rates of deforestation. Conversely, North Asia's forest area increased by 1.0 percent during the 1990s, largely as a result of major afforestation efforts in China. A number of countries have introduced logging bans and/or export restrictions to control deforestation and promote conservation. China, New Zealand, Philippines, Sri Lanka, Thailand and Viet Nam are among the countries of the region that have imposed bans on logging of natural forests in selected areas or nation-wide.

Table 2: Current importance of forest resources in Asia and the Pacific

	More than 10 million ha of forest in total		**Less than 10 million ha of forest in total**	
	More than 40% forest cover	**Less than 40% forest cover**	**More than 40% forest cover**	**Less than 40% forest cover**
More than 0.6 hectares of forest per person	Papua New Guinea Indonesia Malaysia Lao PDR Myanmar	Mongolia Australia	Solomon Isl. Bhutan Brunei Cambodia Fiji Cook Islands Palau	New Zealand New Caledonia Vanuatu Samoa French Polynesia, Niue East Timor
Less than 0.6 hectares of forest per person	Japan	China India Thailand	American Samoa DPR Korea Rep. of Korea	All other countries and territories

Source: Compiled from FRA2000 data

The Asia-Pacific region is home to more than 3.3 billion people, or more than 55 percent of the global population. The diversity of the region can be emphasized by comparing the forest areas in the Asian portion of the region, where forests total 0.15 hectares per capita, against Oceania, which has 6.6 hectares of forests per capita. Thus, Asian forests are subjected to the greatest population pressure of any worldwide, while Oceania's forests are under the least pressure. Within both areas of the region, however, the forest situation varies markedly among countries (Table 2).

Forest inventories

The FRA2000 provides a summary table of national information on forest cover in terms of the latest available statistics, the methodologies used in compiling statistics and the compatibility of statistics with FRA2000 methodologies[2].

[2] See FAO 2001, Global Forest Resources Assessment 2000; Annex 3, Global Tables; Table 2. Forest cover – information status.

Compared with other developing regions, Asian forestry statistics are relatively up-to-date, though statistics for Pacific Island countries – especially the smallest island countries – are comparatively dated. For 43 countries in the Asia-Pacific region, 18 countries have compiled forestry statistics since 1995. A further 18 countries most recently compilations of forestry statistics were made between 1990 and 1995. The remaining seven countries compiled statistics prior to 1990. Of these seven countries, five are small Pacific Island nations.

Most countries are using remote sensing technology as the primary means of estimating national forest cover. Mapping methodologies (i.e. remote sensing) are the primary data source for most recent statistics in 20 countries, with a further 18 countries compiling latest statistics based on expert estimates from a variety of data sources (often extrapolations on earlier inventories). Only Singapore has compiled its most recent forest cover statistics primarily through nation-wide field sampling (in 1990).

Most countries recognize the need for regular forest inventories, but capacities for implementation vary widely. Australia, for example, established a National Forest Inventory in 1988 to produce five-yearly "State of the Forest" reports and is currently developing a continental forest monitoring framework to aid in future monitoring and reporting requirements. Conversely, in Mongolia, although the Law on Forests requires a nation-wide forest inventory be conducted every 10 years, the absence of national capacity has created a 23-year lapse since the last inventory. Similarly, land-cover estimates derived for the Philippines in 1997 were merely derived from a model extrapolating data from the 1988 National Forest Resources Inventory Project. This situation constrains policy makers from evaluating the impacts of government policies, strategies, programmes and projects. In Nepal, a decision was announced in 2000 mandating inventory of community forests (based on annual increment), to ensure sustainable management. However, the government already recognizes that the capacity of forestry staff to actually carry out this task is very limited.

In many places where basic inventory data are available, the absence of other key information means the scope for effectively using inventories for planning is limited. For example, Chrystanto and Justianto (2002) notes:

Some progress on assessing forest cover has been made, however, a number of necessary information (sic) *for decision-making purposes are still lacking, for example, reliable information on growth and yield of tropical tree species, also the status of non-timber forest products.*

Only a few countries have implemented discrete national plantation inventories. New Zealand has published 17 editions of its *National Exotic Forest Description* (plantation inventory) dating back to 1983. Australia published its first *National plantation inventory of Australia* in 1997.

Fires, pests and diseases

Forest fires, pests and diseases are important causes of deforestation and forest degradation in the Asia-Pacific region. Information on losses suffered through fires, pests and diseases is scarce, though data on individual occurrences in some countries clearly demonstrate that major losses are sustained on a regular basis, particularly through fires.

In the period 2000–03, major forest fires occurred in Australia (December 2000–January 2001; January–February 2003), Indonesia (July 2001), and Mongolia (April 2000). In

Australia, in 2003 several hundred bushfires burned across New South Wales, Victoria and Australian Capital Territory, with Canberra city badly affected. More than 400 homes were destroyed in Canberra and more than 10 000 fire fighters were involved in combating the blazes. Vast stretches of forests were destroyed in all three states. In Victoria, for example, at the peak of the blaze the fire extended along a front of 2 100 km and extended over more than a million hectares.

Extensive forest and steppe wildfires burned in Mongolia in April 2000. The total area burned was 2.87 million hectares. Fires are estimated to affect 14 percent of Mongolia's forest areas annually. A short growing season and slow tree growth means that these forests may take 200 years or more to regenerate.

Forest fire patterns in Indonesia show a strong correlation with the El Niño climatic effect, and tools and systems have been developed to relate fire risk to this pattern and to implement preventative measures commensurate with risks. Although strongly influenced by El Niño, forest fires – and the associated smoke pollution – are annual events in Indonesia. In July 2001, fires burned in Sumatra and in West and Central Kalimantan. The Indonesian cities of Medan and Pekanbaru were affected by smog, while serious smoke haze was also recorded in Singapore, Peninsular Malaysia, Sarawak and southern Thailand.

Serious forest fires occurred in many other countries in the region. In Viet Nam, for example, thousands of hectares of natural forests in Southern Kien Giang and Ca Mau provinces were burned in one of the worst fires in Vietnamese history.

Table 3: Total burnt areas for countries in the year 2000

Country	**Area** (1000 ha)
Australia	55 951
China	6 277
India	4 713
Myanmar	1 106
Cambodia	383
Nepal	301
North Korea	263
Thailand	197
Indonesia	194
Lao PDR	147
Japan	120
Republic of Korea	53
Pakistan	41
Viet Nam	39
Bangladesh	29
Bhutan	15
Papua New Guinea	14
Sri Lanka	4
Malaysia	3
Philippines	0.4

Data source: GFMC

Asia-Pacific fire statistics compiled by the Global Fire Monitoring Centre (GFMC)[3] are shown in Table 3. A separate set of GFMC data, for selected countries in the region, shows an average total of more than 5 million hectares of forests is burned (in the selected countries) in the Asia-Pacific region every year. The omission, from this data set of *averages*, of large countries such as China, Mongolia, Myanmar, Pakistan and Papua New Guinea suggests that the average total area burned in the region annually is probably closer to 10 million hectares.

People cause most fires in the region. In many developing countries, fires are intentionally set to clear land for agriculture, including oil palm and other tree plantations. The devastating fires in Indonesia in 1997, for example, were largely blamed on farmers and plantation managers clearing land for agriculture and commercial oil palm plantations. In Bhutan, McKinnel (2000)[4] identified the main sources of forest fires, as follows:

- escapes from agricultural or horticultural burning operations;
- lemon grass harvesters;
- cattle herders, both migratory and sedentary;
- travellers (mainly tossed cigarette butts);
- children playing with matches;
- road workers (from fires used to melt bitumen);
- campfires and warming fires;
- deliberate fires caused by villagers either to scare away wild animals or to kill trees for timber and firewood.

In June 2002, ASEAN countries signed a cross-border anti-haze pact under which each country will cooperate in developing and implementing measures to prevent fires and provide early warning systems. The *ASEAN Agreement on Transboundary Haze Pollution* binds member nations to curb smoke from annual forest fires that regularly cover the region in thick haze. A new regional agency – the *ASEAN Coordinating Centre for Transboundary Haze Pollution Control* – will coordinate efforts to fight haze pollution. Member nations have agreed to increase efforts to prevent slash-and-burn practices and to cooperate regionally in fighting forest fires.

Invasive species also have major impacts on vast areas of forest in the region each year. Invasive species have a long history of causing forest degradation, with many APFC member countries being severely affected. Transfer of invasive species commenced almost simultaneously with the beginning of ship-borne trade – with species such as rats inadvertently transferred from their home ranges to new ecosystems.

During colonial periods, large numbers of European plants and animals were intentionally introduced to Asia-Pacific countries, often with disastrous consequences. In Australia and New Zealand for example, the introduction of foxes, cats, rats, stoats, ferrets and weasels has had a detrimental impact on many species of native wildlife. Similarly, the introduction of ruminants such as deer, goats and pigs, throughout the Asia-Pacific region has caused substantial browsing damage in forests. Inadvertent introduction of animals has been equally detrimental. In the Pacific Islands, for example, the introduction of the brown tree snake has eradicated birdlife on several islands.

[3] http://www.fire.uni-freiburg.de/
[4] Cited in Department of Forest Services, Bhutan (2002)

The introduction of plant species has been injurious in a number of cases in Asia-Pacific. Infestations of *Imperata cylindrica* grass extend across Southeast Asia, as well as affecting areas of the Pacific Islands, South Asia and China, and presently cover more than 50 million hectares in Asia. The South American water hyacinth (*Eichhornia crassipes*) has invaded at least 50 countries, smothering waterways, killing off fish and altering ecosystems. In French Polynesia, *Miconia calvescens* was introduced to Tahiti as an ornamental plant in 1937; it now dominates the forests of over two-thirds of that island and has spread to other islands in French Polynesia (Raiatea, Moorea, Marquesas). Introduced to Hawaii in the 1960s, it is spreading rapidly on several islands (Hawaii, Maui, Oahu), and is now regarded as the worst threat to the rainforest watersheds in these areas. Various species of vines and creepers are invasive in the region (e.g. *Merremia peltata*) and particularly inhibit the regeneration of areas of disturbed forests.

Typical of invasive species in recent times is the inadvertent introduction of forest pests such as insects, fungi and diseases. In 1996, forests in DPR Korea were discovered to be harbouring the Siberian pine caterpillar (*Dendrolimus sibiricus*), with more than 4,500 hectares seriously affected (50 percent mortality). Inadvertently introduced crazy ants (*Anoplolepis gracilipes*) are indirectly destroying the rain forest on Christmas Island by exterminating land crabs that play an important role in sustaining the ecosystem.

Efforts to eradicate invasive species are likely to be costly. For example, during the past decade, New Zealand has suffered major infestations of white-spotted tussock moth (*Orgyia thyellina*) and painted apple moth (*Teia anartoides*), requiring extensive spraying programmes in Auckland city (at a combined cost of around US$40 million). The United States, which has suffered widespread infestation by the Asian longhorned beetle (*Anoplophora glabripennis*), Asian gypsy moth (*Lymantria dispar*) and Dutch elm disease (*Ophiostoma ulmi*), has initiated control programmes collectively costing hundreds of millions of dollars. The total economic cost of infestations runs into billions of dollars.

Countries in which potentially invasive species are endemic also face significant economic costs and risks in terms of quarantine measures enacted by other countries against their exports. For example, as a result of recent Asian long-horned beetle introductions into the United States and an increase in interceptions in both Canada and the United States, both countries implemented new plant health import requirements. As of January 1999, all solid wood cargo crating from China and Hong Kong must be heat- or chemically- treated to prevent further introductions of these pests.

Naturally, there is also an enormous range of endemic, or otherwise long-established, pests and diseases that cause enormous damage to natural forests and plantations throughout the region.

NATURAL FORESTS

Forest areas and conversion of forests to other land uses and deforestation

The FRA2000 estimates total natural forest area in the Asia-Pacific region to be 585 million hectares. China, Australia and Indonesia have the largest natural forest areas, with each reported as having more than 100 million hectares, while the Solomon Islands, Brunei and the Cook Islands have the highest proportionate natural forest cover.

The FRA2000 estimates that overall (net) forest cover in Asia and the Pacific declined by slightly more than 1 million hectares per annum during the previous decade. However, this overall estimate includes data for plantation establishment, so the area of natural forest cleared each year was actually around 2.5 million hectares. The forest area of Indonesia, alone, officially declined by around 1.3 million hectares per annum during the past decade (with unofficial figures suggesting an annual decline closer to 2 million hectares), while Myanmar, Australia, Malaysia and Thailand each lost more than 100 000 hectares of natural forest per annum.

Conversion to agriculture continues to be an important cause of deforestation in many countries. In most of the tropical countries there is considerable pressure to extend plantation areas (including forest plantations, coconut, rubber and, particularly, oil palm), cropland and pasture, while shifting cultivation also remains common. Forest harvesting rarely results in direct deforestation, but often causes degradation of forest resources, especially where poor harvesting practices are employed. Moreover, the construction of forest roads often opens forests to encroachment by migrants, who subsequently clear remaining trees.

The experience of Sri Lanka is typical of many Asian countries. Bandaratillake and Sarath Fernando (2002) notes that:

Deforestation and forest degradation are the key issues faced by the forestry sector during the last several decades. The forest resources in Sri Lanka have diminished dramatically during the last century primarily due to expansion of plantation agriculture and conversion of forests to non-forest uses as a result of population growth. The rapid population increase and resultant land hunger and poverty have led to large-scale agricultural expansion schemes and also encroachments of state forest lands and shifting cultivation.…Control of illegal activities (felling of trees and encroachments) in state forests has been a difficult task due to widespread socio-economic problems such as land issues, unemployment and poverty in the country … Shifting cultivation, which is another main cause for deforestation, is still a traditional agricultural practice in some remote villages in Sri Lanka. A considerable extent of secondary forests are cleared every year for shifting cultivation and a large number of people are involved in this activity particularly in the intermediate and dry-zone areas of the country.

The APFSOS study makes the very important point that:

The direct causes of deforestation and forest degradation obscure the underlying causes, which include poverty, inequitable resource tenure, population pressures, greed, corruption, misguided policies and institutional failures. Experience has shown that when these underlying problems are adequately addressed, deforestation and forest degradation decline dramatically.

In general, key policies in most countries continue to give priority to economic growth, with inadequate safeguards against the loss of natural forests. However, priorities are slowly changing through new policies and initiatives such as, for example, Regional Forest Agreements in Australia, the 5–Million Hectare Reforestation Programme in Viet Nam, and Chinese policies to establish compensatory plantations to substitute for natural forest wood production. In part, these policies are a reflection of some lessening in absolute poverty levels in the region, providing scope for greater focus on environmental issues.

Promotion of sustainable management in natural forests

The need for sustainable forest management is clearly recognized throughout the Asia-Pacific region. At present, however, large-scale implementation of sustainable forest management is not a general practice, though a number of countries have made progress.

Forest management plans

The FRA2000 reports that only 13 Asia-Pacific countries (out of 44) provided full, national-level information on areas under formal, nationally approved forest management plans (Solomon Islands and Indonesia provided partial information). The proportion of forest covered by these plans, in each of these countries, varied between 23 percent and 100 percent of forest area. The total area of forest under management plans in these 13 countries totalled 267 million hectares, or 83 percent of the forest area in these countries. Excluding the advanced industrialized countries (Australia, Japan and New Zealand), the area under formal management plans in 10 countries[5] is 82 million hectares, or 60 percent of the forests in those countries.

The area of forest under management plans provides some indication of a trend towards SFM, but needs to be treated with caution. For example, in can be readily argued that in the past (20 years ago – or as a trivial example, 100 years ago) there were fewer plans, but the forests were in better condition. There is often re-entry logging in areas that have plans and areas that are not supposed to be logged (e.g. because they exceed slope restrictions) are logged anyway. It can be argued that plans may actually legitimize forest degradation, because loggers can point out that they are working to a plan. The keys, of course, lie in the quality of plans and the extent to which they are followed.

There are a number of other tools spearheading the drive towards sustainable forest management. These include the development of criteria and indicators for SFM (discussed in the next section), certification, creation of model forests, reduced impact logging (RIL), codes of practice for forest harvesting (CoP) and use of direct incentives for sustainable management.

Certification

Two principal international programmes for certifying sustainable forest management are operational in the region. These are the Forest Stewardship Council (FSC) system for certifying forest management and the International Organisation for Standardization (ISO), which utilizes the ISO 14001 standard for environmental management systems. Forests in 11 APFC countries, totalling 890 000 hectares (two-thirds of these in New Zealand), have been certified under the FSC scheme. Statistics for ISO 14001 certification of forestry activities in the region are not available. As a whole, however, this process is accelerating rapidly, from 250 certifications worldwide in 1995, to almost 37 000 by the end of 2001. More than 14 000 certificates have been issued in the Asia-Pacific region, though most of these are for environmental management in sectors other than forestry. In 2000, ISO 14001 certificates had been issued to 212 companies operating in the wood and wood products sector, globally. Proportionately, this suggests that perhaps 70 forest owners have been certified in the region.[6]

[5] Bangladesh, Bhutan, India, Malaysia, Nepal, PNG, Philippines, R. of Korea, Singapore, Sri Lanka.
[6] http://www.iso.ch/iso/en/prods-services/otherpubs/pdf/survey11thcycle.pdf

Several countries including Indonesia, Malaysia, Myanmar, New Zealand and Australia have established national certification systems or are in the process of doing so. Lembaga Ekolabel Indonesia (LEI) was established in 1998, with the main objective of ensuring sustainable natural resources and environmental management by applying a credible ecolabelling certification system. Malaysia has established the Malaysian Timber Certification Council (MTCC), which is developing a national set of criteria and indicators based on the International Tropical Timber Organization (ITTO) framework. The Council is responsible for planning and operating a voluntary certification scheme. In Myanmar, a Timber Certification Committee is in the process of developing a National Certification Scheme. New Zealand is developing a Verification of Environmental Performance report card system for plantation forests; and Commonwealth and State Governments in Australia have launched an Australian Forestry Standard that would allow forest products to be independently certified.

Reduced impact logging

Reduced impact logging (RIL) provides a promising avenue for improving the sustainability of forest harvesting practices in the region. RIL involves a systematic approach to planning, implementing, monitoring and evaluating forest harvesting to ensure associated environmental damage is restricted or minimized. RIL also substantially reduces wastage of logging residues. The eighteenth session of the Asia-Pacific Forestry Commission, held in Noosa, Australia in May 2000, recommended that member countries continue to share experiences and work together to document and promote RIL guidelines. The Commission also endorsed convening an International Conference on the Application of Reduced Impact Logging to Advance Sustainable Forest Management: Constraints, Challenges and Opportunities, which was held in Kuching, Malaysia in early-2001. The conference emphasized that RIL is an essential component of sustainable forest management and expressed cautious optimism that change and improvement are occurring. The conference called on governments, industry, research institutions and international organizations to cooperate in furthering the adoption and application of RIL. Individual recommendations were made for each of these groups including:

- for governments: provide an enabling environment for RIL and SFM, including provision of secure resource tenure and investment climate, appropriate resource pricing, fiscal incentives and elimination of policies that discourage improved forest management;
- for industry: show commitment to good forest management by adopting RIL and working towards SFM;
- for research institutions: give priority to practical applied research that supports the adoption of RIL practices by timber harvesting organizations; and
- for international organizations: foster development and raise awareness of innovative mechanisms for encouraging the adoption and application of RIL (e.g. certification, forest-based carbon offsets and other payments for the environmental benefits of SFM).

FAO manages the RILNET listserver[7], an e-mail distribution network run under the auspices of the APFC to distribute information, synopses of research results and activities on reduced impact logging. FAO has also arranged study tours to observe and discuss the various aspects of RIL and related forest harvesting and silvicultural practices and is implementing a series of RIL training workshops across the region. FAO is also promoting RILSIM – a software package for financial analysis of conventional logging and reduced impact logging systems. A number of other organizations in the region are also heavily involved in RIL activities. ITTO, for example, has financed projects in Sarawak, Malaysia and East Kalimantan, Indonesia to

[7] http://www.apfcweb.org/Activities/RILNET/rilnet.htm

promote RIL. ITTO is also implementing a project to create a logging school to facilitate the adoption of RIL in the Asia-Pacific region. The activities of the Tropical Forest Foundation (TFF) include collecting and disseminating information, conducting training programmes and developing guidelines training materials and technical procedure manuals in support of RIL. CIFOR also has a significant RIL programme.

Codes of practice

The APFC has taken a leadership role in supporting the formulation of codes of practice for forest harvesting in the region. The principal effort has centred on the development and implementation of a regional *Code of Practice for Forest Harvesting in Asia-Pacific* (Asia-Pacific Forestry Commission, 1999). The Code provides practical guidance toward sustainable forest management, with particular emphasis on timber harvesting in natural forests. Associated activities have included awareness raising, garnering of political support, information exchange, training, and development and implementation of national codes of practice. Most major timber harvesting countries in the region have developed, or are working toward, the establishment of national codes of practice (Table 4). The International Labour Organisation (ILO) and FAO are currently supporting the preparation of the *Code of Forest Harvesting Practices in Community-based Forest Management Program in the Philippines.*

A *Regional Strategy for Implementing the Code of Practice for Forest Harvesting in Asia-Pacific* (Asia Pacific Forestry Commission 2001a) has been developed to provide an overall strategic framework for implementation. Another high priority initiative has been the development of a training strategy to support the implementation of the regional code. Increased attention is also being given to training and research directed toward improving community-based and other small-scale forest harvesting. Political support for the process was enhanced by formal ASEAN (Association of Southeast Asian Nations) endorsement of the Regional Code in 2001.

