ASIA-PACIFIC FORESTRY COMMISSION

Forests out of bounds:

Impacts and effectiveness of logging bans in natural forests in Asia-Pacific

Food and Agriculture Organization of the United Nations
Regional Office for Asia and the Pacific
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Food and Agricultural Organization of the United Nations
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ACRONYMS

AAC	Annual allowable cut
ACR	Accelerated Conservation Review
APFC	Asia-Pacific Forestry Commission
BFD	Bureau of Forest Development
BTT	Business turnover tax
CADC	Certificate of Ancestral Domain Claim
CADT	Certificate of Ancestral Domain Title
CBFM	Community-based forest management
CBFMA	Community-based Forest Management Agreement
CBRM	Community-based resource management
CENRO	Community Environment and Natural Resources Office
CPC	Ceylon Plywood Corporation
CPPAP	Conservation of priority protected areas
DAO	Department Administrative Order
DENR	Department of Environment and Natural Resources
DFID	Department for International Development
DILG	Department of Interior and Local Government
DOC	Department of Conservation
DWLC	Department of Wildlife Conservation
EIA	Environment impact assessment
EO	Executive Order
ESSC	Environmental Science and Social Change
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FD	Forest Department
FDC-UPLB	Forest Development Center- University of the Philippines at Los Baños
FFPO	Fauna and Flora Protection Ordinance
FIO	Forest Industry Organization
FMB	Forest Management Bureau
FMP	Forestry Master Plan
FO	Forest Ordinance
FSMP	Forestry Sector Master Plan
FYIP	Five Year Implementation Programme
GDP	Gross domestic product
IFMA	Industrial Forest Management Agreement
IRR	Internal rates of return
IUCN	International Union for Conservation of Nature and Natural Resources
LGU	Local Government Unit
MAB	Man and Biosphere
MARD	Ministry of Agriculture and Rural Development
MDF	Medium density fibreboard

MNR	Ministry of Natural Resources
MOF	Ministry of Forestry
MPFD	Master Plan for Forest Development
MSL	Mean sea level
NCIP	National Commission for Indigenous Peoples
NCR	National Conservation Review
NCS	National Conservation Strategy
NEAP	National Environmental Action Plan
NESDP	National Economic and Social Development Plan
NFCP	Natural Forest Conservation Program
NGOs	Non-government organizations
NHWA	National Heritage and Wilderness Area
NIPAS	National Integrated Protected Area Systems
NPWC	National Policy for Wildlife Conservation
NRMP	Natural Resources Management Program
NWFPs	Non-wood forest products
PA	Protected area
PAS	Protected area system
PCA	Philippine Coconut Authority
PD	Presidential Decree
PENRO	Provincial Environment and Natural Resources Office
PSSD	Philippine Strategy for Sustainable Development
RA	Republic Act
RED	Regional Executive Director
RFD	Royal Forest Department
RIL	Reduced impact logging
RMA	Resource Management Act of 1991
RTG	Royal Thai Government
SFA	State Forestry Administration
SL Rs	Sri Lanka rupees
STC	State Timber Corporation
TAO	Tambon Administrative Organization
TFSMP	Thai Forestry Sector Master Plan
TLA	Timber License Agreement
TWC	Timberlands West Coast Limited
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
US$	United States dollar
USAID	United States Agency for International Development
VINAFOR	Viet Nam Forestry General Corporation

FOREWORD

No issue in forestry evokes such strong emotions as logging — and for good reasons. Logging provides the timber and fiber needed to satisfy the rapidly increasing demands of today's societies. It generates billions of dollars in revenues, supports national economic and industrial development, and provides income and employment for millions of individuals. It conveys immense power and prestige to officials responsible for allocating harvesting rights and monitoring logging practices.

But logging — especially as conventionally conducted in many countries — also can cause significant damage to forests, or even facilitate the conversion of forests to other land uses. Logging is viewed by many people as a key factor in the loss of biological diversity and species habitats, deterioration of watersheds and water quality, expansion of deserts and the demise of forest-dependent people. Moreover, timber harvesting is frequently seen as benefiting only a small segment of society, leaving poor people to shoulder its costs. Arguments become even more emotional when logging is blamed for causing or exacerbating floods, landslides or other natural disasters that result in loss of human life.

In response to rapid deforestation and forest degradation, a number of countries in Asia and the Pacific have imposed partial or total bans on harvesting timber from natural forests. Several other countries are contemplating similar measures. The study of the *Impacts and effectiveness of logging bans in natural forests* arose from the need to assess the successes and failures of such strategies and approaches in the Asia-Pacific region. While logging bans and other harvesting restrictions are intuitively attractive measures to support forest protection, more rigorous analysis reveals that conserving forests is