Table 4: National status in Code of Practice development

Status	Countries
Code of Practice established	Australia, Fiji, New Zealand, Papua New Guinea, Samoa, Solomon Islands (revised in 2002), Vanuatu, Cambodia, Indonesia, Lao PDR, Malaysia (guidelines), Myanmar, Viet Nam, Japan
Code of Practice under development	Bhutan, Mongolia, Sri Lanka, China
Code of Practice planned	Bangladesh, India, Nepal, Pakistan, Republic of Korea
Logging minimal or suspended	Philippines[8], Thailand

Source: APFC, 2001

Model forests

A number of countries in the region are conducting pilot programmes aimed at promoting sustainable management of natural forests. For example, China (Li'nan), Indonesia (Berau), Japan (Ishikari-Sorachi and Shimanto-Gawa), Philippines (Ulot Watershed), Myanmar (Pauk Khaung) and Thailand (Ngao) have established model forests with the purpose of testing and demonstrating SFM. All are working-scale models managed through partnerships of diverse

[8] The Philippines is in the process of developing a code of practice for community-based harvesting.

stakeholders. The International Model Forest Network[9] describes the philosophy of the model forest concept as:

Each model forest is established as a working-scale model aimed at effecting a transition from conventional forest management to management for sustainable forest production and environmental conservation. Each model forest attempts to demonstrate sustainable and integrated forest management, to transfer the knowledge to forest managers and to have the applicable technology applied operationally as applicable. Each model forest is managed through a partnership of stakeholders in the area. Each model forest demonstrates the integrated management of key resources and utilizes state-of-the-art technology and ecologically sound forestry practices.

Direct incentives

A handful of countries provide direct government incentives to promote sustainable forest management. Generally these incentives are targeted at a specific component of SFM, such as conservation or tree planting, rather than at a holistic management system. For example, several schemes are emerging for payment to local people for the protection of natural forests. Viet Nam (Box 1) and China are among countries making direct payments to local people for forest protection.

Box 1: Village Forest Protection Committees in Viet Nam

An inter-ministerial circular, in July 1998 outlines the system of grants available for payment to Village Forest Protection Committees for protecting forests. The circular notes that grants of up to VND 50 000 (US$3.20) per hectare are available annually to protect forest areas from encroachment and deforestation. Where forest regeneration activities are undertaken, up to US$65 per hectare is available over a 6-year period.

Source: Decision N 661/QD-TTG dated 29/7/98

In Sabah, Malaysia, the State Government has implemented a system of Sustainable Forest Management Licence Agreements (SFMLAs) as a means of SFM. Private sector organizations sign SFMLAs to manage forests in accordance with SFM principles for 100 years. SFMLA holders are expected to prepare long-term management plans, employ ecologically friendly harvesting techniques, and undertake enrichment planting, forest rehabilitation and silviculture. SFMLA holders are not permitted to extract timber from their concession until they have complied with all the conditions of the licence. To date, however, most licence holders have not been able to meet the stringent guidelines or to fulfil the conditions.

A recent initiative is an International Fund for Agricultural Development (IFAD) funded programme on Developing Mechanisms for Rewarding the Upland Poor in Asia for Environmental Services They Provide (RUPES)[10]. This programme seeks to enhance livelihood and resource security for poor upland communities through proactive development of environmental transfer mechanisms. RUPES recognizes that many of Asia's rural poor live in strongly degraded uplands, under worsening poverty and resulting in negative environmental impacts on others. However, opportunities exist for local farmers to maintain

[9] www.idrc.ca/ev_en.php
[10] http://www.worldagroforestrycentre.org/sea/RUPES/Index.htm

or restore local agro-ecosystem functions that protect watersheds, conserve biodiversity and sequester carbon. These mechanisms include financial incentives and resource security that promote conservation. In addition, new market mechanisms are also emerging that have the potential to reward the upland communities for good natural resources management.

Progress in the development and implementation of criteria and indicators for sustainable forest management

One of the key global strategies for the promotion of SFM is through the development and implementation of criteria and indicators for SFM as a means of benchmarking and measuring progress towards specific and holistic objectives. Within the Asia-Pacific region, two processes are well established. The International Tropical Timber Organization pioneered the development of criteria for sustainable forest management, with its member countries endorsing ITTO Criteria for Sustainable Tropical Forest Management in 1992. Also in the region, a number of temperate countries are participants in the Montreal Process Working Group on Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests.

More recently, a need has been recognized for a process to develop criteria and indicators for forest ecosystems outside the moist tropical, and temperate and boreal classifications. In particular, efforts have been made to more actively involve countries with substantial areas of dry forests in the development and implementation of criteria and indicators specifically oriented toward the unique features of dry forest management. A *Workshop on National-Level Criteria and Indicators for Sustainable Management of Dry Forests in Asia* was organized by FAO, in collaboration with UNEP, ITTO, USDA Forest Service and the Indian Institute of Forest Management (IIFM) in Bhopal, India, in late 1999. The workshop identified 8 criteria and 49 indicators with particular relevance for dry forests. It recommended that member countries refine and improve the set to fit national ecological, economic and socio-cultural conditions. Guidelines[11] have been drafted for monitoring criteria and indicators in dry forests of Asia.

A number of countries in the region are in the process of developing national criteria and indicators. Several of the tropical countries are utilising ITTO criteria and guidelines as a basis for the development of national criteria and indicators. For example, the ten ASEAN countries are in the process of adapting the ITTO criteria and indicators for their own specific uses. Similarly, temperate countries are adapting Montreal Process criteria and indicators. For instance, Australia has developed, and is implementing, a nationally agreed framework of regional (sub-national) criteria and indicators, based on the Montreal Process structure. The framework provides a coordinated approach for collecting data on forests that facilitates consistent reporting and minimizes duplication.

Other countries note that further assistance is needed to develop criteria and indicators for additional forest types. For example, Wani (2002) notes that:

Criteria and indicators for sustainable forest management (SFM) do not exist for different ecosystems, mountain forests, irrigated plantations, riverain forests and coastal mangrove ecosystems.

[11] Asia-Pacific Forestry Commission (2003)

Forest research on sustainable management

Research and development constitute a critical link in the introduction of sustainable forest management in the Asia-Pacific region. At present, research capabilities and capacities vary enormously at the national level. In most countries research systems are very weak, with inadequate infrastructure and a shortage of qualified personnel. Lacking in proper orientation and direction, research efforts have not kept pace with the rapid changes in the forestry sector. Research systems often function in isolation and insufficient efforts are made to share information or undertake collaborative efforts to deal with common problems. For many countries with insufficiently developed research systems, there is an urgent need for major capacity building in forestry research. This includes assistance in research prioritization, development of research strategies, research planning support, training, increased access to information and supporting the establishment of arrangements to facilitate technology transfer and adaptation.

At the regional level the Forestry Research Support Programme for Asia and the Pacific (FORSPA) and the Asia Pacific Association of Forestry Research Institutions (APAFRI) have attempted to address these deficiencies. As part of their programmes, FORSPA and APAFRI have collaborated in developing *Forest Research Priorities for the Asia Region* (FORSPA 2001)[12].

This publication identifies 8 priority areas that were identified during a regional process of review and consultation, which took place between August and November 2001. These are:

- Forest ecosystem management
- Forest plantations
- Social or community forestry
- Forest conservation and environmental protection
- Non-timber forest products (NTFPs)
- Biomass and wood utilization
- Agroforestry
- Urban and landscape forestry.

Four additional issues that are common to each priority area have also been identified:

- Policies and institutions
- Socio-economics
- Interdisciplinary linkages
- Uptake and impact of research.

A major challenge is to re-focus research activities to ensure they remain relevant to national priorities across economic, environmental and social dimensions. A significant opportunity, and challenge, is to bring private companies, NGOs, foundations and other private sector groups into collaborative research partnerships.

[12] Much of the discussion in this section is drawn directly from FORSPA (2001).

In general, the private sector in the Asia-Pacific region is not closely involved in forestry research and development. The exceptions are countries such as Australia, Indonesia, Japan, Malaysia, New Zealand and the Philippines, which have large commercial enterprises engaged in forestry and forestry research.

Forest Research Priorities for the Asia Region identifies the key elements in developing forestry research in the region as being the strengthening of collaborative linkages across three spheres:

1. Interdisciplinary linkages: research priorities are generally interdependent. Consequently, a key requirement is interdisciplinary contact and communication. Integrated research programmes or adequate allowance for building linkages between more tightly focused research programmes are important in this regard.

2. International linkages and resources. Although some countries in Asia are capable of mounting strong, internationally recognized research in some areas, the majority are dependent on maintaining linkages to regional or international research programmes, especially in terms of access to relevant data and the latest research developments. Opportunities to capitalize on international or regional research efforts need to be sought and encouraged.

3. Policy development/research linkages. Research in priority areas has major policy implications, and the links to policy and decision-making should, where possible, be enhanced and formalized.

Forest harvesting, forest concessions and logging restrictions

A vast number of different systems of forest ownership and management are in evidence throughout the Asia-Pacific region and these tend to strongly influence systems for administering forest harvesting. Of particular interest are systems relating to natural forests, which are variously owned by governments, by communities or individuals, or in a very few cases, by private sector companies. Similarly, harvesting in natural forests is also variously carried out by governments, the private sector and communities, but with private sector companies often having a much more significant role. Plantation forests are generally grown for production purposes (industrial or fuelwood) and their harvesting tends to be less controversial, with less complex environmental and social factors impinging on harvesting.

Several governments in the region have opted to ban, or heavily restrict harvesting in natural forests. In 2001, APFC published an in-depth study on *Impacts and effectiveness of logging bans in natural forests in Asia-Pacific* (Asia Pacific Forestry Commission, 2001b). The study examined logging restrictions in China, New Zealand, Philippines, Sri Lanka, Thailand and Viet Nam. The study noted that the restrictions and modes of implementation differ markedly across countries:

While several countries, notably Thailand and Sri Lanka, have imposed blanket national bans on logging in natural forests, the supporting policy and regulatory measures in each country differ markedly. Other case-study countries have imposed only partial logging bans, covering certain types of natural forests or specific geographic areas (as in China) or a combination of both (Philippines and Viet Nam).…restrictions in New Zealand are based on sustainability criteria and large-scale transfers to the conservation estate.

In Thailand, two Royal Decrees were passed in 1989 to make provision for a nationwide ban on commercial timber production from natural forests. Timber harvesting has been reduced drastically since the implementation of these bans and is now only legally undertaken in plantations and mangroves. Similarly, in the Philippines, Department Administrative Order No. 24 (1991) prohibited logging in old growth forests and on slopes with gradients greater than 50 percent. Logging is still permissible, however, in some second-growth natural forests. In Sri Lanka, timber harvesting is banned in all natural forests. Non-forest wood resources play a major part in wood supplies, with home gardens and rubber and coconut plantations the most important sources of wood.

In Viet Nam, where natural forests have been cleared or degraded during decades of high-impact timber extraction and shifting cultivation, the government has enacted decisions to limit production for a period of 15–20 years to assist forest restoration and rejuvenation. A timber exploitation ban was placed on special-use forests and reserved forests (most natural forests) in 1992, and also encompassed limits on other logging. Commercial logging has been prohibited in the remaining natural forests of Northern Viet Nam, southeast of the South Mekong delta, and in the Red river delta. An annual allowable cut of 300 000 m^3 has been applied since 2000. In New Zealand, Timberlands West Coast, a state-owned corporation is presently phasing out its forest harvesting operations, which comprise the sole concessions operating in state-owned natural forests.

China's logging bans apply only to natural forests in specified regions. The bans, imposed in 1998, cover natural forests in the upper reaches of the Yangtze river, the middle and upper reaches of the Yellow river and the upper reaches of the Songhuajiang river, and in Sichuan, Yunnan, Chongqing, Gansu, Shaanxi and Qinghai Provinces. The logging bans constitute an integral part of the new Natural Forest Conservation Program (NFCP). The specific objectives of the NFCP include reducing timber harvest volumes from natural forests from 32 million m^3 (in 1997) to only 12 million m^3 by 2003 and conserving 42 million hectares of natural forests in areas listed above. Much forest harvesting in China is still carried out by government agencies, but recent measures to stabilize ownership structures have seen forests allocated to local communities for private use and a forest production responsibility system being established. Forests may be managed and harvested by community collectives or leased out to individual families.

Several other countries (not covered in the APFC study) have also implemented substantive logging restrictions. Serious degradation of sal forests on the plains of Bangladesh saw a moratorium on logging imposed in 1972. In 1989, this moratorium was extended to all natural forests, with plans to continue these restrictions until 2005. In 2003, Bangladesh banned all tree felling in its Sundarban mangrove forest. The ban includes felling of timber for firewood.

In Pakistan, catastrophic floods during September 1992 in the north of the country were attributed, rightly or wrongly, to large-scale deforestation in mountainous areas by forestry cooperatives during the previous decade. As a consequence, the government placed a ban on commercial logging of forests in 1993 that continued until December 2000.

In an effort to preserve forest resources in India, the Supreme Court prohibited the Forest Department from harvesting wood in "non-plan" areas (areas that have not been targeted for managed culling and replanting) in 1996. The court also banned the transport of logs from India's northeastern states, requiring all wood shipments be sawn or further processed before transport. In 1997, the Supreme Court ordered the closure of all unlicensed sawmills and wood processing plants, and forbade states from licensing new operations.

In Lao PDR, concerns over unsustainable logging practices and corruption in 1991 led to a Presidential Decree banning logging. The full ban was, however, relatively short-lived. The country stopped issuing concessions for forest harvesting in 1994, but logging is still permitted in areas designated to become hydroelectric reservoirs, irrigation reservoirs, transmission pylons, electricity lines and other infrastructural and rural development projects. Commercial forest harvesting in Lao PDR is carried out almost exclusively by state-owned enterprises such as the Bolisat Phattana Khet Phoudoi (BPKP), a company founded and owned by the Ministry of Defence, or by joint ventures associated with these companies.

Several other countries operate harvesting systems under which only government corporations or agencies carry out harvesting. In Myanmar, the Myanma Timber Enterprise is the sole agency responsible for the extraction and export of teak and other hardwood species. Harvesting and export of hardwoods other than teak was carried out by private sector agencies between 1989 and 1993, but indiscriminate cutting and failure to follow regulatory procedures resulted in the banning of logging by the private sector. Similarly in Bhutan, where a heavy conservation emphasis is applied to forests, the Bhutan Logging Corporation, a government-owned enterprise is responsible for most commercial logging and firewood harvesting in the country.

In Nepal, forest harvesting practices fall into two distinct categories. The first is by government forestry agencies such as the Timber Corporation of Nepal. The other is small-scale, manual harvesting by communities organized as Forest User Group collectives responsible for the management and utilization of community forest areas. In many other small countries in the region, where forestry is a relatively minor economic activity, communities or individuals predominantly carry out harvesting on an *ad hoc* basis. This is notable in many of the small Pacific Island countries, where forests are generally under customary ownership.

Most other countries in the Asia-Pacific use systems based on forest concessions for the management and particularly harvesting of state-owned natural forests. These countries include Brunei Darussalam, Cambodia, Fiji, Indonesia, Malaysia, Mongolia, Papua New Guinea, Solomon Islands and Vanuatu.

In Cambodia, harvesting is generally carried out by the private sector, under concession agreements. At present, 3.8 million hectares or 21.4 percent of the country's total land area has been allocated to concessions. The size of the concessions ranges from 90 000 hectares to 400 000 hectares. In 2000, the government conducted a review of all forest concessionaires to determine compliance with their contracts and Cambodian laws. The review recommended that new contracts and management plans should be drawn up, and that in the interim, a moratorium on harvesting should be imposed. As the result of this review, 22 forest concessions covering an area of 3 million hectares have been terminated.

International efforts to assist Cambodia in controlling logging have also been implemented. A *Forest Crime Monitoring and Reporting Project* has operated in Cambodia since 1999 to provide the government with a mechanism for tracking specific instances of illegal logging from their initial reporting to their final resolution. The World Bank has been funding a *Forest Concession Management and Control Pilot Project* to help resolve controversial issues in concession management and public consultation.

In Indonesia, forest harvesting is based on a well-established concession system, whereby private concessions are granted to private or state companies. In recent times, however, substantial modifications have been implemented or proposed. In particular, a Production Forest Management Unit (KPHP) system is being tested in two provinces, Central Kalimantan

and Jambi. In 1998, the government issued a new policy that limited concession areas to a maximum of 400 000 hectares. As part of the decentralization process, the 1999 revised forestry law gave district heads the right to hand out logging licenses for areas not larger than 100 ha. In June 2002, Indonesia placed a ban on the export of unprocessed logs, and in August 2003 announced a complete ban on logging on Java.

Forest harvesting in Malaysia is also regulated and controlled under well-defined concession systems. Malaysia uses an area control approach, whereby a certain area of forest is designated for harvesting each year. This is done through the allocation of an annual felling coupe, based on resource availability and current forest management practices. For example, the annual coupe for Peninsula Malaysia during the period 1995–2000 was 46 000 hectares. These areas are allocated as forest concessions using a licence tender process.

In Mongolia, the governors of individual districts license forest harvesting. Concession licenses are issued after considering the economic efficiency of proposed activities, including proposed harvesting and processing systems. Licenses are issued to state corporations, timber companies and individuals.

In Fiji, most forestland is under native customary ownership. To harvest timber on native land, a Forestry Right License is required under law. These are negotiated through the Native Lands Trust Board. There are four categories of tenure for timber cutting rights in the natural forests:

- timber concessions (15–30 year period);
- long term licenses (10 years);
- annual licenses; and
- other licences and prepayment licenses (usually for land clearing).

Almost half of Papua New Guinea's accessible forests are already committed to industrial logging and more than 30 proposed timber projects target most of the remainder. In 1999, the government imposed a moratorium on new logging concessions, extensions and conversions, and undertook to review all existing logging licences to ensure that proper procedures had been followed in the forest acquisition and allocation process.

Forest harvesting in the Solomon Islands has been highly controversial during the past 20 years. Logging practices have been criticized for being wantonly destructive, with "high grading" being carried out with little regard for the residual forest or the wider environmental implications of forest degradation. Log harvests have far exceeded the sustainable capacity of the merchantable forests, and most projections suggest these forests will be cut out within the next decade. More recently, the government has made significant efforts to enforce greater control over logging. These efforts have included the development of the National Code of Practice for Timber Harvesting, moratoriums on issuing new licenses have been declared, while some unused licenses have been revoked; and concessions and remissions to logging companies have been stopped.

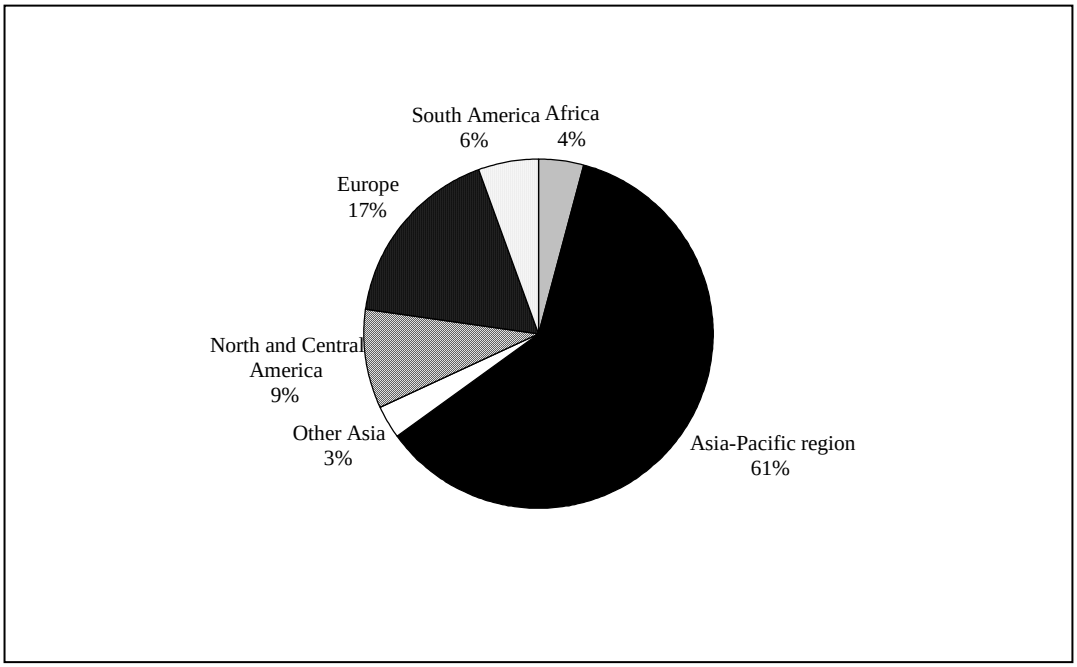
Almost all of the land in Vanuatu is under customary ownership and, as a consequence, day-to-day management of forestlands rests with owners. In practice, most forestland that receives active forest management is leased either as logging concessions, or for plantation establishment. In many cases, forestry is a significant source of cash income for rural dwellers. In 1999, for example, landowners were paid about US$250 000 in royalties for 41 000 m^3 of logs. This money, however, translates to only about one-sixteenth of the retail log value.

FOREST PLANTATIONS

Extent and rate of expansion

Forest plantations presently account for a modest proportion of the total forest area in Asia and the Pacific. The FRA2000 reports the total area of plantations in the Asia-Pacific region to be 113.2 million hectares. This translates to approximately 16 percent of the region's forest estate, a significant component compared with the global average of plantations comprising 5 percent of forests. In terms of global plantation resources, the Asia-Pacific region is an extremely important player, accounting for 61 percent of the world's plantation forests (Figure 1).

Figure 1: Global distribution of forest plantations by region in 2000



Source: FAO, 2001

Equally revealing is the share of the global forest plantation resource held by a small group of countries. Five Asia-Pacific countries rank among the world's top ten plantation countries – China (45.1 million ha), India (32.6 million ha), Japan (10.7 million ha), Indonesia (9.9 million ha) and Thailand (4.9 million ha). Together, these five countries account for 55 percent of the global forest plantation resource and 91 percent of the Asia-Pacific resource.

Total forest planting in the Asia-Pacific region (excluding Japan, Australia and New Zealand) during 1990–2000 was around 34 million hectares (Table 5), a marked increase on the 27 million hectares established during the 1980s. India (averaging 1.5 million hectares per annum) and China (averaging 1.2 million hectares per annum) had the highest rates of plantation establishment in the 1990s. Recent statistics from China suggest plantation establishment has accelerated markedly in recent times. Plantation establishment in 2002 is reported to exceed 7 million hectares.

China's timber plantations comprise mainly *Cunninghamia lanceolata* and a variety of different pine and poplar species. More than 80 percent of China's plantations are planted with industrial species. In Japan, around 45 percent of forests are classified as plantations. The main species are sugi (*Cryptomeria japonica*), hinoki (*Chamaecyparis obtusa*), a variety of pines and Japanese larch (*Larix leptolepis*).

Plantation forests in India have, generally, had a markedly different focus with more than two-thirds of plantations designated "non-industrial", although many have actually been harvested as sources of construction timber. In recent times, much planting in India has been for industrial purposes. India's plantations are dominated by fast-growing hardwoods, particularly, acacia and eucalyptus species. Teak (*Tectona grandis*) is the most commercially important timber species planted, totalling around 1 million hectares. India's new National Afforestation Programme was launched in 2002. The Programme aims to help meet a national target of 25 percent tree/forest cover. In December 2002, the Programme had 227 operational projects covering an area of 375 000 hectares.

Indonesia has planted 3 million hectares of plantations, with the predominant species being rubber (*Hevea brasiliensis*), teak and *Acacia mangium*. Thailand's plantations are similarly dominated by rubber, with teak the second most important species.

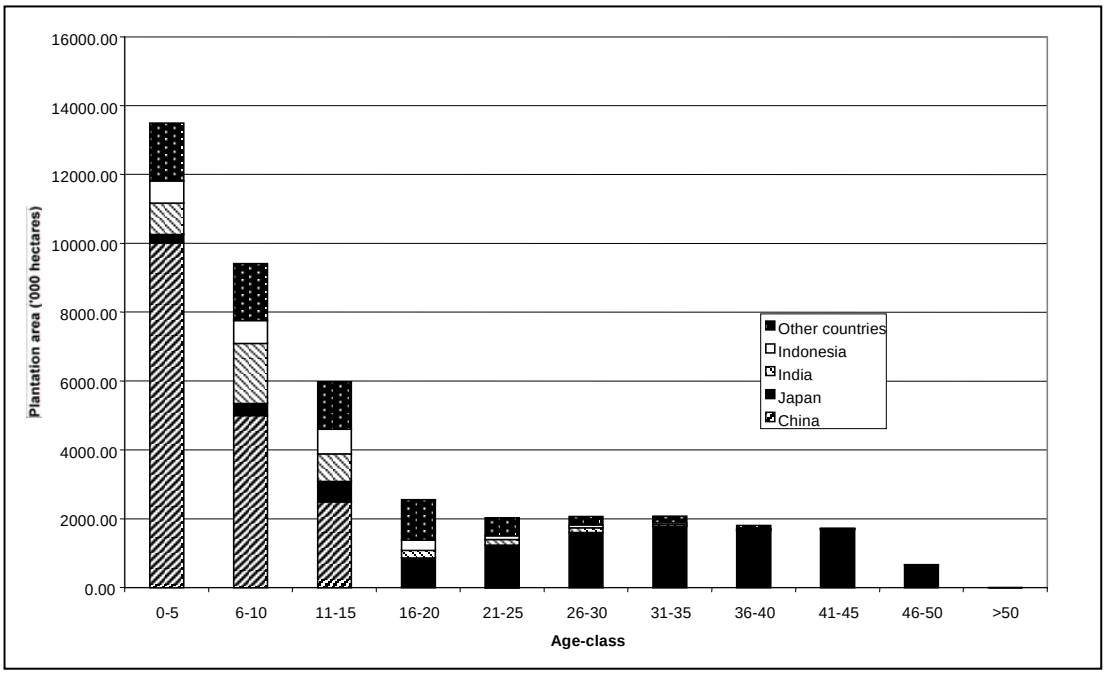
Table 5: Plantation areas by sub-region and species 2000

Country/area	Total plantation area	Plantation area by species group						
		Annual planting rate	Acacia	Eucalyptus	Hevea	Tectona	Pinus	Other
	1000 ha	1000 ha	1000 ha	1000 ha	1000 ha	1000 ha	1000 ha	1000 ha
South Asia	34 652	1 571	6 679	8 341	815	2 713	748	15 356
Insular SE Asia	12 376	336	871	336	5 053	1 520	840	3 756
Continental SE Asia	7 596	351	280	974	2 598	1 152	958	1 634
North Asia	45 083	1 154	129	1 334	592	24	12 909	30 095
Advanced industrial countries	13 267	0	0	0	0	0	0	13 267
Pacific Islands	263	15	8	33	20	7	73	121
Total	**113 237**	**3 427**	**7 967**	**11 019**	**9 078**	**5 416**	**15 528**	**64 229**

Source: FAO, 2001

The majority of Asia's industrial plantations are aged less than 15 years (Figure 2). This is largely the result of a very rapid acceleration in plantation establishment in China, and owing to the short rotations generally used in that country. Japanese plantations predominate in the older age-classes.

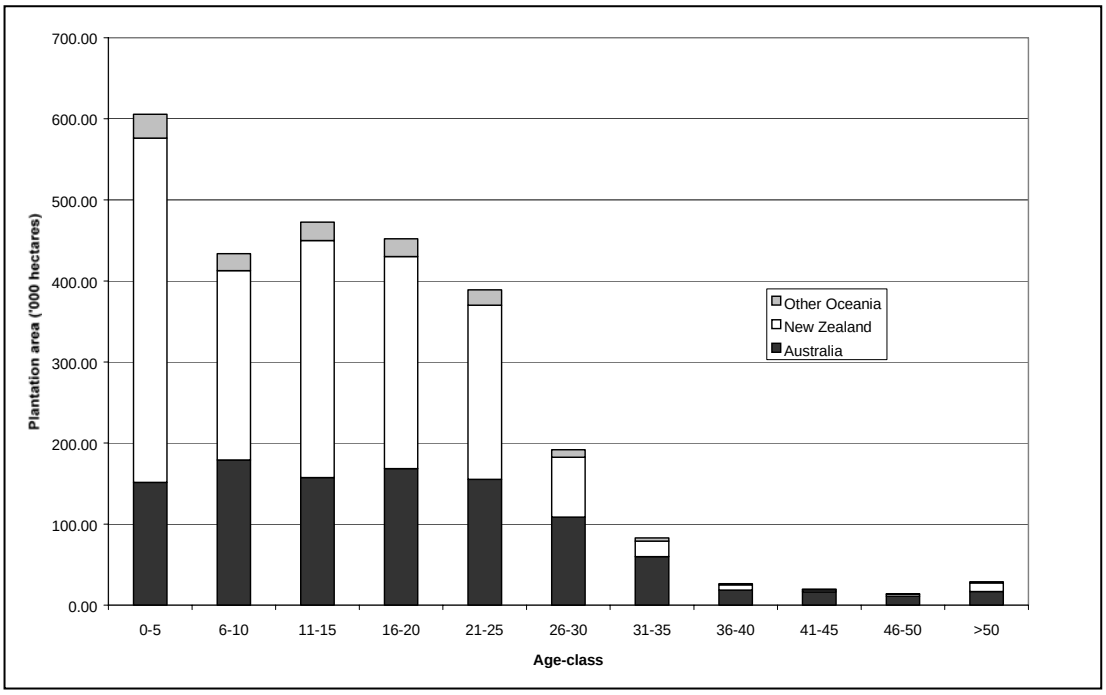
Figure 2: Derived industrial plantation age-class structure – Asia 1995



Source: Brown, 1999

Figure 3 shows the age-class distribution for plantation forests in Oceania. The dominant plantation species in Oceania is *Pinus radiata*. This species accounts for 91 percent of plantation area in New Zealand, and 62 percent in Australia.

Figure 3: Derived industrial plantation age-class structure – Oceania 1995



Source: Brown, 1999

Other pine species, most notably *Pinus caribaea* in Fiji, and *Pinus caribaea* and *P. oocarpa* in northern Australia make up the bulk of the softwood plantations in Oceania. *Eucalyptus* species in Australia predominate in hardwood plantations, although Fiji also has significant areas of mahogany (*Swietenia macrophylla*) and teak plantations.

Both New Zealand and Australia commenced plantation establishment programmes prior to 1930. Significant areas of plantations have reached maturity and are being harvested. Substantial plantation areas in New Zealand and Australia are in second rotation, with a few in third rotations. New Zealand, Australia and Fiji anticipate significant increases in their plantation wood production during the next decade.

Tree improvement and other biotechnology programmes

The basis of successful plantation forestry production lies in effective research and development, based on suitable genetic resources and appropriate silviculture. In particular, major production gains are associated with tree improvement, which can be defined as the utilization and development of species, provenances (seed sources) and individuals that exhibit desirable characteristics (Palmberg-Lerche and Hald, 2000).

FAO has been supporting the exploration, conservation and testing of species and provenances in the Asia-Pacific since the 1960s, when tree-breeding projects were initiated in Bangladesh, India, Indonesia, Malaysia and Thailand. Despite this long history, enormous scope for improvement exists through the application of more sophisticated biotechnologies. Good tree improvement programmes will result in considerable gains in wood yields from tropical and non-tropical forest plantations.

Extensive information on tree improvement programmes in Asia-Pacific countries is available through the FAO REFORGEN Database (www.fao.org/forestry). For example, information on tree improvement programmes in South Asian countries shows that activities relating to improvement of plantation species are relatively extensive in many countries with, for example, more than 100 teak provenances having been tested in India alone, and almost 650 different clones established in seed orchards. In developed countries in the region, efforts in tree improvement are generally even more intensive. Australia, for instance, has implemented tree improvement programmes for 39 species.

In addition to traditional tree improvement programmes, considerable efforts are being devoted to biotechnology research, particularly in more developed countries. Among the most promising biotechnology programmes are those relating to genomic mapping, molecular markers, transformation and micro-propagation. The development of clonal propagation techniques is an important addendum to these, enabling advances to be rapidly transferred into growing stock. In New Zealand for example, research into improvement of radiata pine encompasses a spectrum across genome mapping, gene discovery, genetic modification, molecular breeding, classical tree breeding, vegetative propagation, and developing customized genotypes for specific sites and purposes.

Similarly in Malaysia, tree breeding activities are currently focusing on commercial indigenous species such as *Dryobalanops aromatica*, *Endospermum malaccense*, *Shorea parvifolia* and *Hopea spp*., while exotic species include *Acacia mangium*, *Hevea brasiliensis* and *Tectona grandis*, aimed at increasing the growth and standing volume of timber. Efforts are specifically focusing on identifying elite materials using DNA studies, mass-propagating these materials through tissue culture and extending seed viability through long-term storage.

In countries where tree improvement efforts are less well developed, enhancement of productivity of plantations has been achieved through importing genetically superior planting material, better nursery practices and improved planting and management practices.

Supporting forest plantation establishment

A number of countries have implemented programmes to encourage and increase plantation establishment. In many countries the government's forestry agency is directly responsible for the vast majority of plantation establishment. In a number of countries, however, governments have started to devolve plantation establishment responsibilities to local governments and the private sector.

China has built its enormous plantation resource on the back of several government supported initiatives. The creation of the Three North shelter-forest has, for example, been an exercise in cooperative resourcing. The Chinese Government has provided funds to the programme, and counterpart funding has been provided from local governments and from other stakeholders. Local communities (the programme beneficiaries) have supplied most of the labour.

In the past several years China has implemented four new priority programmes for afforestation and greening that support tree-planting:

1. *Program for conversion of cropland to forest and grassland*: addresses erosion control with a total of 22.7 million hectares of erosion-affected land targeted for conversion by 2010.

2. *Program to combat desertification in Beijing and Tianjin*: aims to improve environmental conditions in the capital by focusing on the problem of sandstorms arising in neighbouring provinces. Forest cover in these areas is expected to be increased from 6.7 percent to 21.4 percent by 2010.

3. *Shelterbelt development program for the middle and lower reaches of the Yangtze river*: this includes further development of the Three North shelterbelt and other areas including coastal areas, the Pearl river, the Huaihe river, and the middle and lower reaches of the Yangtze. The programme involves almost 1 700 counties and plans to establish of 22.7 million hectares of plantations. An additional 71.9 million hectares of natural forests will be conserved and enriched.

4. *High-yield timber plantation development program*: aims to resolve projected wood-supply shortages by establishing plantations to produce 130 million cubic metres per annum.

In India, the Grants-in Aid Scheme operated by the National Afforestation and Eco-Development Board provides financial assistance for afforestation, soil and moisture conservation, and regeneration of degraded forests. Similarly, the Philippines offers loans and tax exemptions to promote the establishment of industrial forest plantations. A common practice is to provide seedlings free of charge, as is done, for example, in Sri Lanka where planting material is provided to farmers and the general public under various Forest Department extension programmes.

Viet Nam initiated the Five Million Hectare Reforestation Program in 1998. This programme aims to re-establish or rehabilitate 5 million hectares of forest by 2010. The programme,

launched to counter the devastating deterioration of the country's forests, represents an urgent attempt to increase forest cover and enhance ecological stability while expanding income opportunities for the rural population. Viet Nam proposes to establish around one million hectares of fast-growing plantations, with most of the remaining area comprising the rehabilitation of degraded natural forest using enrichment planting.

Box 2: Use of enabling incentives – example of New Zealand

Many developed countries, including New Zealand, have begun to pay specific attention to enabling incentives. That is, rather than offering a tangible encouragement, the focus has shifted to removing structural constraints and creating an attractive environment for plantation investment – the so-called "climate of enterprise". The emphasis here is on specific attention to enabling incentives, which are at the top of the broad hierarchy of incentives.

Key measures to maintain private sector interest and investment in plantation development are related to reduction of barriers and removal of structural impediments and operational constraints. Incentives such as good governance, clear tenure arrangements, national security, research and technical assistance, and well-established markets often have a greater influence than direct incentives such as free seedlings, subsidized credit or cost-sharing of planting expenses.

In New Zealand, the development of infrastructure (e.g. roads, railways, modern port facilities, hydro-electric power stations) by government paved the way for large-scale processing initiatives based on plantation-grown timber. These public sector investments provided a tacit assurance to potential planters that the government was serious in developing a viable plantation sector including processing industries.

Source: Enters et al (2003)

In 1997, Australia launched the Plantations 2020 programme, a national strategy for the development of the Australian plantation forestry sector with the aim of trebling the area of Australia's timber plantations to three million hectares.

Australian governments and industry will collaborate to create an environment that will attract the private investment necessary to develop a significant plantation resource, which will enhance the growth in Australia's forest industries and the contribution made by plantations to the Australian economy, rural communities and regional development. The development of both softwood and hardwood plantations will complement the production of wood from native forests managed on a sustainable basis through Regional Forests Agreements.[13]

[13] www.plantations2020.com.au

FOREST POLICY, LEGISLATION AND PLANNING

National forest policies

The development of national forest policies generally centres on needs and requirements for the implementation of sustainable forest management. Asia-Pacific countries recognize the need for sustainable forest management, and for forests to contribute to national development and the benefit of local communities. There is a high degree of commonality in the general thrusts of most national forest polices, though national conditions dictate the specific policy emphasis in individual countries. Topical concerns in forest policy development include deforestation and forest degradation, illegal logging, plantation development, devolution and decentralization of forest management, and conservation. Table 6 identifies the key forestry policies and programmes in Asia-Pacific countries and summarizes the general thrust of each. Most countries have a number of supplementary policies and, in some instances, the basic policy listed in Table 6 has been substantially revised.

Specific changes in forest policies during the past several years were reported to the nineteenth session of the Asia-Pacific Forestry Commission. These include:

- In Bhutan, new forestry priorities have been specified in the 9th Five-Year Plan. These centre on SFM at the community level, efforts to increase community involvement in forest management, and strengthening of the country's extension capabilities. A greater emphasis is also being placed on production forestry to generate employment and income, particularly the development of wood-based industries.

- During 2002, Cambodia adopted the Statement of the Royal Government on National Forest Policy. The policy emphasises conservation and sustainable management as twin pillars supporting sustainable socio-economic development. The policy designates the country's remaining forest resources as Permanent Forest Estate, to be maintained in perpetuity. Community participation in forest management is seen as necessary to ensure food security, poverty reduction and socio-economic development.

- Pakistan has established a National Forest Policy 2002 after a broad consultative process. The new policy focuses on substantive issues related to the economic aspects of forestry, forest health and productivity including preservation of fragile eco-systems, and maintaining forest cover to meet present and future needs. The central plank of the policy is sustainable management of forests, with a special emphasis on preventing damage from illegal activities.

- In India, the National Forestry Action Programme 1999 (NFAP) provides a comprehensive long-term strategic plan for the next 20 years. It identifies the issues and the programmes for achieving sustainable forestry development by harmonising activities of different stakeholders. The plan identifies five programmes: (1) protecting existing forest resources, (2) improving forest productivity, (3) reducing total demand, (4) strengthening policy and institutional frameworks and (5) expanding forest area. Unfortunately, the NFAP remains largely unimplemented owing to budget shortages.

- The Tenth National Five-Year Plan (2002-2007) commenced in Nepal from mid-July 2002. The major forestry priorities include managing and utilising forest resources in a sustainable manner to ensure a balance between the environment and socio-economic development. In keeping with an overall goal of poverty reduction, the plan encompasses

the expansion of community and, especially, leasehold forestry to generate employment for the poor and disadvantaged, increasing private sector involvement in forest management, and the adoption of improved land-use practices. The policy specifies that forest and other wooded land cover should be maintained at 40 percent of national land area. Nepal also released a Revised Forestry Sector Policy (RFSP) in 2000, which emphasises management of the forests of the Terai, Inner-Terai and Siwalik regions of the country. The RFSP provides more specific guidance on the general tenor of the Five Year Plan, with short-, medium-, and long-term objectives.

- Mongolia has implemented a National Programme on Forestry with three five-year phases, running through to 2015. The main goal of the Programme is to develop a national forest policy framework and establish policy-based guidelines for forestry activities. Key objectives are to increase forest protection, promote rational utilization and rehabilitate forests to ensure sustainable economic development and ecological sustainability.

- The key goal in Australia's forest policy is to ensure society obtains a balanced return from all forest uses. For the past several years this objective has been pursued through the development of Regional Forest Agreements (RFAs). The RFA process aims to provide certainty for forest-based industries, conservation and the community through:

  - the establishment of a Comprehensive, Adequate and Representative (CAR) reserve system under nationally agreed criteria;
  - ensuring ecologically sustainable forest management (ESFM) across the whole forest estate; and
  - an internationally-competitive forest industry.

  Once agreements are signed, they are in place for 20 years, subject to five-year reviews. To date, 10 RFAs have been signed, with the most recent covering the Southern region of New South Wales was signed in April 2001.

- The national forest programme process in Indonesia was initiated through Presidential Decree No. 80/2000. Multi-stakeholder dialogue in support of the process commenced in three regions (Sumatra, Kalimantan and Nusa Tenggara) in July 2001. Key imperatives for Indonesia's national forest programme are protection, production and participation. More specific issues to be addressed include:

  - combating illegal logging;
  - forest fire prevention and suppression;
  - restructuring forest-based industry;
  - forest plantation development and reforestation; and
  - decentralization of the forestry sector.

  The government is currently drafting a National Forest Statement to provide a political expression of Indonesia's commitment to achieving sustainable forest management.

Table 6: Overarching national forest policies and programmes in Asia-Pacific countries

Country	Forest Policy	Date	Key policy directions
Australia	National Forest Policy Statement	1992	Ecologically sustainable management of the nation's forests.
Bangladesh	National Forest Policy	1994	Optimize the contribution of forest resources for environmental stability and economic and social development and increase forest cover.
Bhutan	National Forest Policy (draft)	1991	Community participation in forest management while also focusing on the multiple values – economic, social and environmental – of forestry.
Brunei Darussalam	National Forestry Policy	1986	Pursuit of sustainable utilization and management of forest resources consistent with global strategies on bio-ecology.
Cambodia	National Forest Policy Statement	2002	Sustainable forest management, assessment and optimal allocation of land resources, and emphasis on community participation.
China	Forest Action Plan for China's Agenda 21	1995	Lays foundations for the establishment of sustainable, and comprehensive, forest ecosystems and a fully developed forestry industry by 2010.
Fiji	Fijian Forestry Sector Review	1988	Sustainable contribution to economic development whilst encouraging active participation in sectoral development and enhancing environmental conservation.
India	National Forest Policy	1988	Environmental protection with the principal aim of providing environmental stability and ecological balance. Recognizes the role of community in forest management and rehabilitation of degraded forests.
Indonesia	Indonesian Forestry Action Plan	1992	Improved efficiency in production forestry with also a strong conservation/protection focus.
Japan	Nation-wide Forest Plan	1996	Policy directions and guidelines for forest management.
Korea, DPR	No formal nfp		
Korea, Rep.	4th Forest Development Plan	1998	Lay the foundation for sustainable forest management by establishing more valuable forest resources, fostering competitive industries, and maintaining a healthy forest environment.
Lao PDR	National Forestry Action Plan (Strategy in preparation)	1991	Forest protection and increased forest cover through participatory approaches emphasising linkages to food security. A balance between economic and conservation objectives.
Malaysia	National Forestry Policy	1978	Maintain a Permanent Forest Estate with the objective of maximising social, economic and environmental benefits for the nation, in accordance with principles of sound forest management.
Mongolia	National Forestry Statement	1998	Protect and develop the existing forests to ensure their maximum contribution to soil and watershed protection, and the conservation of existing ecosystems, while also meeting needs of Mongolian people.

Myanmar	Myanmar Forest Policy	1995	Focus on enhancing national socio-economic development and ensuring ecological balance and environmental stability.
Nepal	Revised Forestry Sector Policy	2000	Effective forest management through land-use planning, people's participation, sufficient investment, and conservation.
New Zealand	No formal nfp		
Pakistan	National Forest Policy	2002	Sustainable forest management with a focus on economic aspects of forestry, forest health and productivity, and maintaining forest cover
Papua New Guinea	National Forest Policy	1990	Utilization of forest resources to generate economic growth, employment, and greater participation in industry; and to manage and protect forest resources as a renewable asset
Philippines	Master Plan for Forestry Development	1990	General goals of conserving forest ecosystems and genetic resources, while at the same time meeting people's needs for forestry products in a sustainable manner, and promoting the country's overall goals of social justice based on principles of equity.
Samoa	National Forest Policy	1995	Sustainable forest management emphasising meeting basic human needs, forest protection, individual and collective responsibility, and economic development.
Solomon Islands	National Forest Policy	1994	Sustainable forest management; promotion of greater involvement by forest owners in forestry operations; increasing levels of domestic processing; and enhancing economic benefits arising from forestry.
Sri Lanka	National Forest Policy	1995	Safeguarding the remaining natural forests to conserve biodiversity, soil and water resources. Emphasis on retaining the present natural forest cover and increasing the overall tree cover.
Thailand	Forestry Sector Master Plan (draft)	1995	Arresting destruction of biological diversity; rehabilitating degraded watersheds; promoting social justice in forest-based rural development; high degree of self-sufficiency in forest products.
Vanuatu	National Forest Policy	1998	All stakeholders work cooperatively to achieve sustainable forest management, while also ensuring long-run revenue generation, economic development, and conservation of forest biodiversity.
Viet Nam	National Forestry Action Plan	1993	Meet needs for forest products and sustainable environmental protection; increase social and economic benefits through efficient utilization; increase people's participation; and improve the living conditions of the rural population.

Strategies and mechanisms to implement forest policies

While most countries in the region have articulated well-defined forest policies, there remain substantial challenges with implementation. Scarcity of resources, lack of political will, weak law enforcement, institutional weaknesses, shortages of suitably skilled staff and inadequate operational structures all create impediments to effective policy implementation. During the past decade, the principal shift in implementation strategies has centred on substituting participatory forestry practices for traditional centralized forest management strategies. Many countries are moving in this direction, but progress is generally slow.

Forest policy implementation strategies fall in three categories:

1. Regulation and control to discourage particular activities;
2. Incentives to encourage desired activities;
3. Removal of impediments to encourage specific activities.

Historically, Asia-Pacific countries have regulated forest management, mainly by assigning management responsibilities to government agencies and by attempting to enforce strict controls on forest access. The massive, sometimes transient, populations of Asia, along with some traditional tenure systems that have relied on common access to forests have often conflicted with policy initiatives. This has led to a general failure to meet many forest management objectives defined by governments, particularly those relating to conservation and sustainability. While many countries are experimenting with participatory systems, the region generally retains a strong paternalistic approach to forest management. In most countries, government forestry agencies continue to dominate forest management and government officers display high degrees of scepticism over local people's ability to manage forests sustainably and resistance to change towards participatory forestry.

The use of direct incentives has been particularly popular in the region in relation to the establishment of forest plantations. APFC has undertaken a comprehensive multi-country study on the *Impact of incentives on the development of forest plantation resources in the Asia-Pacific region*. Analysis of the case studies identifies several issues common to all countries, including the limited impacts of direct incentives.

The general context and socio-economic environment explain to a considerable extent the effectiveness of direct and indirect incentives and investors' interest in plantation establishment. High interest rates, low wood prices, lack of suitable planting areas and the financial attractiveness of alternative land uses (e.g. oil palm) discourage interest in tree growing by the private sector. Good governance, clear land tenure arrangements, national security and market development attract and empower investors (small- and large-scale). Such indirect or enabling incentives often have a greater influence than direct incentives such as free seedlings or inexpensive credit, which are commonly offered in hopes of stimulating more forest plantation development (Enters et al, 2003).

Some developed countries such as New Zealand and Australia have evolved strong market-based economies with well-developed information systems. The primary roles of governments in forest management have moved towards the creation of policy environments in which desirable outcomes can be achieved through market mechanisms, rather than payment of direct incentives. Such environments require judicious regulation, but also strong government efforts to remove impediments to the private sector and communities (Box 3).

Box 3: Removing impediments to business in Australia

Since 2000, Australia has shifted from a policy of creating incentives for forest industry growth to a policy of removing impediments. This change is underpinned by a number of changes in the institutional environment, including:

- the introduction of a National Competition Policy;
- wide ranging reforms of the tax system; and
- decreases to business tax rates.

A nationally applied policy initiative by the Commonwealth Government is the National Competition Policy (NCP). In the past, many government business activities were able to obtain business advantages over their private sector rivals because of their public ownership, giving unfair market advantage to government owned businesses, regardless of their efficiency. Under the NCP, competitive neutrality principles apply. As such, governments should apply full taxes or tax equivalent payments, debt guarantee fees and private sector equivalent regulation. An essential element of the obligations is that government business activities, like their private sector counterparts, set prices that enable them to earn sufficient revenue to cover their costs, including the cost of capital. This ensures these businesses face the same costs and commercial pressures as their private sector competitors.

Source: Agriculture, Fisheries and Forestry – Australia, 2002

The formulation and implementation of national forest programmes (nfp) as a means of implementing forest policies has been widely recognized in international dialogue conducted under the Intergovernmental Panel on Forests (IPF), the Intergovernmental Forum on Forests (IFF) and the United Nations Forum on Forests (UNFF). National forest programmes encompass a broad variety of strategic frameworks encompassing Forestry Sector Masterplans, National Forestry Action Plans and suchlike.

Many developing countries continue, however, to be constrained in developing national forest programmes by a number of critical factors. These include:

- lack of knowledge on how to address key cross-sectoral and economy-wide constraints to sustainable forest management;
- inadequate knowledge and information on how to create an enabling environment for forestry sector development through the design and implementation of effective forest policies;
- weak capacity of countries to manage and implement national forest programme processes that are participatory, multi-sectoral and country-led; and
- broader constraints related to governance, accountability and transparency of sectoral information.

In response to these challenges, FAO and leading international partners have established the National Forest Programme (nfp) Facility. A major objective of the Facility is to provide direct country-level support, with grant money, to ease the development and implementation of nfps. Facility support has two main objectives. First, it is directed towards developing national capacity to assemble and exchange forestry information and knowledge, with particular emphasis on addressing poverty alleviation and governance issues. A second

objective of the Facility is to stimulate the engagement of civil society in the forestry debate, and ensure the active participation of a broad range of stakeholders in the nfp process.

Box 4: National forest programme implementation in Viet Nam

Viet Nam provides a useful example of how an nfp process can work. Viet Nam launched a Tropical Forestry Action Programme (TFAP) exercise in 1988. The exercise identified seven key issues and constraints:

- deterioration of living conditions for the rural population;
- declining forest cover;
- lack of operational efficiency;
- decline in biodiversity;
- watershed degradation;
- wood imbalances; and
- lack of skilled human resources.

The TFAP exercise proposed four key programmes, relating to institutional strengthening, environmental protection, forest management and integrated land use planning as a means of addressing these issues. A broad range of national and institutional donors offered support in implementing 28 priority programmes. One of the most significant of these was the National Programme for Upland Development, which is still in operation. However, the overall programme has evolved over time to complement transitions in the political, economic and social spheres in Viet Nam. For example, the National Five Million Hectares Reforestation Programme is now a core activity in the country's National Forest Programme.

Source: FAO, 2000

The Facility is already active in several countries in Asia. In Thailand, for example, it is supporting the development of a National Forest Policy. In China, the Facility is assisting in developing new systems for information collection, management and sharing. The Facility is supporting a range of activities in Mongolia including work to integrate the national forest programme into broader strategies, assistance in policy reform including decentralization and institutional strengthening in the sector, and raising awareness of the public at large. Work has also been initiated in the Philippines to assist in strengthening Community-based Forest Management and in Indonesia to assist in the preparation of a National Forest Statement.

Forest legislation

Most countries in the region have numerous policies, laws and programmes aimed at regulating and orienting the use of forests and the development of forestry activities. Some of these are outdated and, even more significantly, execution, control and monitoring are frequently deficient, reducing the effectiveness of legislative and planning efforts. For example, Bandaratillake and Sarath Fernando (2002) notes that, despite efforts to address shortfalls in legislative structures, out-dated forest legislation is a major challenge in implementing a holistic approach to forest management in Sri Lanka:

The glaring deficiency is that the existing laws do not address all the main issues. Thus the legislation does not adequately support the policy. As legislation is the most important tool in translating policy statements into action, if proper laws are not implemented or enacted, it is unlikely that the policy objectives can ever be achieved.

Similarly, in the Philippines, failure to enact the Sustainable Forest Management Bill means the sector continues to be governed by outdated legislation (Presidential Decree No. 705 issued in 1975). Thus while policymakers are strongly cognizant of the need for comprehensive legislative reform to tackle the problems besetting the forestry sector, an impasse over whether to allow commercial logging in the remaining natural forests has stalled implementation for more than a decade. Thailand's proposed Community Forestry Bill has been stalled for a similar length of time over controversies such as whether people should be allowed to continue living in protected forest areas.

Most countries are making efforts to modernize legislation to support economic, social and environmental policy frameworks. Significant new legislation enacted during the past several years includes:

- In Australia, a Regional Forest Agreements Act 2002 came into effect in May 2002. It provides legislative commitment to the Commonwealth's obligations under the RFAs and ongoing support for the implementation of an Action Agenda for the Forest and Wood Products Industry, through the Forest and Wood Products Council. The Action Agenda, launched in September 2000, is a government-industry programme to maximize sustainable and profitable activity for tree-growing, value adding and marketing of Australian forest and wood products.

- In Bangladesh, a major amendment to the Forest Act was enacted in 2000. This amendment incorporates social forestry aspects into the governing forest legislation. There remain, however, significant challenges in developing a legislative environment that encourages private tree growers to the extent desired.

- Forest and Nature Conservation Rules 2000 have been formulated in Bhutan to support the implementation of the Forest and Nature Conservation Act 1995. The new rules deal with:

  - management of production forests;
  - private and community forestry;
  - timber production and trade;
  - management of protected area systems; and
  - land clearance on government and private land.

- Illegal logging has been a legislative focus in Cambodia in recent times. In January 1999, the government issued Declaration No. 1 on Measures to Management of Forest and the Elimination of Forest Illegal Activities. This Declaration cancelled all permissions to establish new sawmills throughout the country, in order to eliminate the utilization of illegal wood supplies. Only wood processing mills belonging to forest concessions and their subsidiaries are allowed to operate. In 2002, the Government of Cambodia introduced a new Forestry Law to define the framework for management, harvesting, use, development and conservation of the forests in Cambodia. The principal objective of the Law is to ensure the sustainable management of forests for their social, economic and

environmental benefits, including conservation of biological diversity and cultural heritage.

Box 5: Key aspects of Cambodia's Forestry Law 2002

The Forestry Law 2002 provides a comprehensive framework for management in the Cambodian forestry sector. The law vests forest management responsibilities under the general jurisdiction of the Forest Administration of the Ministry of Agriculture, Forestry and Fisheries. It also provides a structure for the Forest Administration incorporating a hierarchy of regional and district levels. It formalizes a participatory approach to decision making in forestry and requires the preparation of Environmental and Social Impact Assessments for major forest ecosystem activities.

The law structures Cambodian forests into a Permanent Forest Estate comprising:

- *Production Forest* – maintained in a manner to allow for the sustainable production of timber products and NTFPs;
- *Protection Forest* – maintained primarily for protection of the forest ecosystem and natural resources (local communities retain customary user rights to collect timber products and NTFPs within the Protection Forest);
- *Conversion Forest* – forest for other development purposes. This is idle State land, comprising mainly secondary vegetation, not yet designated for use by any sector. It is temporarily classified as Permanent Forest;
- *Private Forest* – maintained by the owner of the land with the right to manage and develop, harvest, use, and sell and distribute forest products.

The law establishes a National Committee to Prepare and Implement Forest Policy. The law also requires the preparation of a National Forestry Management Plan. The law establishes rules for forest concession management including bidding processes and requirements for management planning and rules for management of non-concession forests. Rules for management of Community forests are also incorporated including provision for communities that traditionally practice slash and burn agriculture to continue on community land provided the activity is registered with the State and authorized as part of a community forest management plan.

The new law establishes export quota arrangements for timber products and NTFPs.

Source: Royal Government of Cambodia

- The Government of Indonesia controls, regulates, and manages the nation's forests under provisions and regulations enshrined in Act No. 41/1999 Concerning Forestry (which replaced of the Basic Forestry Law of 1967). This law is the primary source of authority and guidance for all forest administration and regulation and forms the legal basis for forest land-use planning. Act No. 41 enables forest areas to be classified and delineated according to their intended functions, (e.g. protection, production, nature reserve and recreational purposes). Indonesia has also enacted Act No. 22/1999 on Regional Governance and Act No. 25/1999 on Fiscal Balance between Central Government and Regional Autonomy. These Acts authorize and necessitate decentralization of forest

management and include provisions for institutional restructuring and changes in systems for forest policy development and planning.

- In Vanuatu, a new Forestry Act 2001 lays down some general principles of forestry administration, and sets out the steps for preparation of the Forestry Sector Plan. The new Act sets out rules for access to forest resources, including a requirement for all commercial forestry operations to establish an agreement with the customary owners − either a Timber Rights Agreement, a Timber Permit or a Forestry Lease. Commercial forestry operations will also require a licence to harvest − either a Timber Licence, Mobile Sawmill Licence, Sandalwood Licence or Special Licence. All licensees must pay a forest management charge into a Forestry Project Fund for forestry management, conservation and development purposes.

FORESTRY INSTITUTIONS

Forestry institutions and institutional restructuring

Rapid transformation of forestry in the Asia-Pacific region needs to be reflected in dynamic and flexible forestry institutional structures. A general shift in the region, towards more participatory philosophies, means that forestry departments in many countries have devolved significant forest management responsibilities. The challenge for these institutions is to reposition themselves to remain effective, while ensuring staff acquire new skills to carry out significantly different types of work.

Box 6: Devolution and decentralization defined

There are differing definitions of decentralization and devolution, and the two terms are often even treated as equivalent. It is useful, however, to distinguish between them. Decentralization can be defined as the relocation of administrative functions away from a central location, and devolution as the relocation of power away from a central location. In this sense, power can be equated with the capacity or authority to contribute to decision-making. While decentralization and devolution may occur at the same time, it is quite possible to decentralize administrative functions without devolving the power to make meaningful decisions.

Source: Fisher 1999

Institutional reform in the forestry sector has been extensively debated and discussed in recent years and restructurings of government forestry agencies are relatively commonplace in the region. Governments throughout Asia and the Pacific are creating exciting and innovative opportunities for achieving sustainable forest management and biodiversity conservation by decentralizing authority and responsibility for resource management. Discernable shifts can be seen – away from centralized forestry departments and toward the devolution of forest management responsibilities, to state or provincial agencies, to the private sector, and to community and NGO groups. The trend to decentralize is driven by a range of factors, including efforts to reduce central bureaucracies and cut budgets, a history of government forest management failures, increased economic liberalization and market orientation, and growing commitment to more equitable forest management. While the decentralization trends

are promising, many programmes have encountered major challenges, disappointments and setbacks.

Many institutional structures have been reformed to reflect changing responsibilities. Box 7, for example, describes objectives and challenges for a forthcoming change in the Department of Forestry and Wildlife in Cambodia. Similarly, in India, the forest departments in many states have been reorganized to more effectively implement the objectives of the National Forest Policy 1988. Shifts towards creation of a market-oriented environment and an appropriate legal and administrative framework conducive to people's participation in the management of forestry sector have required significant policy and institutional changes.

Box 7: Institutional reform in Cambodia

Cambodia is in the process of institutional adjustment in line with the recently enacted Forest Law 2002. As part of the process of implementing the new legislation, the Department of Forestry and Wildlife will be substantially reformed. A new four-tiered administrative structure will establish a technical line of control from the central level to the local level. This reform will provide a clarification of authority over forests and result in a more coherent governmental administration of the forest estate. The existing administrative structure, with Provincial and District Forest Offices under direct authority of Provincial and District officials, will be abandoned and Provincial and District Forest Offices will be integrated into the new structure. With the new administrative structure, the Royal Government of Cambodia plans to decentralize ministerial functions to lower level authorities.

The administrative reform will present new professional challenges for the entire institution and personnel at all levels. It will require a comprehensive review of the roles and functional responsibilities of forestry administration. Formal lines of communication and supervision will have to be reviewed, and interactions with other ministries and government departments will have to be redefined.

Source: Savet and Sokhun, 2002

Government agencies need to establish an environment to appropriately balance social, economic and environmental goals of forestry. In general, the Asia-Pacific Forestry Sector Outlook Study (FAO, 1998) noted three main roles for forestry institutions:

(a) to establish conditions conducive to forestry development and ensure appropriate, policies, laws and regulations;

(b) to anticipate, identify and prioritize goals and promote their achievement; and

(c) to provide or develop support services such as training, extension, education and research as a basis for increasing or maintaining productivity and competitiveness.

These objectives are driving forces for change in countries in transition towards market economies, several of which are implementing major institutional changes in the forestry sector. China, Mongolia and Myanmar are significant in this regard. In Mongolia, for example, forestry responsibilities were re-organized in 1987, with the Ministry of Forest Industry being abolished and forest management responsibilities assigned to the Ministry of Nature and Environment. Timber harvesting and forest industry development were placed under the Ministry of Trade and Industry. More recently, organizational deficiencies in the sector have been apparent and Mongolia's renewed National Forest Programme has placed a

central focus on structural and organizational changes, including re-establishing a specialist central government agency in charge of forest issues (Nature, Forest and Water Resources Agency, Ministry of Nature and Environment), and establishment of provincial forest offices.

Changes in lines of control for forestry agencies have occurred frequently in the region during the past few years. In several countries, including New Zealand and the Cook Islands, specialist forestry agencies or divisions were abolished altogether, with responsibilities moving to larger entities. In New Zealand, the Ministry of Forestry was merged with the Ministry of Agriculture, in 1997, to create a larger department with more efficient administrative systems. In the Cook Islands, public service restructuring in the mid-1990s saw the discontinuation of the Ministry of Agriculture's Forestry Division, although the Ministry of Agriculture's Planning and Administration Division adopted some forestry responsibilities.

Elsewhere, forestry responsibilities have moved from agricultural or primary industries departments, to agencies with broader environmental scope – and vice-versa. In Sri Lanka, a new Ministry of Environmental and Natural Resources was established in 2001. This ministry is now responsible for all environment related organizations such as Forest Department, Department of Wildlife Conservation, and Central Environmental Authority. In Australia, forestry responsibilities have migrated from the Department of Primary Industries and Environment, to the Department of Agriculture, Fisheries and Forestry – Australia, with dual roles of providing customer services to the agricultural, food, fisheries and forest industries, and addressing the challenges of natural resource management. In Thailand, a new Ministry of Natural Resources and Environment was established in 2002. This organization has assumed responsibility for protected forests, as well as undertaking policy and planning for national parks, watershed management, wildlife conservation, community forestry and fire control. "Economic forests" have remained the responsibility of the Royal Forest Department.

The rapid evolution of principles and requirements for SFM means that forestry institutions have had to undertake major changes in their roles and perspectives. In some cases, this has created a marked dislocation, particularly when government forest management responsibilities have been devolved to communities and/or the private sector. Many government forestry institutions are grappling with the need to acquire new skills or struggling to define their new roles in forestry. For most institutions, devolution and decentralization of forest management responsibilities have resulted in major changes. Many institutions also remain severely under-funded, and in some instances the devolution of forest harvesting responsibilities and revenues has compounded budgetary problems.

Box 8: India establishes a National Forest Commission

A National Forest Commission, headed by a Former Chief Justice of India was established in November 2002. The Commission will operate over a two-year time frame and has a mandate to review, reform and strengthen the entire forest management set up of the country. The terms of reference for the Commission include:

- To review and assess the existing policy and legal frameworks and their impacts, in a holistic manner, from ecological, scientific, economic, social and cultural viewpoints.
- To examine the current status of forest administration and the forestry institutions, both on all India and State levels, to meet the emerging needs of civil society.
- To suggest ways and means to make forest administration more effective with a view to helping achieve policy options.

Changing roles and responsibilities are not confined to government agencies. Institutional change is evident in the private sector, among environmental NGOs and even in forest communities, throughout the region.

The devolution of forest management responsibilities means that the challenge of achieving sustainable forest management "on the ground", is increasingly being shifted to the private sector and to society in general. Private sector companies are often changing their modes of operation in response to changes in community and consumer perceptions. Industry groups have also become more proactive in introducing initiatives such as voluntary codes of practice, in the recognition that self-regulation is preferable to government enforcement. Similarly, many companies have recognized the merits of taking a consultative approach to managing their operations or are required by law to do so. In New Zealand, for example, the Resource Management Act 1991 requires an extensive consultative process prior to establishing new processing mills.

Many challenges still remain, especially where the balance of power is uneven (for example, between private sector companies and tribal groups). Where industry holds advantages in education, resources, understanding and technology there remains a risk of over-exploitation. However, the development of more powerful NGO groups means companies are often held more accountable for their actions. Rogue operators are liable to be held up as critical examples to international audiences, sometimes with significant commercial repercussions.

In countries where communities have a large "hands-on" role in forest management, institutional structures are developing to ensure a coordinated voice in macro-level decision-making. In Nepal, for example, the Federation of Community Forest Users in Nepal (FECOFUN) represents Forest User Groups at a national level. In Pakistan, the Central Board of Forestry was restructured in 2001, into the Federal Forestry Board, with a view to establish a broad-based, multi-stakeholder forum to debate forest policy and sustainable management issues.

Research and education

Forestry research and education is widely recognised throughout the region as a prerequisite for effective management of natural resources. However, this discernment is not normally matched with commensurate effort and organization. Research, education and information systems are variable across the region, dependent mainly on the availability of funding and other resources and facilities. However, without exception, countries invest relatively less in forestry research than in related sectors such as agriculture. Core government forestry agencies in most countries do very little research; most of their resources going into fiscal control and policing work. Extension services are equally limited and often lack even the most basic tools. Few forest departments and research institutes have sufficient critical mass of researchers and generally the researchers lack sufficient training, support and facilities. Even the relatively strong organizations suffer from instability, rapid turnover of personnel, and frequent abandonment of research prior to completion.

Lack of resources is the main constraint hindering research capacities and productivity. However, institutions can do more through reorganization, and better management of talent, time and resources. Most institutions still devote considerable research effort to traditional fields of forestry, in a broad number of biophysical aspects of natural forests and plantations. Few have shifted their emphasis toward policy, environmental and social issues. Instead of focusing energy and resources in areas where they have competitive advantages, institutions tend to undertake an extraordinary number of studies. Often researchers work alone, and the

work lacks inter-disciplinary approaches. As a consequence, results are seldom timely and may have little applicability in the real world. Nor is sufficient emphasis placed on transferring the findings into practice.

With the economic downturn in the late 1990s, state support for research declined markedly. Despite the decline, few research institutions have ventured to develop partnerships with the private sector, nor have adequate collaborative arrangements been made with other institutions to access complementary skills and resources. Networking has not become the norm among most institutions. Nonetheless, the more progressive institutions are proactively addressing these challenges.

India is placing considerable emphasis on forestry research, education and extension. The Indian Council for Forestry Research and Education (ICFRE) coordinates research and has recently developed a National Forestry Research Plan, based on priorities laid out in the national forest programme. ICFRE also oversees forestry education and supports development of curricula at various levels to ensure expertise in different fields of forestry research. Research institutes have been established for each forest ecological zone including tropical forests, dry forests, and montane forests. A variety of other institutions, including the Wildlife Institute of India and the Indian Institute of Forest Management, provide technical support to the State Forest Departments and to private tree growers. The Forest Survey of India monitors the forest cover of the country and publishes a *State of Forests* report biennially. A number of private institutions (e.g. Tata Energy Research Institute) and NGOs (e.g. Ashoka Trust for Research in Ecology and the Environment) are beginning to make credible impacts in forestry research. Many forward-looking ideas in community forestry and participatory processes have been initiated in India.

Bangladesh has eight institutions offering education and training in forestry. Of these, four offer university-level professional education, three technical and one vocational level, education and training. However, staff shortages in terms of numbers, skills and capabilities are common in all government forestry institutions. Increasingly, research emphasis is now being given to conservation of natural stands, non-wood forest products, farm forestry, and improved utilization of products.

In Pakistan, the primary research agency is the Pakistan Forest Institute, which also provides professional training and education in forestry. The focus of research has traditionally been on technical issues, especially related to fast-growing plantation species such as eucalyptus and poplars. Since 1991, however, greater focus has been placed on the social aspects of forestry management. Efforts have also been made to decentralize research, by inviting industry and private sector sponsorship, while also promoting the establishment of regional research centres.

In Nepal, forestry research is consolidated within the Forest Research Division of the Forest Research and Survey Office. The main research objectives are to meet the increasing demand for forest products, halt environmental degradation, and ensure agriculture can be maintained in the mountainous zones. As well as traditional tree research, the FRD also looks into the needs of rural communities, with research in fodder production, agroforestry, and non-wood forest products. Notable advances have been achieved in the field of community forestry and participatory processes.

Bhutan currently has four research centres that address forestry. The country also has long-term cooperative arrangements with several European agencies. There are two institutes providing forest training within the country at two-year diploma level and forest guard level. Credible work is ongoing in participatory research to ensure that results can be implemented.

Additional focus is placed on ecotourism and other non-destructive forms of economic activity.

In Sri Lanka, agricultural and forestry research is managed by the Council for Agricultural Research Policy. Within this framework, forestry research is undertaken by the Forest Department. The priority research areas include tree improvement and propagation, plantations, protection of the environment, forest produce, wood technology and socio-economics.

Forestry research in China is carried out in the State Forestry Administration (SFA), universities and the Chinese Academy of Sciences (CAS). SFA supports research through the Chinese Academy of Forestry (CAF), provincial research institutes (30 provinces), and the Prefectural Forestry Research Institutes (251 research institutes). The CAS is engaged in fundamental forestry research such as applied ecology, water and soil conservation, and taxonomy. The CAF is engaged in a wider range of forestry research issues, and employs nearly 2 000 scientists. There is an emphasis on the transfer of research findings, and over 1 500 forestry extension stations have been set up in the provinces for this purpose.

Until recently, forestry research, extension and community education in Thailand were mainly the responsibility of the Royal Forest Department's (RFD) research divisions. The RFD has since been reorganized, and some of the activities transferred to other agencies. Most of the conservation work, biodiversity and biotechnological research are now with the Ministry of Environment and Natural Resources. Commercialisation work is handled by the Forest Industries Organization. The RFD is still maintaining the traditional research work on silviculture and management. Overall, the emphasis has moved away from natural forests to research on plantations, and increasingly into biotechnology. Kasetsart University has the country's only forestry faculty and trains most of the country's professional foresters.

The Forest Research Institute at Yezin, Pyinmana, undertakes forestry research in Myanmar. A number of externally funded projects are currently assisting research, mainly in the field of managing teak forests. The recently concluded Regional Model Forest Project introduced several improvements in the management of teak forests, including improvements in harvesting techniques and participatory practices.

A decade ago, Cambodia had virtually no forest research capacity. The Forest and Wildlife Research Institute has since been established as the principal forestry research institution. Initial work concentrated on forest management, but has since diversified into community-based natural resources management, biodiversity protection, and participatory processes.

National efforts in forestry research in Laos only began in the late 1980s. Initially, forestry research was undertaken by the Silviculture Division of the Department of Forestry. Forestry research has since been reorganized under the National Agriculture and Forestry Research Institute. With low capacity, both in terms of personnel and facilities, emphasis has been given to applied and adaptive research. The main work so far has focused on evaluation of tree species and provenances for plantations, reforestation, and harvesting.

In Viet Nam, the Forest Science Institute of Vietnam undertakes forestry research. Provincial institutes undertake the implementation of research. Much attention is given to resource creation, and large afforestation programmes have been established. Focus is also being applied to poverty issues, and a variety of community forestry systems are being developed.

In Indonesia, the Agency for Forestry Research and Development (AFRD) under the Ministry of Forestry is responsible for coordinating and supervising forestry research. Forest Research

Institutes are distributed among the various forest ecosystems, and institutes have been set up especially for dipterocarp forests, rainforest and natural pine, semi-arid forests, and the swamp and alpine forests, which undertake a broad and diverse range of research.

In Malaysia, the principal forestry research institute is the Forest Research Institute Malaysia (FRIM). Research functions are also undertaken by the Forestry Departments of Sarawak and Sabah. Two universities, the Universiti Putra Malaysia and the University Malaysia Sabah provide tertiary level education for foresters. Unlike most other developing countries in the region, the Malaysian institutes are well funded and adequately equipped. However, the organization and management of research still needs further improvement. There remains a lack of prioritization, teamwork and inter-disciplinary approaches. Most of the research is still limited to the traditional areas of forestry. Some exceptional work has emanated from the forest products area – for example, whole new industries sprang out of FRIM's work on rubber wood and oil palm fibre.

In the Philippines, the Department of Environment and Natural Resources (DENR) is the primary government agency responsible for forestry research. DENR has six sectoral concerns, viz. forestry, lands, environment, geosciences, parks and wildlife, and research and development. The Ecosystems Research and Development Bureau (ERDB), the research arm of DENR, is responsible for developing an integrated research and development program. Four divisions – Forest Ecosystem Division, Upland Farms Division, Grassland and Degraded Areas Ecosystem Division, and Coastal Zone and Freshwater Ecosystem Division, carry out research.

In Papua New Guinea, the Forest Research Institute was established in April 1989 in Lae with a grant from Japan. This consolidated previously scattered research activities into a single institution. Research is organized along divisional lines of forest management, forest products, botany, and forest protection, with focus gradually shifting towards participatory approaches, community forestry and agroforestry.

Forestry research in Fiji is primarily under the auspices of the Silvicultural Research Division of the Department of Forestry, although Pacific Reforestation (Fiji) Ltd also carries out plantation research, particularly focusing on tree breeding programmes for eucalyptus and acacia species. Fiji Pine Ltd has undertaken valuable work on pines and other plantation species.

In Australia, the Forest and Wood Products Research and Development Corporation (FWPRDC), the Australian Centre for International Agricultural Research (ACIAR), and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) are the main research bodies at the national level. The FWPRDC, as a key initiative under the National Forest Policy Statement, undertakes research and development which advances an internationally competitive, sustainable and environmentally responsible forest and wood products industry. CSIRO is a research leader in Australia and carries out forestry research through its Forestry and Forest Products Division. ACIAR was established in 1982 to assist and encourage Australia's agricultural scientists to use their skills for the benefit of developing countries.

Japan's principal forestry research agency is the Forestry and Forest Products Institute (FFPRI). With the headquarters in Tsukuba, FFPRI has over 120 laboratories distributed throughout the country, covering various fields. The research themes cover elucidation of forest functions, improvement of productivity, forest utilization, new uses of wood, innovative technology and international research cooperation and contribution to world forestry.

In New Zealand, forestry research and development funds are drawn from both the Public Good Science Fund and from forest industry. Forestry research in New Zealand has received considerable scrutiny recently, mainly because it has developed a strategy whereby the industry bears some of the costs of research. Forest Research (formerly NZFRI) is the principal forestry research facility. Several universities provide professional forestry training while polytechnics and accredited private training enterprises deliver operational education and training.

ECONOMIC ASPECTS OF FORESTRY UTILIZATION

Harvest

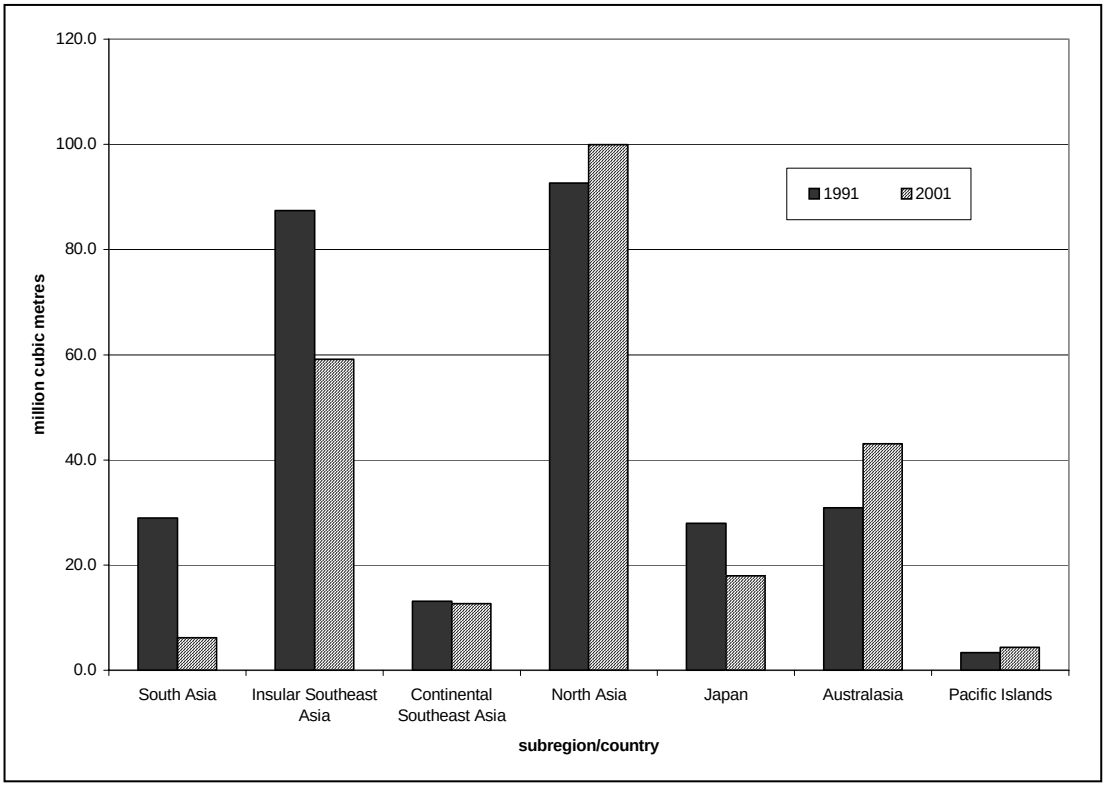
Total roundwood production in the Asia-Pacific region in 2000 amounted to 758 million m^3, or 24.7 percent of global production.[14] Production of wood for fuel in the region totalled 515 million m^3, or 34 percent of global woodfuel production. Roundwood production for industrial purposes totalled 243 million m^3, or 16 percent of the world's total. Coniferous industrial roundwood production in the Asia-Pacific region totalled 113 million m^3, and non-coniferous production totalled 130 million m^3. Industrial roundwood production from forest plantations in the region in 2000 was estimated[15] to be 142 million m^3, which suggests that current production from natural forests is somewhere in the vicinity of 100 million m^3. The majority of industrial wood produced officially[16] (i.e. that is entered into official statistics) in the region is now sourced from plantation forests. There are, however, large volumes of wood harvested, illegally or otherwise, which do not appear in official statistics.

China (287 million m^3) and Indonesia (117 million m^3) are easily the region's largest producers of wood, together accounting for 53 percent of the region's production. In terms of industrial roundwood production, China, Indonesia, Malaysia, Australia, New Zealand and Japan all produced more than 15 million m^3 in 2001. No other country produced more than 5 million m^3. It should be noted that there remains considerable scope for improvement in forest products statistics. Some critics claim, with justification, that actual harvesting in some countries may be twice, or even three-times, as high as official figures, due to reporting discrepancies, inefficient data collection, illegal logging and various forms of corruption that distort the data.

Important changes have occurred in industrial roundwood production levels in sub-regions during the past decade (Figure 4). Among the most evident are significant declines in harvest in South Asia and Insular Southeast Asia, largely as a result of declining harvests in India, Malaysia and Indonesia. Industrial roundwood harvests in these three countries are reported to have collectively declined by slightly more than 50 million m^3 in 2001, compared with 1991 levels. It should be noted that, in Indonesia at least, the problem of illegal logging is sufficiently severe that this decrease can be attributed to harvesting shifting from the legitimate forestry sector to illegal sectors. Otherwise, a significant portion of declining harvests in these countries is primarily a result of tighter regulations on forest harvesting, including a ban on harvesting in most of India's natural forests. These have brought about changes in trade dynamics, including import access in India, and shifts toward the production of higher value products.

[14] FAOSTAT August 2002
[15] Brown (1999)
[16] Statistics quoted in this section ignore "unofficial" wood supplies.

Figure 4: Changes in industrial roundwood production by sub-region

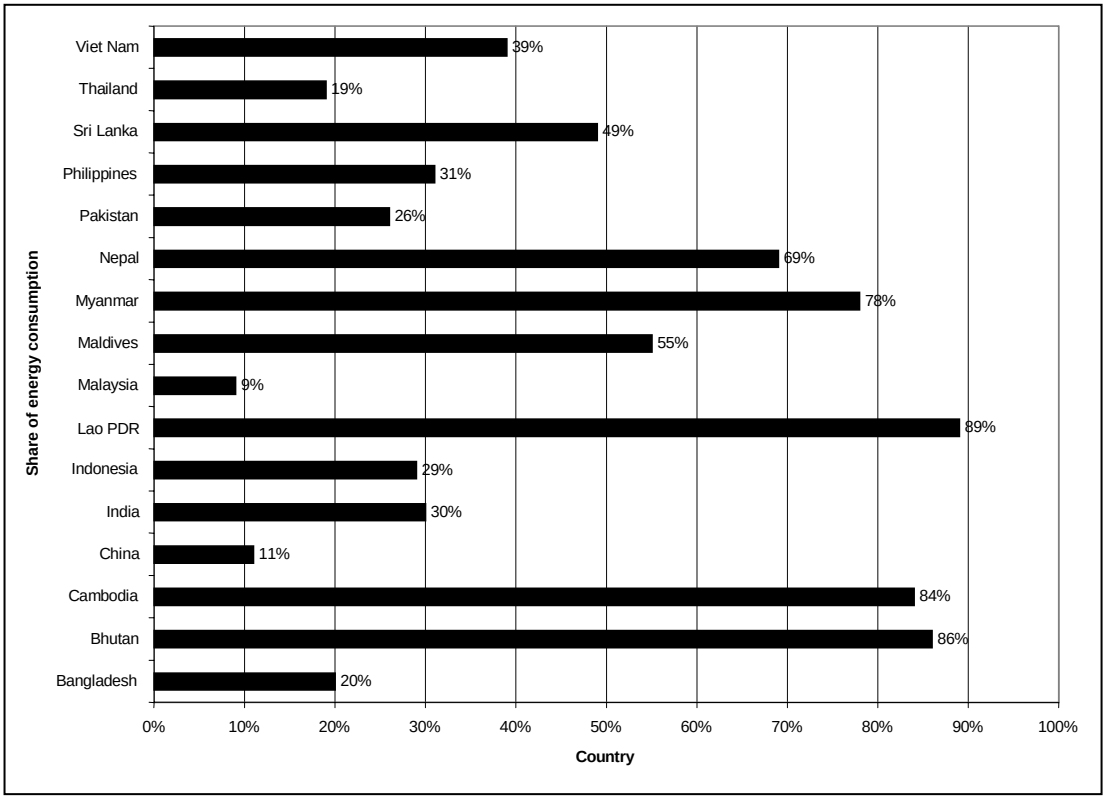


Source: FAOSTAT

The grouping of Advanced Industrialized Countries has been segmented to display Australasia (Australia and New Zealand) and Japan as separate components, highlighting the marked increase in Australasian harvests and a commensurate decline in Japan's harvest. The decline in Japanese roundwood production is primarily due to increasing costs, rendering harvesting uneconomic in many areas. The Australasian industrial roundwood harvest has increased 12 million m^3 per annum during the past decade, and a similar magnitude of increase is expected during the next decade as additional plantations mature. Similarly, the timber harvest in China increased modestly in the period 1991–2001, but this does not reflect a significant substitution of plantation grown timber for timber sourced from natural forests. In the past several years, natural forest harvests in China have declined markedly in response to the natural forest logging bans implemented in 1998. This has had significant effects on forest products trade flows in the region with, for example, China's log imports increasing by around 44 percent in 2002, in tandem with a 33 percent increase in sawn timber imports. During the next decade, plantation timber supplies in China are expected to increase dramatically.

Wood energy contributes a significant portion of the region's total energy consumption, particularly in South and Southeast Asia. Woodfuel production and use are highest in China, India, Indonesia, Philippines, Bangladesh, Viet Nam, Pakistan and Thailand. Woodfuel consumption, as a percentage of total energy use, is highest in Lao PDR, Bhutan, Cambodia and Myanmar, where woodfuel use exceeds 75 percent of total energy consumption (Figure 5).

Figure 5: Share of wood energy in total energy consumption 1997



Source: RWEDP, 1997

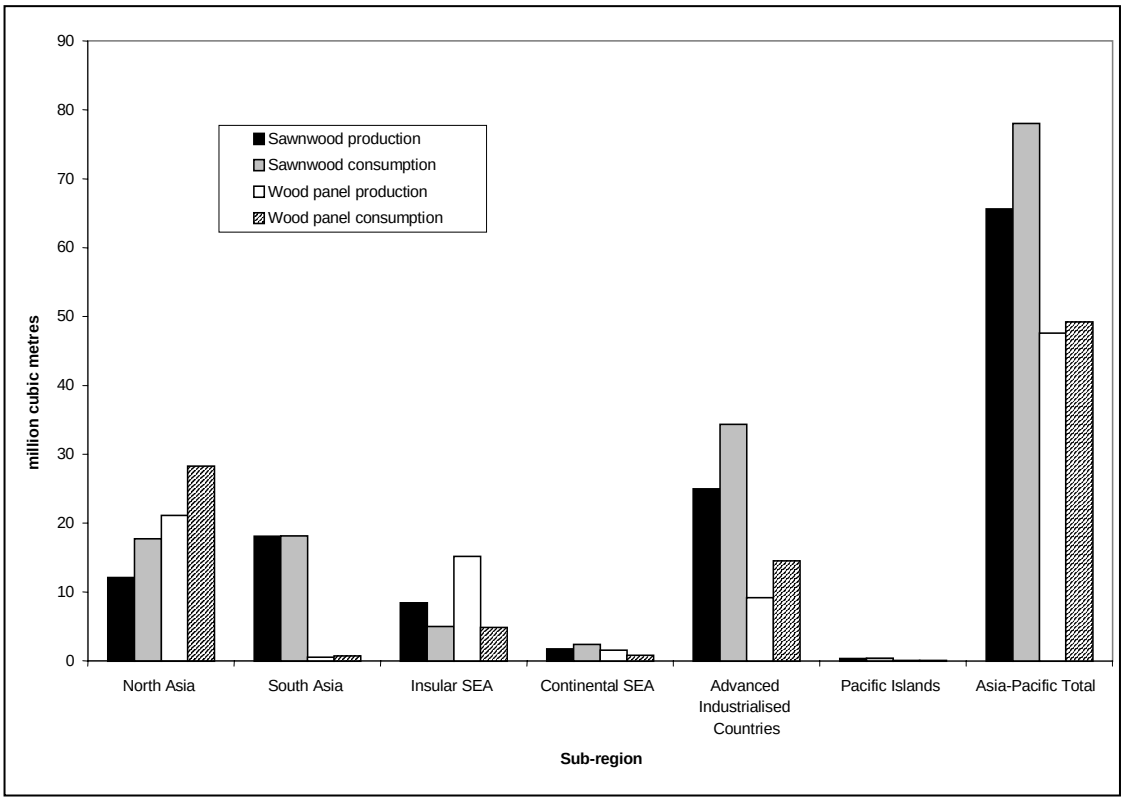
Forest products and industry

Wood processing capacity in the Asia-Pacific region has increased enormously during the past 30 years, but has been more than matched by major increases in consumption of wood products in the region. A large part of industrial production capacity is concentrated in the most developed countries: Japan, Australia, New Zealand, Republic of Korea and Malaysia; as well as those with the largest populations and forest resources: Indonesia, China and India.

Japan (17.1 million m^3) and India (16.3 million m^3) were the largest producers of sawnwood in 2001, together accounting for 51 percent of the region's total production. Most countries in the region produce moderate volumes of sawnwood, with a median production (excluding very small island countries) of around 300 000 m^3. Sawnwood production in the region constituted 13 percent of world production in 2001.

Sawnwood consumption in the region exceeds production (Figure 6), with the balance imported from other regions, dominated by Japanese imports from North America and Europe. The majority of sawnwood consumption is by Japan (27 million m^3), India (16.3 million m^3) and China (12.1 million m^3), which collectively account for 71 percent of Asia-Pacific consumption.

Figure 6: Production and consumption of sawnwood and wood panels – 2001



Source: FAOSTAT

The largest producers of wood panels in the region are China (18.6 million m^3), Indonesia (8.4 million m^3), Malaysia (5.9 million m^3) and Japan (5.7 million m^3). These countries collectively account for 81 percent of wood panel production in the region. There is, however, significant diversity in the types of wood panels produced in each country, with production in Indonesia and Malaysia heavily dominated by plywood and veneer. The majority of wood panel production in China and Japan is also plywood, but these countries also produce large volumes of fibreboard and particleboard. The Republic of Korea and New Zealand are also major fibreboard producers in the region. Thailand and Australia both produce around 1 million m^3 of particleboard, while the Republic of Korea produced around 0.75 million m^3 of plywood in 2001. The Asia-Pacific was the largest regional producer of wood panels in 2001, accounting for 30 percent of global production.

The Asia-Pacific region, as a whole, is nearly self-sufficient in wood panels (Figure 6), although Japan, China and Republic of Korea are all significant importers, collectively totalling 15.7 million m^3 (91 percent of the regional total). These are offset, to a large extent, by exports from a number of countries, most significantly Indonesia and Malaysia, which account for 70 percent of the region's wood panel exports.

Production of pulp, paper and paperboard is mainly confined to a small number of countries in the region. Japan, China, Indonesia, India and New Zealand all produce more than 1 million tonnes of pulp per year, and these countries account for 88 percent of wood pulp production in the region. China and Japan are easily the largest producers of paper and paperboard, although Republic of Korea, Indonesia, India, Thailand and Australia are also significant producers. These seven countries account for 96 percent of the region's production. The region as a whole accounts for 15 percent of global pulp and 30 percent of

paper and paperboard production. The region is the second largest consumer of paper and paperboard behind North America, accounting for 32 percent of global consumption, though per capita consumption in Asia-Pacific is much lower than in North America and Europe.

Domestic and international markets

The contribution of the forestry sector to GDP has declined over the past two decades in most countries of the region. Bhutan, Solomon Islands, Lao PDR, Papua New Guinea, Indonesia and Malaysia are the only countries in which forestry contributes 10 percent or more to GDP. In spite of this, forests play important economic, social and environmental roles that are not necessarily reflected in the national accounts. Forestry is also a highly significant contributor to export earnings in several countries. Forestry's contribution to export receipts is greater than 10 percent in Cambodia, Solomon Islands, Myanmar, Lao PDR, Fiji, Indonesia, Bhutan and New Zealand. The forestry sector provides formal and informal employment for millions of people and continues to act as a food reserve in times of hardship.

In many countries, forestry activities are strongly oriented towards trade. Within the region, China and Japan provide the most important markets, with these two countries being the world's second and third largest importers of forest products, behind the United States. Japan and China collectively import US$28 billion worth of forest products. Republic of Korea, Australia, Indonesia and Thailand account for an additional US$8 billion in forestry imports, collectively, with the regional total in 2001 of almost US$41 billion. Growth in China's imports during the past decade has been a notable feature of forest products trade in the region. China's forest products imports have doubled in value since 1993, from US$7.2 billion to US$14.5 billion in 2001. Imports of logs into China increased from 7.3 million m^3 to 18.5 million m^3 between 1998 and 2001. In the first six months of 2002, China's log imports totalled 12 million m^3.

Exports of forest products in the region totalled slightly more than US$20 billion in 2001. Net forestry trade in the region (value of exports minus value of imports) consequently ran a deficit of more than US$20 billion. This net deficit is, however, markedly smaller than the US$24.6 billion recorded in the APFSOS study, for 1995, largely owing to the declining value of wood products imports into Japan (down from US$19.5 billion in 1995 to US$11.2 billion in 2001). Indonesia is the region's largest forest product exporter, with the total value of its forestry exports in 2001 exceeding US$5.5 billion. Other major exporters (Table 7) include China (US$3.9 billion), Malaysia (US$2.7 billion), Japan (US$1.9 billion) Korea (US$1.6 billion) and New Zealand (US$1.5 billion). These six countries collectively account for 85 percent of the region's exports.

Table 7: Value of commodities exported by major Asia-Pacific exporting countries – 2001 (US$ million)

Country	Industrial roundwood	Sawnwood	Panels	Pulp	Paper and Paperboard
Indonesia	233	608	2 094	727	1 730
China	376	403	638	30	2 391
Malaysia	686	532	1 373	0	87
Japan	1	8	29	79	1 767
Korea	0	9	82	0	1 533
New Zealand	320	355	221	285	253

Source: FAOSTAT

Trade in industrial roundwood is an interesting indicator of the adequacy of national forests to meet demand for forest products and the level of development of forest products processing industries, as well as highlighting some important challenges in reconciling data (Table 8). Significant volumes of industrial roundwood are traded among Asia-Pacific countries, but the region as a whole is a strong net importer of industrial roundwood, with large volumes sourced particularly from North America and the Russian Federation. Conversely, only relatively small volumes of industrial roundwood are exported from the Asia-Pacific region to North America and Europe. An interesting feature of Table 8 is the extent to which it highlights data deficiencies in relation to the global forest products trade. For example, Papua New Guinea, Myanmar and Malaysia all report volumes of roundwood exports substantially less than the total volumes of imports reported as sourced from those countries by their trading partners.

Table 8: Direction of trade industrial roundwood – Asia-Pacific region 2000

EXPORTERS (1000 m^3)	**China**	**Indonesia**	**Malaysia**	**New Zealand**	**PNG**	**Myanmar**	**Australia**	**Other Asia-Pacific**	**North America**	**Europe**	**Total**
IMPORTERS											
Japan	24	47	2 457	1 657	1 337	2	163	38	4 788	5 674	15 948
China		620	4 558	543	1 437	153	70	275	96	5 974	15 532
Rep. Korea	4	8	541	2 969	716	0	544	155	259	2 072	6 869
India		0	0	255	0	0	13	0	25	41	2 090
Malaysia	0	624		25	0	0	0	6	19	1	758
Thailand	0	0	0	20	0	0	15	0	10	1	714
Philippines	0	42	67	276	89	0	16	151	0	1	562
Other Asia	1	0	13	69	2	11	230				2 281
North America	1	0	0	34	0	0	1				6 581
Europe	1	2	5	0	0	28	0				64 405
Total	781	1 504	6 845	5 772	1 902	949	969	1 206	14 971	71 144	106 043

Source: FAOSTAT

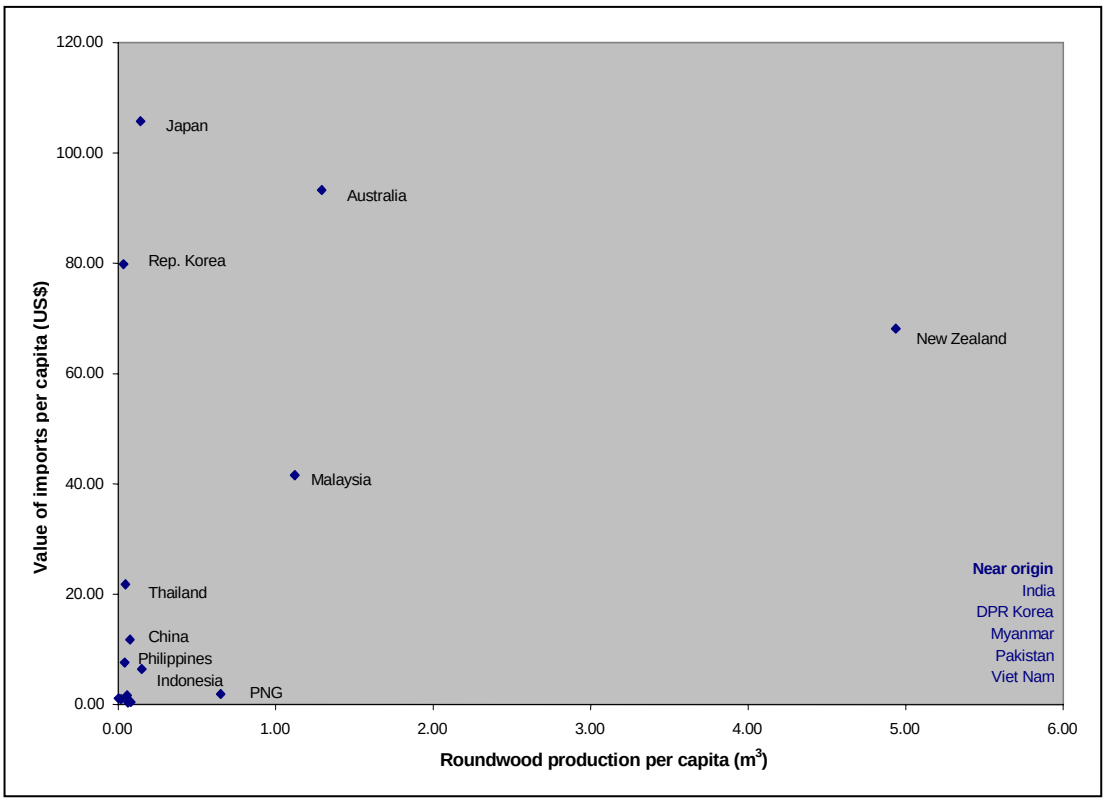
A number of countries in the region have become important producers and exporters of finished wood products, such as furniture. In Malaysia, for example, rubberwood furniture is estimated to account for around 70 percent of the $1.4 billion furniture industry. China's furniture industry currently has a total output value of around US$17 billion, with more than 50 000 manufacturing enterprises. This compares with an industry valuation of just US$160 million in 1978, implying an average annual growth rate of 15 percent over the intervening 25 years. Chinese furniture exports in the first 6 months of 2002 were valued at around US$2.6 billion.

People in the Asia-Pacific region are not generally among the world's heaviest users of wood and wood products (Figure 7). New Zealand, with a relatively small population and extensive tracts of plantation forests is clearly wood rich relative to other countries, producing around 5 m^3 of wood per person per annum. Australia, Malaysia and Papua New Guinea are also

relatively “wood rich” in per capita terms. Most countries of the region, however, are below the global average of 0.54 m^3 of wood production per capita.

Per capita imports of forest products correlate closely with wealth. The more developed countries – Japan, Australia, New Zealand, Republic of Korea and Malaysia – have the highest rates of imports, with Japan purchasing US$106 of imported wood products per capita in 2001. By comparison, a number of poorer countries purchase less than one dollar of imported forest products per capita.

Figure 7: Per capita production of industrial roundwood and imports of wood products in selected countries



Source: FAOSTAT

SOCIAL ASPECTS OF FOREST UTILIZATION

The Asia-Pacific region is undergoing a positive change with regard to society’s perception of the importance of forests. During the past 20 years, there has been a marked increase in public awareness of the various ecological and social services provided by forests, as well as recognition of some of the ethical principles that guide and support forest stewardship and conservation. At the same time, improvements in living standards and the development of a distinct urban middle class in several countries, has facilitated the development of environmental activism. Educated and articulate groups, strengthened with staff and financial resources, have emerged as effective conservation advocates in many countries. The development and growth of a strong Asia-Pacific environmental NGO community evidences this change. For example, Tsukasa (1999) notes:

One study estimates that by the early 1980s there were about 13 000 environmental NGOs in industrialized countries, while the number of environmental NGOs operating in developing countries was estimated at around 2 230. The number of environmental NGOs in developing countries has continued to increase. Asian countries probably have the largest number of NGOs in the developing world, with the Philippines having the largest number of environmental and other NGOs in Asia, with 18 000 including some internationally prominent ones.

This rise of environmental activism has paralleled a rise in social activism related to forest management and access rights to natural resources. Throughout the Asia-Pacific region, people have begun to demand greater accountability in the way that forests are managed and, even more so, a direct say in forest management.

Undoubtedly, the key trend relating to socio-economic aspects of forestry in the Asia-Pacific region relates to collaborative forest management. Many countries have recognized that the immense pressures brought to bear on forests in populous areas mean that authoritarian styles of centralized forest management are neither appropriate, nor effective, in meeting the forest management objectives of today. Government resource constraints also dictate that centralized forest management is less effective than other means. Forest departments have increasingly found their management objectives are unreachable, or seriously compromised, unless they empower communities and stakeholders to participate in decision-making and obtain their "buy in" to specific plans and objectives. For example, Nalampoon (2002), notes:

It is evident that top-down government policy to protect and conserve natural forests failed to obtain cooperation from rural poor people who lived close to or within the forests. The policy makers do not understand and know the living situation of those forest encroachers. They are destitute – living from hand to mouth. People look at natural trees in the forest as forbidden fruit. They felt aggrieved at seeing logging companies exploit timber resources out of the forest around their villages whereas they always have been told by the government officials to conserve them. They wanted to have new houses or lumber to repair their old houses as well. But they have no right in those natural resources. Many NGOs, local communal leaders and ringleaders incited them to request the government to take part in management of forest resources. This request gained stronger and stronger support from the public and turned to be political issue that finally forced the government to yield to this pressure.

Similarly, Choudhury (2002) notes specific instances of encroachment:

During the last few years, destruction of the plantations and encroachment of the plantation sites have cropped up as a serious problem. The basic cause behind such problems is "land tenure"….… Most of such sites in the district of Chittagong and Cox's Bazaar are falling prey to fisheries, whereas those in Noakhali district are being encroached for agriculture and construction of homesteads … These sites may be put under some sort of participatory management so that the locals can derive sustainable benefits without jeopardizing the land as well as the resource.

Many countries have mechanisms intended to increase the participation of civil society, both directly in the management of forests, and in decisions regarding policies and legislation related with the management and use of forest resources. A central plank in most national forest programmes is increased community participation in forestry.

Box 9: Community forest management in India, Nepal and the Philippines

Many of the national programmes for initiating community-based forest management in the Asia-Pacific region are very well known. In India, for example, the National Forest Policy 1988 marked a watershed in Indian forestry by recognising the role of communities in forest management and rehabilitation of degraded forests. Accordingly, Joint Forest Management (JFM) on a benefit-sharing basis was legalized in 1990. The concept formally recognizes the importance of involving local people in protecting, managing and developing forests. It envisages mobilising communities through the formation of Village Forest Committees and empowering them to manage degraded forests on a benefit-sharing basis, though without the formal transfer of ownership of forestlands. JFM involves collaboration between the Forestry Department and the local community, with a local NGO serving as an interface between people and government. Joint Forest Management has been implemented on more than 16 million hectares of degraded forests through 63 000 Village Forest Committees.

In Nepal, community forestry is a major focus of evolving forest management principles, particularly in the mountains. The Master Plan for the Forestry Sector 1988 established the concept of Forest User Groups, to which the user rights of specific tracts of forest would be ceded by the government. This definition and allocation of formal management and user rights and responsibilities, to community-based groups, is designed to halt rapid rates of deforestation and degradation that arose from the absence of management in open-access forests (the "tragedy of the commons"). To date, more than 10 000 Forest User Groups have been recognized and more than 600 000 hectares of forests have been placed under User Group management. Recently, however, there has been acknowledgement that community forestry does not benefit the very poor and marginalized people. The Government of Nepal is actively pursuing leasehold forestry as a means of empowering the most impoverished.

Community participation in forest management in the Philippines occurs predominantly under three (now integrated) people-oriented forestry programmes: the Integrated Social Forestry Programme (ISFP), Forest Land Management Agreements (FLMAs) and Community-Based Forest Management (CBFM). A number of other programmes have also been integrated and unified under the umbrella of CBFM.

The ISFP, launched in 1982, cedes forest management and utilization rights to individual forest dwellers. Under the IFSP, local people were granted rights to seven hectares of land, with security of tenure for 25 years, renewable for another 25 years based on performance. There is a requirement to plant trees on at least 20 percent of the area, while the remainder may be used for agricultural cropping.

FLMAs are production-sharing contracts entered into by the government with individual families, communities, or corporations for the management of plantation areas established under contract reforestation schemes. FLMA holders are entitled to harvest, process, utilize or sell wood and other commodities produced from the plantation. In return, they (the FLMA holders) are mandated to protect, maintain, and manage the plantation covered by the contract. FLMAs are 25-year leases, with rights of renewal.

CBFM is implemented to provide more equitable distribution of opportunities, income and wealth to Filipino people. The programme allocates tracts of state forest to communities to manage. Community rights and responsibilities are agreed with the government through a CBFM agreement. About 5.5 million hectares of forests (those with cover) and forestlands (brush lands, grasslands, uplands, etc.) are covered by CBFM in the Philippines. About half of these are under Certificate of Ancestral Domain Claims or Certificate of Ancestral Domain Titles.

Box 9 shows that participatory forestry is well established in several Asia-Pacific countries and discernible trends towards greater community participation are evident in most others. Most recently, policies and legislation supporting such trends include Forestry Law No. 41 enacted in Indonesia in 1999, which incorporates forest management principles of utility and sustainability, people and partnership, and transparency and integrity. Similarly, in Cambodia, the new Forestry Law establishes the rights and obligations of forest users and includes provision for private sector and community participation in forestry.

A crucial challenge in many countries is resolving issues of forest tenure, including ownership, user-rights and common access issues. In many Pacific Island countries, for example, land tenure issues are highly complex, with systems of ownership reflecting elements of customary tenure, including tribal, clan and individual ownership. This may result in conflict in relation to commercial exploitation of forests, as well as creating management challenges, where communal access can reduce incentives for individuals to make conservation decisions. Complexities in inheritance systems also create challenges relating to fragmentation of forest resources. In Tonga, for instance, until recently, the King entitled all male taxpayers to an 8-acre allotment, which continuously fragmented landholdings. More than 60 percent of the country's land area is held in allotments and this system limits much forestry development to small, scattered woodlots.

A substantive issue in many countries remains the marginalization of forest-dwelling ethnic minorities. In many instances, these groups are living as shifting cultivators, without formalized access rights to forests or land. Many Asian countries are implementing programmes to encourage transient people into permanent settlement. In Lao PDR, a primary government concern is to stabilize shifting cultivation, which is presently practiced by more than a quarter of the population. The government is attempting to provide sustainable land-use and job opportunities for shifting cultivators. A central plank in national participatory strategies in Lao PDR is a form of community forestry known as Village Forestry. The Village Forestry concept facilitates people's participation in forest management with varying degrees of intensity. By early-1998, Village Forestry implementation covered about 145 000 hectares. Much of the land allocated under the Village Forestry programme is non-commercial or barren forestland, which is handed over to communities with few resources and little training. Consequently, the programme is presently struggling to contribute positively to forest management. An encouraging development in 2002 was the preparation of the Sustainable Forestry and Rural Development Project, which recognizes the potential of villagers as forest managers and partners of local government forestry staff.

In India, tenure issues for forest dwellers reached a crisis point during May 2002, when the Ministry of Environment and Forests issued a notice to all State and Union territories, to summarily evict all encroaching forest dwellers (Box 10).

In Viet Nam, a National Programme for Upland Development aims to increase income levels of upland households, through improved land-use practices and the development of infrastructure. The Programme is developing agroforestry techniques and specific development projects, for which the driving force comes from farming households. The programme seeks to couple improved land-use practices with improved standards of living, thereby linking the interests of the country with benefits for local participants. In 1994, a decree concerning the allocation of land to be managed by individuals, households and organizations was promulgated. This allocation programme, a key plank in the country's push towards sustainable forest management, has seen the management of more than five million hectares of forestland devolved to one million Vietnamese families.

Box 10: The Supreme Court of India and the "Encroachers"

The Supreme Court (SC), in WP No. 202/1995, which has come to be known as the "forest conservation case", while dealing with the problem of deforestation and its causes, reviewed the issue of forest encroachment, that is, illegal or unauthorized occupation or cultivation of the forestlands. The issue came to the notice of the SC, when the amicus curie in IA 703/2001 mentioned that one of the major reasons for decimation of forests is the growing extent of encroachments. The problem of encroachment was highlighted with reference to some of the eco-fragile regions in Andaman and Nicobar, West Bengal, Karnataka, Madhya Pradesh, Chhattisgarh, Tamil Nadu, and Assam. The SC instructed the Chief Secretaries of these states to indicate the steps to be taken by them. Taking a cue from this, the MoEF immediately sent a circular of May 3, 2002 to all states and union territories to evict all encroachers by September 30, 2002, even though the SC had not ordered eviction of encroachers. Naturally, the country and the forest dwellers were outraged.

Source: Centre for Civil Society, 2003

Gender-based issues continue to be of major significance for forest-dependent communities. Often the challenges for forest dwellers are intensified by isolation and cultural factors. These challenges encompass many aspects, such as gender-specific roles, labour, health, education, and political participation. In some areas, the advent of opportunities for seasonal and permanent out-migration and resultant gender-based and youth-based impacts are significant. Particularly in South Asia, the out-migration of men to urban centres, to earn supplementary remittances, leaves women as heads of the household for much longer periods, while often retaining a cultural dependence on absent men to make key economic decisions. At the same time, women are disadvantaged owing to limited access to credit, livelihood extension, and other services.

In many parts of Asia and the Pacific, the "greying of rural communities" has also become a significant social issue, as young people migrate to cities and the forestry (and agriculture) labour force ages. In Japan, for instance, there are notable challenges created by difficulties in attracting young people to work in the forestry industry. Tending and harvesting programmes in private cooperative forests are lagging due to labour shortages, and labour productivity is declining as the average age of the workforce escalates.

ENVIRONMENTAL ASPECTS OF FOREST UTILIZATION

The importance of forests in the environment is clearly recognized throughout the Asia-Pacific region. Increasing environmental priorities are reflected in expanding protected areas, greater focus on biodiversity conservation and the strengthening of environmental NGO activities. Other manifestations of increasing environmental priorities are structural changes in government organizations, re-orientation of policies and greater participation of civil society in forest conservation and management.

The FRA2000 reports that 8.9 percent of forests in Asia, and 11.7 percent of Oceania forests, are in protected areas. Several countries have transferred very significant proportions of their forest estates into conservation areas, with Bhutan (35 percent), Brunei Darussalam (22 percent), Cambodia (24 percent), Lao PDR (20 percent), Sri Lanka (18 percent) and

Thailand (23 percent) among the highest. However, protected areas in many countries of the region suffer severe management deficiencies. For various reasons, countries do not assign sufficient resources for their proper protection and administration. This is reflected in the lack of management plans, illegal felling of theoretically protected forests, illegal occupation of land in national parks and reserves, illegal capture of wildlife and the occurrence of intentional fires. Thus, although the area of forest in designated protected areas is one gauge of improving environmental performance, it is often a poor indicator of effective conservation.

In total, the Asia-Pacific region has 9.7 percent of forests in protected areas (Table 9). This is marginally below the gross IUCN target of 10 percent of forests in protected areas. Many countries in the region are, however, significantly below this objective, and in many countries that exceed the objective, several forest types are significantly under-represented.

Table 9: Forests in protected areas by sub-region

Country/Area	Total forest area (000 ha)	Forest in protected areas (%)	Forest in protected areas (000 ha)
South Asia	76 665	8.9	6 841
Insular SE Asia	131 018	14.5	19 052
Continental SE Asia	80 896	12.9	10 458
North Asia	188 583	3.5	6 572
Advanced industrial countries	186 566	11.9	22 255
Pacific Islands	35 138	7.9	2 762
Total	**698,866**	**9.7**	**67 940**

Source: FAO, 2001

Conservation of forest biological diversity is crucial for maintaining forest health and vitality, and provides another important indicator of environmental performance. While direct measurement of biological diversity is impractical, a number of indicators such as the incidence of endangered forest species, "naturalness" of forests (following a graduated scale of natural forests, semi-natural forests and plantations), protection status under various IUCN categories, degree of fragmentation of forest areas, and monitoring forest protection by areas in specific ecological zones, can assist in assessing relative performance in biodiversity conservation.

FRA2000 reports on numbers of identified endangered species by country including amphibians, birds, ferns, mammals, palms, reptiles and trees.

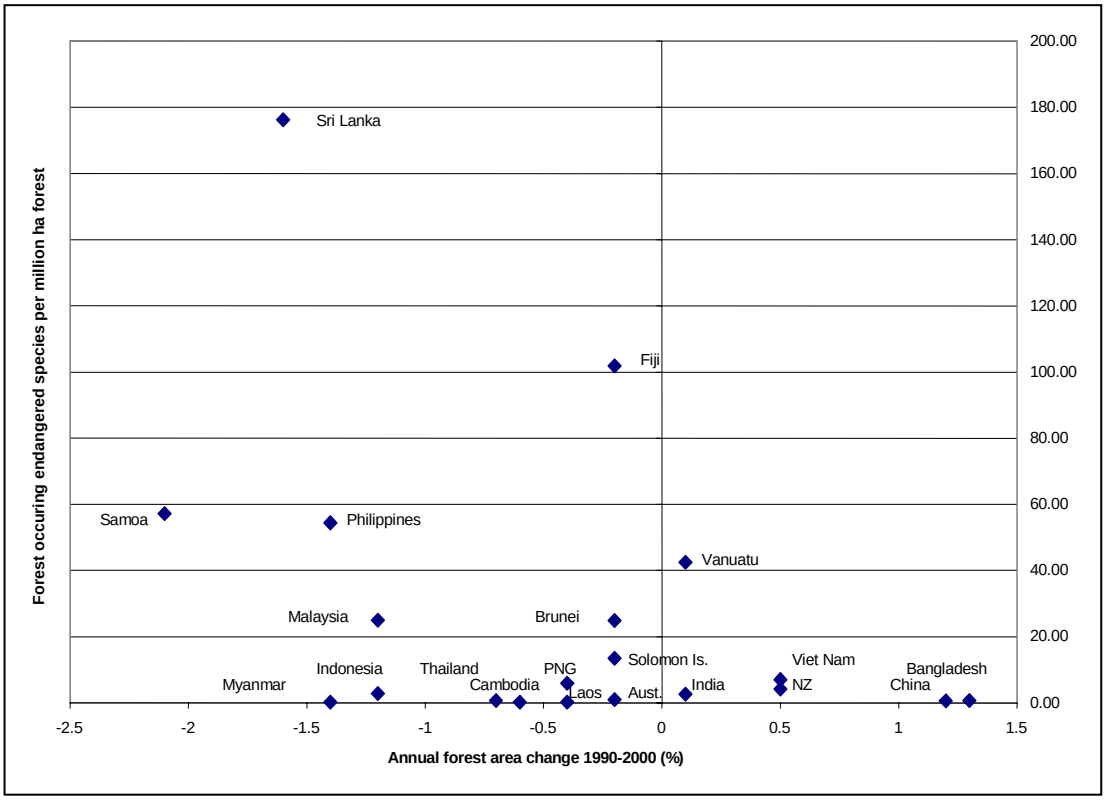
Figure 8 shows national relationships between numbers of forest-occurring endangered species per million hectares of forests, and annual change in forest area during the past decade. Not surprisingly, smaller countries with higher rates of deforestation have very high rates[17] of endangered forest species. Sri Lanka, Samoa and the Philippines are shown with high levels of endangerment, and are joined by other smaller countries such as Fiji, Vanuatu and Brunei Darussalam, with lower rates of deforestation, but where some species are naturally limited by country size. Conversely, countries with larger forest areas, such as Myanmar, Indonesia and Thailand, are able to sustain higher rates of deforestation with generally less immediate risk to overall national levels of biodiversity. However, in these

[17] N.B. countries such as Samoa, Brunei, Fiji and Vanuatu, with less than 1 million hectares of forest, are shown with higher rates of endangered species than actual numbers of endangered species.

larger countries, fragmentation of forest resources can pose a threat to biodiversity if forest areas become sufficiently isolated and too small to support viable populations of wildlife. Chrystanto and Justianto (2002), for example, notes:

About 25 percent of protected areas are found in Java where the human population pressure is very high. However, most of Java's protected areas are not connected properly by, so called, wildlife corridors. Therefore, many of them are fragmented into small island ecosystems that cannot support viable populations of endangered species.

Figure 8: Endangered species relative to forest area change



Source: FAO, 2001

A number of countries in the region have initiated policies whereby conservation of forests is explicitly given priority over production. In Bhutan, for example, environmental conservation is the main theme of the forest policy. Department of Forest Services, Bhutan (2002) notes:

The conservation goal is to be met first and only thereafter other goals can be pursued. The policy clearly states that the forests of the country are to be demarcated into protection and production forests. Sufficient areas comprising all representative eco-zones of the country are to be set aside with the sole purpose of protecting and maintaining the rich biodiversity. The remaining areas can be used for production but principles of conservation and sustainable management are to be applied.

Sri Lanka has adopted a similar focus. The Sri Lankan National Forest Policy 1995 specifies that:

The natural forests will be allocated firstly for conservation, and secondly for regulated multiple-use production forestry.

Similarly, in New Zealand, the vast majority of natural forests are locked into a conservation estate, with the government presently in the process of phasing out the last harvesting operations in government-owned forests. In Australia, the system of Regional Forest Agreements, negotiated between the Commonwealth and State governments, provides a blueprint for long-term management and use of forests in a particular region.

In Thailand, the principal forest policy revolves around protecting and conserving remaining forestlands. The initial ban on harvesting in Thailand's natural forests was handed down as a government decree and management of the ban, to date, has generally been as much through enforcement as through community cooperation. The Royal Forest Department's approach has encompassed employment of forest guards and forest patrolling. In Bangladesh, the Forest Department has similarly enforced an autocratic rather than participatory approach to conservation. Choudhury (2002) notes:

Protected areas (in Bangladesh) *are portions of reserved forests. Public entry into the reserved forests, without the permission of the Forest Department is prohibited in Bangladesh. The protected areas in the reserved forests are not subjected to any kind of commercial harvest.*

In Thailand, as the harvesting ban has gained greater community acceptance, policies allocating more forestlands as protected areas seem relatively successful. This is mainly due to better participation from all sides, i.e. NGOs, local communities, government agencies, and conservationists. A new generation is growing up in Thailand with understanding of the beneficial functions of the forest, and a greater acceptance of conservation values.

The need for participation and buy-in by communities in forest conservation activities, especially in countries where population pressure and poverty place heavy demands on forests, is recognized throughout the region. For instance, Wani (2002) notes:

Although there is some realization to preserve and protect representative ecosystems as an invaluable cultural heritage of Pakistan these relict ecosystems and their biodiversity are on the verge of extinction. Protection of these forests and natural regeneration is only possible if subsistence needs of the communities are met through incentives and substitutes for firewood and fodder. The juniper, chilghoza and blue pine forests of Balochistan, and the mixed spruce forests in Nalter Valley in Northern Areas, need to be protected through special legislation and active participation of local communities.

Indonesia is experiencing similar challenges, with conflicts between environmental and economic imperatives tending to be dominated by the latter. As Chrystanto and Justianto (2002) notes, the win-win solutions offered by activities such as ecotourism are not easily realized:

Ecotourism has not yet generated sufficient direct revenues to local government as well as local communities. The current protected areas and buffer zone management have not provided significant development opportunities to local communities and other stakeholders. In addition, there are many overlapping and conflicting claims to lands within protected areas due to unclear borders and weak commitment of the stakeholders toward biodiversity conservation efforts.

INTERNATIONAL COOPERATION AND SUPPORT

International conventions and agreements

Asia-Pacific countries have signed more than a dozen international treaties, conventions and protocols with the potential to directly impact on forest management. Those reflecting mainly environmental objectives include:

- International Convention for the Protection of Birds (ICPB), 1950;
- Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention), 1971;
- Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention), 1972;
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1973;
- Convention on the Conservation of Migratory Species of Wild Animals, 1979.
- Convention on Biological Diversity (CBD), 1992;
- United Nations Framework Convention on Climate Change (UNFCCC), 1992;
- United Nations Convention to Combat Desertification (UNCCD), 1994;
- International Tropical Timber Agreement (ITTA), 1994;
- Kyoto Protocol to the UNFCCC, 1997.

Preliminary analysis for the State of the World's Forests (2003) indicates that, excluding small Pacific Island territories, a large majority of Asia-Pacific countries have ratified the conventions most relevant to forestry (Table 10). In addition, virtually all countries in the region have undertaken to adhere to Chapter XI of Agenda 21 and the non-binding Forest Principles elaborated at UNCED in 1992.

Outside of the environmental sphere, the World Trade Organisation (WTO) Agreement has significant potential to influence forestry decision-making. Many countries in the region are signatories to the WTO agreement, with Bhutan, Cambodia, DPR Korea, East Timor, Lao PDR, Nepal and Viet Nam, the non-signatories from Asia, while Australia, Fiji, New Zealand, Papua New Guinea and Solomon Islands are signatories from the Pacific.

Table 10: Status of ratification of international conventions 2003

Country/ territory	CBD	UNFCCC	Kyoto Protoc.	CITES	UNCCD	World Heritage Convention	Ramsar Convent.	ITTA signatories
Australia	x	x		x	x	x	x	x
Bangladesh	x	x	x	x	x	x	x	
Bhutan	x	x				x		
Brunei Darussalam				x				
Cambodia	x	x		x	x	x	x	x
China	x	x		x	x	x	x	x
Cook Islands	x	x	x		x			
DPR Korea	x	x				x		
East Timor								
Fiji	x	x	x	x	x	x		x
India	x	x		x	x	x	x	x
Indonesia	x	x		x	x	x	x	x
Japan	x	x	x	x	x	x	x	x
Kiribati	x	x	x		x	x		
Lao PDR	x	x	x		x	x		
Malaysia	x	x		x	x	x	x	x
Maldives	x	x	x			x		
Marshall Is.	x	x	x		x	x		
Micronesia	x	x	x		x	x		
Mongolia	x	x	x	x	x	x	x	
Myanmar	x	x		x	x	x		x
Nauru	x	x	x		x			
Nepal	x	x		x	x	x	x	x
New Zealand	x	x	x	x	x	x	x	x
Niue	x	x	x		x	x		
Pakistan	x	x		x	x	x	x	
Palau	x	x	x		x	x		
Papua NG	x	x	x	x	x	x	x	x
Philippines	x	x		x	x	x	x	x
Rep. of Korea	x	x		x	x	x	x	x
Samoa	x	x	x		x	x		
Singapore	x	x		x	x			
Solomon Is.	x	x			x	x		
Sri Lanka	x	x		x	x	x	x	
Thailand	x	x		x	x	x	x	x
Tonga	x	x			x			
Tuvalu	x	x	x		x	x		
Vanuatu	x	x	x	x	x	x		x
Viet Nam	x	x		x	x	x	x	

International cooperation

A number of Asia-Pacific countries have participated actively in the international dialogue on forests. This includes discussions initially in the Intergovernmental Panel on Forests (IPF), in the Inter-governmental Forum on Forests (IFF), and subsequently in the United Nations Forum on Forests (UNFF). For example, representatives of the following countries attended the Second Session of UNFF held in New York in March 2002:

Australia, Bangladesh, Brunei Darussalam, China, DPR Korea, Fiji, India, Indonesia, Japan, Lao PDR, Malaysia, Federated States of Micronesia, Mongolia, Myanmar, Nauru, Nepal, New Zealand, Pakistan, Papua New Guinea, Philippines, Republic of Korea, Sri Lanka and Thailand.

A number of countries from the region have also been sponsors or hosts of initiatives, sub-processes and meetings directly contributing to this international dialogue.

Cooperation within the region takes place at a number of levels. Perhaps the most visible collaborative arrangements are sub-regional economic groups, the most significant of which include the Association of Southeast Asian Nations (ASEAN), the South Asian Association for Regional Cooperation (SAARC) and the South Pacific Forum (SPF). These associations encourage cooperation at a number of levels. For example, the ASEAN Declaration notes the aims and purpose of the Association are to:

accelerate economic growth, social progress and cultural development…(and) *to promote regional peace and stability*.

SAARC also proposes to accelerate economic growth, social progress and cultural development, as well as objectives relating to promoting the welfare of people, strengthening self reliance among South Asian nations, and strengthening cooperation among member countries and with the international community. The SPF provides a forum to discuss a wide variety of issues of relevance to South Pacific countries. Forestry is of periodic interest in each of these forums. For ASEAN, the interest and focus on forestry is regular. The ASEAN Senior Officials on Forestry (ASOF) meet at least once a year. The Strategic Plan of Action on ASEAN Cooperation in Food, Agriculture and Forestry (1999–2004) has various Action Programmes related to forestry and in implementing the programmes ASEAN is currently supported by the ASEAN-German Regional Forest Programme.

The regional economic groups also play roles in facilitating transboundary cooperation on issues that may arise (or require mitigation) in one country, but impact on neighbouring countries through cross-border effects. In 2002, for example, the *ASEAN Agreement on Transboundary Haze Pollution* was enacted in response to problems created by forest fires. This Agreement provides a legal and institutional framework to tackle problems on a national as well as a regional basis, including prevention, monitoring, coordination, disaster relief, and research and development.

Transboundary cooperation on forestry-related environmental issues typically occurs in relation to major international river systems and waterways, adjacent parks and reserves, and wildlife corridors. For example, a transboundary partnership between the governments of Nepal and China (Tibet Autonomous Region) has been undertaken to jointly manage the Sagarmatha (Mt Everest) region.

In Asia, four of the world's leading rivers, the Indus, Ganges, Brahmaputra and Mekong, originate in the Himalaya, but are international watercourses. These rivers are essential for

some of the world's largest irrigation schemes and hydroelectric works and sharing their waters is often a source of political tension. Various mechanisms exist for cooperation on river management. One example is the Mekong River Commission (MRC) established in 1995. The MRC member countries are Cambodia, Lao PDR, Thailand and Viet Nam. The MRC also maintains regular dialogue with the two upland states of the Mekong river basin – China and Myanmar. MRC member countries have agreed to cooperate in all fields of sustainable development, utilization, management and conservation of water and related resources of the Mekong river basin, including flood control, agriculture, hydropower and environmental protection.

A variety of other regional forestry agreements, institutions, and *ad hoc* meetings promote international cooperation on forestry within the region. In terms of global intergovernmental organizations, FAO, ITTO, World Bank, UNDP, IPGRI, International Network for Bamboo and Rattan (INBAR) and IUCN (among others) have strong forestry programmes or involvement in forestry. A number of regional institutions have important roles in promoting international cooperation on specific forestry themes and issues. These include the Asian Development Bank (ADB), Asia Pacific Association of Forestry Research Institutions (APAFRI), Center for International Forestry Research (CIFOR), International Center for Research in Agroforestry (ICRAF), Regional Community Forestry Training Center for Asia and the Pacific (RECOFTC), International Center for Integrated Mountain Development (ICIMOD) and South Pacific Regional Environment Programme (SPREP). A wide variety of forestry-related NGOs also operate in the region and play important roles in facilitating dialogue and change.

In terms of regional forums, the Asia-Pacific Forestry Commission (APFC) provides a unique opportunity for discussion of forestry issues relevant to the region. Created in 1949, APFC is one of six FAO Regional Forestry Commissions that cover the world's major geographic regions. APFC activities are shaped by shifts in international forestry paradigms, priorities and practices. The APFC meets every two years in general session to review progress, discuss problems of mutual concern and set new agendas. A variety of other regional forestry meetings occur, often on an *ad hoc* basis. For example, in September 2001, a Forest Law Enforcement and Governance East Asia Ministerial Conference convened in Bali, Indonesia. The Conference issued a Ministerial Declaration on illegal logging, the intent of which is largely encapsulated in its first declaration to:

take immediate action to intensify national efforts, and to strengthen bilateral, regional and multilateral collaboration to address violations of forest law and forest crime, in particular illegal logging, associated illegal trade and corruption, and their negative effects on the rule of law.

In 2002, the Asia Forest Partnership (AFP) was launched by the governments of Japan and Indonesia as an outcome of the World Summit on Sustainable Development. The purpose of the AFP is to promote sustainable forest management in Asia, with a focus on forest law enforcement, good governance, illegal logging and rehabilitation and reforestation of degraded lands in ASEAN countries as well as in China, Korea and Japan. To date, 15 governments and 9 NGOs have become partners in the initiative.

A large number of bilateral and multilateral development projects are implemented in the region. Japan, Australia and New Zealand are the main donor countries based in the region. Japan is a major donor on a global scale, and contributes substantially to forestry projects in the Asia-Pacific. In 2001-2002 the Australian aid programme provided $11.1 million for sustainable forestry activities in the Asia-Pacific region. A further $31.7 million was provided to support activities with significant forestry components. New Zealand's aid programme

focuses primarily on the Pacific Islands, and it funds several bilateral forestry projects in the Pacific and Asia.

Box 11: New Bank Policies

World Bank Forest Policy

The World Bank recently approved a new forest policy and strategy that is expected to help to improve the livelihoods of millions of the rural poor, while also safeguarding environmental values of forests, and integrating forests in sustainable economic development. The Bank will finance commercial harvesting only in areas where strict environmental assessments or authoritative scientific surveys have demonstrated that the areas in question do not contain critical natural habitats. The new policy reflects a vision of responsible growth, and is a marked departure from a previous strategy of disengagement from the forestry sector. The previous policy has failed to slow deforestation or deter the expansion of illegal logging. The new policy contains provisions for a partnership with the World Wildlife Fund (WWF), aiming to bring at least 200 million hectares of production forests under sustainable forest management through third party certification.

ADB Environment Policy

The ADB approved a new Environment Policy in November 2002, after two years of extensive consultations with internal and external stakeholders. The Environment Policy has been prepared to address five main challenges:

- the need for environmental interventions to reduce poverty
- the need to mainstream environmental considerations into economic growth and development planning
- the need to maintain regional and global life support systems
- the need to work in partnership with others
- the need to further strengthen the processes and procedures for addressing environmental concerns in ADB's own operations

The Policy highlights a number of areas that require attention in ADB's environmental assessment process. It addresses the need for more environmental assessment at the level of country programming, the need for more structured consultation in the conduct of environmental assessments, the need for greater emphasis on monitoring and compliance with environmental requirements during project implementation, and finally the need to view environmental assessment as an ongoing process rather than a one-time event.

Source: ADB (http://www.adb.org/Environment/envpol/default.asp)

Almost all developing countries in the Asia-Pacific region are implementing forestry development projects with international support and cooperation. These range across the entire spectrum of forestry from institutional strengthening and policy development, across the spheres of community and participatory forestry, and to projects directly funding reforestation, nursery development and monitoring illegal forest activities. The Vietnamese Forest Sector Support Programme (Box 12) provides a good example of international cooperation in forestry development.

Box 12: Viet Nam Forest Sector Support Programme (FSSP) and Partnership

In November 2001, the Ministry for Agriculture and Rural Development and 18 international donors and NGOs signed a Memorandum of Agreement for the Viet Nam Forest Sector Support Programme (FSSP) and Partnership. The FSSP arises from a two-year process including a joint sector review and formulation of a programme framework for the FSSP, based on the Vietnamese Forest Development Strategy 2001-2010. The objective of the partnership is to collaborate in support of the forest sector of Viet Nam on the basis of agreed policies, strategies, priorities and principles of implementation. Signatories to the partnership share a commitment to the sustainable management of forests and the conservation of biodiversity to achieve: (a) protection of the environment; (b) improved livelihoods of people in forest areas; and (c) enhanced contribution of forestry to the national economy.

CONCLUSIONS

In the foreword to this publication, Mr He Changhui writes, *"Forestry is a sector undergoing dynamic evolution in a rapidly-changing world"*. As a consequence, drawing generalized conclusions on the state of forestry in the region is both difficult and fraught with hazard. Conclusions may only be applicable in certain instances and can be rapidly outpaced by sectoral change. Nonetheless, there presently appears to be good reasons for cautious optimism over the future of forests in the region, despite ongoing problems of deforestation and forest degradation.

The overall forest area in Asia-Pacific continues to decline, with many remaining forest areas being subject to degradation. Total net forest area in the region decreased by 10.5 million hectares during the 1990s. This trend is a serious concern. In many countries, particularly in South and Southeast Asia, stated commitment to sustainable forest management is not being translated into action on the ground. This ongoing destruction of forests, allied with policy inconsistencies and examples of patent cronyism lend weight to conclusions that some countries have lost their way in working towards forest sustainability goals – and that they are lacking in true political will to regain their path. However, a closer examination of forestry statistics reveals some positive messages. Almost a quarter of the countries in which significant changes in forest areas occurred during the 1990s reported an increase in forest cover. While the experiences of developed countries such as Japan and New Zealand mirror those of many other countries in Europe and North America, the examples set by developing countries such as China and Viet Nam, where dedicated efforts are being made to rehabilitate and expand forest areas, provide great cause for optimism that other countries in the region can and will similarly address their forestry challenges.

Most countries in the region have a relatively sound policy and legislative foundation from which to implement sustainable forest management. In some instances, policy frameworks are obsolete, but most countries are at least working to update their forest policies. In general, however, the major challenges are not with forest policies *per se*, but rather in terms of countries' capacities and commitment to implement them. Too often, policy recommendations are promulgated without adequate reference to requisite resources and capabilities for effective implementation. This is a thread that appears to run through all levels of forest policy debate including international dialogues, national policy development processes and individual meetings and workshops. A number of common themes are apparent in forest policies in the region. Almost all espouse an overarching drive towards sustainable forest

management. A need for participatory approaches to forest management is a common plank for most countries. Conservation objectives maintenance of competitive forest industries and efforts to curtail illegal forest activities are other frequent themes.

Some of the weakest links in the chain toward sustainable forest management are institutional capacities in the region. The rapid changes that have been associated with policies that encompass participatory forestry, devolution and decentralization of forest management responsibilities have regularly outpaced the capacities of traditional forestry institutions to encompass change. Government institutions that have historically been responsible for direct management of forests are now being asked to undertake roles to facilitate other groups undertaking forest management. The skill sets between the historical and current roles are markedly different, institutional structures need to be revamped, and generally there are insufficient resources to effectively implement these changes. Similar challenges confront institutions involved in forest research, education and training as well as private sector agencies, environmental NGOs and forest communities.

The economic contribution of forests in the region remains substantial, but it is a major contributor to GDP and/or export earnings in only a handful of countries. The total volume of roundwood harvested in the Asia-Pacific region is estimated at 758 million cubic metres, or 22 percent of the world's total. Official production of industrial roundwood in the region has declined by around 50 million cubic metres during the past decade and there has been a significant shift towards plantation production. Nonetheless, illegal logging is widespread and it is believed that actual harvests are substantially higher than reported statistics in several countries. Apparent positive indications for forests, reflected in official claims of declining harvests in some countries, may not be born out by actual events on the ground.

The rise of participatory forestry in the region, during the past 20 years, offers considerable cause for optimism – particularly given the number of countries that are endeavouring to implement plans for extensive community-based forest management. Nonetheless, participatory forestry has so far yet to prove it is a panacea for national forestry sectors, even in leading countries. Shortages in resources to implement joint forest management schemes, allied with lack of training for communities and scepticism among government forestry staff, has meant that uptake of participatory forestry opportunities has been far less than the more optimistic forecasts of the early-1990s. In India, for example, Joint Forest Management has been applied to less than a quarter of the country's forests, while in Nepal only around 15 percent of forests have been allocated to Forest User Groups. In some instances, community forestry struggles to be financially viable. It can also be argued that community forestry efforts have not benefited the most impoverished. Participatory forestry offers an avenue of hope – but not a guarantee – for a bright future for forestry.

Considerable progress in demarcating conservation forest areas has been made in the region. As a whole, the region is close to meeting the IUCN target of 10 percent of forests under conservation status. There are, however, many challenges still to be addressed including ensuring that demarcated areas are also effectively managed, ensuring an even distribution of representative forest types in conservation areas, as well as making sure conservation areas are of sufficient size to provide a viable habitat for wildlife. Encroachment into conservation areas is a major problem in many Asia-Pacific countries, and few countries are finding satisfactory means of resolving this challenge.

Finally, several generic factors give rise to cautious optimism over the future of forestry in Asia and the Pacific. These broadly relate to levels of development, information sharing and international cooperation.

There is little doubt that developed countries have enhanced opportunities for forest conservation while, conversely, the process of development generally entails significant environmental degradation. For example, the FRA2000 reports that in Europe, during the 1990s, 27 countries increased their forest cover and only three countries reported declining forest area. By comparison, in the Asia-Pacific region, 7 countries increased forest cover during the 1990s, while forest areas in 20 countries were reported to have declined. During the past 20 years, however, there has been an enormous rate of development in many countries of the region. Wealth has increased, infrastructure has been built and, in a number of countries, a strong environmental conscience has evolved. This latter point is important, because there is a strong correlation between level of development and the strength of environmental movements in countries. Similarly, the openness and transparency of debate that characterize good forest management generally come about as countries become less defensive about their environmental records. In several countries in the region, discernable development, in tandem with a visible environmental movement and increasing levels of discussion and debate offer tangible hope for rapid improvement in forest management and conservation during the next decade.

The enormous increases in availability and accessibility of information implicit in technology developments such as the Internet, as well as a noticeable increase in the willingness of countries to share their forestry experiences, is also cause for optimism. Along with the developed countries in the region, countries such as Malaysia, China and India are showing leadership in sharing information and experiences, as well as encouraging international collaboration. There is a recognition that there are enormous efficiency gains to be realized through learning from others' experiences and that every country has valuable insights to share. There is notable enthusiasm to participate in international networks, collaborative workshops and conferences, and in comparative multi-country studies. This willingness to cooperate confers the greatest hope that forestry is finding a positive path for advancement.

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Appendix 1: Basic data on countries and areas

Country/area	Land area	Population				Economic indicators	
	Total, 1999 *(1000 ha)*	Total, 1999 *(thousands)*	Density, 1999 *(per km²)*	Annual rate of change, 1995-2000 *(%)*	Rural, 1999 *(%)*	GNP per capita, 1997 *(US$)*	Annual growth rate of GDP, 1997 *(%)*
Bangladesh	13017	126947	975.2	1.7	79.4	352	5.9
Bhutan	4700	2064	43.9	2.8	93.1	406	n.a.
India	297319	998056	335.7	1.7	71.9	392	5.2
Maldives	30	278	926.7	2.8	71.9	1107	6.2
Nepal	14300	23385	163.5	2.4	88.4	216	4
Pakistan	77088	152331	197.6	2.8	63.5	502	-0.4
Sri Lanka	6463	18639	288.4	1	76.7	770	6.4
South Asia	**412917**	**1321700**	**320.1**	**n.a.**	**72.0**	**n.a.**	**n.a.**
Brunei Darussalam	527	322	61.1	2.2	28.6	n.a.	4
East Timor	1479	871	58.6	1.7	92.5	n.a.	n.a.
Indonesia	181157	209255	115.5	1.4	60.8	1096	4.9
Malaysia	32855	21830	66.4	2	43.5	4469	7.8
Philippines	29817	74454	249.7	2.1	42.3	1170	5.2
Singapore	61	3522	5773.8	1.4	0	32486	7.8
Insular Southeast Asia	**245896**	**310254**	**126.2**	**n.a.**	**54.5**	**n.a.**	**n.a.**
Cambodia	17652	10945	62	2.3	77.2	303	1
Lao PDR	23080	5297	23	2.6	77.1	414	6.5
Myanmar	65755	45059	68.5	1.2	72.7	n.a.	n.a.
Thailand	51089	60856	119.1	0.9	78.8	2821	-0.4
Viet Nam	32549	78705	241.8	1.6	80.3	299	8.8
Continental Southeast Asia	**190125**	**200862**	**105.6**	**n.a.**	**77.9**	**n.a.**	**n.a.**
China	932742	1274106	136.6	0.9	66.2	668	8.8
DPR Korea	12041	23702	196.8	1.6	37.5	n.a.	n.a.
Mongolia	156650	2621	1.7	1.7	37	391	3.3
Republic of Korea	9873	46480	470.8	0.8	14.8	11028	5.5
North Asia	**1111306**	**1346909**	**121.2**	**n.a.**	**63.9**	**n.a.**	**n.a.**
Australia	768230	18701	2.4	1	15.3	19689	1.7
Japan	37652	126505	336	0.2	21.3	43574	0.8
New Zealand	26799	3828	14.3	1	13.3	15233	2.4
Advanced Industrial Countries	**832681**	**149034**	**17.9**	**n.a.**	**20.3**	**n.a.**	**n.a.**
American Samoa	20	66	330	3.7	48.5	n.a.	n.a.
Cook Islands	23	19	82.6	0.6	36.8	n.a.	n.a.
Fiji	1827	806	44.1	1.2	58.1	2340	-1.8
French Polynesia	366	231	63.1	1.8	43.3	n.a.	n.a.
Guam	55	164	298.2	2.1	61	n.a.	n.a.
Kiribati	73	82	112.3	1.4	63.4	839	3
Marshall Islands	18	62	344.4	3.3	29	1473	-5.2
Micronesia	70	116	165.7	2	70.7	1886	-4
Nauru	2	11	550	1.9	n.a.	n.a.	n.a.
New Caledonia	1828	210	11.5	2.1	36.2	n.a.	n.a.
Niue	26	2	7.7	-1.9	50	n.a.	n.a.
Northern Mariana Is.	46	74	160.9	5.9	45.9	n.a.	n.a.
Palau	46	19	41.3	2.4	26.3	n.a.	n.a.
Papua New Guinea	45239	4702	10.4	2.2	82.9	931	-6.5
Samoa	283	177	62.5	1.4	78.5	1239	4
Solomon Islands	2856	430	15.4	3.2	80.9	797	-0.5
Tonga	72	98	136.1	0.3	55.1	1635	-1.7
Vanuatu	1219	186	15.3	2.4	80.1	1315	2.7
Pacific Islands	**54069**	**7455**	**13.8**	**n.a.**	**74.6**	**n.a.**	**n.a.**
Southeast Asia	**436021**	**511116**	**117.2**	**n.a.**	**63.7**	**n.a.**	**n.a.**
Asia	**1997896**	**3306230**	**165.5**	**1.4**	**65.5**	**n.a.**	**n.a.**
Oceania	**849098**	**29984**	**3.5**	**1.3**	**29.8**	**n.a.**	**n.a.**
Asia-Pacific	**3283015**	**3847330**	**117.2**	**1.4**	**56.5**	**n.a.**	**n.a.**
TOTAL WORLD	**13063896**	**5978143**	**45.8**	**1.3**	**53**	**n.a.**	**n.a.**

Appendix 2: Forest resources 2000

Country/area	Land area *(1000 ha)*	Forest area, 2000				Wood volume in forests *(m^3/ha)*	Wood biomass in forests *(t/ha)*
		Total forest *(1000 ha)*	Percentage of land area *(%)*	Area per capita *(ha)*	Forest plantations *(1000 ha)*		
Bangladesh	13017	1334	10	n.s.	625	23	39
Bhutan	4701	3016	64	1.50	21	163	178
India	297319	64113	22	0.10	32578	43	73
Maldives	30	1	3	n.s.	-	-	-
Nepal	14300	3900	27	0.20	133	100	109
Pakistan	77087	2361	3	n.s.	980	22	27
Sri Lanka	6463	1940	30	0.10	316	34	59
South Asia	**412917**	**76665**	**19**	**0.06**	**34653**	**49**	**77**
Brunei Darussalam	527	442	84	1.40	3	119	205
East Timor	1479	507	34	0.60	-	79	136
Indonesia	181157	104986	58	0.50	9871	79	136
Malaysia	32855	19292	59	0.90	1750	119	205
Philippines	29817	5789	19	0.10	753	66	114
Singapore	61	2	3	n.s.	-	119	205
Insular Southeast Asia	**245896**	**131018**	**53**	**0.42**	**12377**	**84**	**145**
Cambodia	17652	9335	53	0.90	90	40	69
Lao People's Dem. Rep.	23080	12561	54	2.40	54	29	31
Myanmar	65755	34419	52	0.80	821	33	57
Thailand	51089	14762	29	0.20	4920	17	29
Viet Nam	32550	9819	30	0.10	1711	38	66
Continental Southeast Asia	**190126**	**80896**	**43**	**0.40**	**7596**	**31**	**50**
China	932743	163480	18	0.10	45083	52	61
DPR Korea	12041	8210	68	0.30	-	41	25
Mongolia	156650	10645	7	4.10	-	128	80
Republic of Korea	9873	6248	63	0.10	-	58	36
North Asia	**1111307**	**188583**	**17**	**0.14**	**45083**	**56**	**60**
Australia	768230	154539	20	8.30	1396	55	57
Japan	37652	24081	64	0.20	10682	145	88
New Zealand	26799	7946	30	2.10	1542	125	217
Advanced Industrialized Countries	**832681**	**186566**	**22**	**1.25**	**13620**	**70**	**68**
American Samoa	20	12	60	0.20	0	-	-
Cook Islands	23	22	96	1.20	1	-	-
Fiji	1827	815	45	1.00	97	-	-
French Polynesia	366	105	29	0.50	5	-	-
Guam	55	21	38	0.10	0	-	-
Kiribati	73	28	38	0.30	0	-	-
Marshall Islands	18	n.s.	-	-	-	-	-
Micronesia	69	15	22	0.10	0	-	-
Nauru	2	n.s.	-	-	-	-	-
New Caledonia	1828	372	20	1.80	10	-	-
Niue	26	6	-	3.00	0	-	-
Northern Mariana Is.	46	14	30	0.20	-	-	-
Palau	46	35	76	1.80	0	-	-
Papua New Guinea	45239	30601	68	6.50	90	34	58
Samoa	282	105	37	0.60	5	-	-
Solomon Islands	2856	2536	89	5.90	50	-	-
Tonga	73	4	6	n.s.	1	-	-
Vanuatu	1218	447	37	2.40	3	-	-
Pacific Islands	**54067**	**35138**	**65**	**4.71**	**262**	**34**	**58**
Southeast Asia	**436022**	**211914**	**49**	**0.41**	**19973**	**64**	**109**
Asia	**1997898**	**501243**	**25**	**0.15**	**110391**	**74**	**100**
Oceania	**849096**	**197623**	**23**	**6.59**	**3200**	**54**	**64**
Asia-Pacific	**2846994**	**698866**	**25**	**0.18**	**113591**	**68**	**88**
TOTAL WORLD	**13063900**	**3869455**	**30**	**0.65**	**187086**	**100**	**109**

Appendix 3: Change in forest area 1990–2000

Country/area	Total forest, 1990 *(1000 ha)*	Total forest, 2000 *(1000 ha)*	Forest cover change, 1990-2000	
			Annual change *('000 ha)*	Annual rate of change *(%)*
Bangladesh	1169	1334	17	1.3
Bhutan	3016	3016	n.s.	n.s.
India	63732	64113	38	0.1
Maldives	1	1	n.s.	n.s.
Nepal	4683	3900	-78	-1.8
Pakistan	2755	2361	-39	-1.5
Sri Lanka	2288	1940	-35	-1.6
South Asia	**77644**	**76665**	**-97.9**	**-1.2**
Brunei Darussalam	452	442	-1	-0.2
East Timor	541	507	-3	-0.6
Indonesia	118110	104986	-1312	-1.2
Malaysia	21661	19292	-237	-1.2
Philippines	6676	5789	-89	-1.4
Singapore	2	2	n.s.	n.s.
Insular Southeast Asia	**147442**	**131018**	**-1642**	**-1.1**
Cambodia	9896	9335	-56	-0.6
Lao People's Dem. Rep	13088	12561	-53	-0.4
Myanmar	39588	34419	-517	-1.4
Thailand	15886	14762	-112	-0.7
Viet Nam	9303	9819	52	0.5
Continental Southeast Asia	**87761**	**80896**	**-686.5**	**-0.8**
China	145417	163480	1806	1.2
Dem People's Rep. of Korea	8210	8210	n.s.	n.s.
Mongolia	11245	10645	-60	-0.5
Republic of Korea	6299	6248	-5	-0.1
North Asia	**171171**	**188583**	**1741**	**1**
Australia	157359	154539	-282	-0.2
Japan	24047	24081	3	n.s.
New Zealand	7556	7946	39	0.5
Advanced Industrialized Countries	**188962**	**186566**	**-240**	**-0.1**
American Samoa	12	12	n.s.	n.s.
Cook Islands	22	22	n.s.	n.s.
Fiji	832	815	-2	-0.2
French Polynesia	105	105	n.s.	n.s.
Guam	21	21	n.s.	n.s.
Kiribati	28	28	n.s.	n.s.
Marshall Islands	n.s.	n.s.	n.s.	n.s.
Micronesia	24	15	-1	-4.5
Nauru	n.s.	n.s.	n.s.	n.s.
New Caledonia	372	372	n.s.	n.s.
Niue	6	6	n.s.	n.s.
Northern Mariana Islands	14	14	n.s.	n.s.
Palau	35	35	n.s.	n.s.
Papua New Guinea	31730	30601	-113	-0.4
Samoa	130	105	-3	-2.1
Solomon Islands	2580	2536	-4	-0.2
Tonga	4	4	n.s.	n.s.
Vanuatu	441	447	1	0.1
Pacific Islands	**36356**	**35138**	**-122**	**-0.3**
Southeast Asia	**235203**	**211914**	**-2328.9**	**-1.0**
Asia	**484054**	**477198**	**-685.6**	**-0.1**
Oceania	**201271**	**197623**	**-364.8**	**-0.2**
Asia-Pacific	**920528**	**886735**	**-3379.3**	**-0.4**
TOTAL WORLD	**3963429**	**3869455**	**-9391**	**-0.2**

The Asia-Pacific region is characterised by diversity and rapid change. These attributes are reflected in the forestry sector, where rapid evolution of social, economic and environmental issues means policies, legislation, institutions and the broad forestry community are being challenged to cope with constantly shifting goals and expectations.

The *State of forestry in Asia and the Pacific – 2003* provides a broad status report and overview of developments in forestry in the region during the past several years. It has been prepared to inform and update policy makers, forestry officials and others interested in recent developments in the region's forestry sector.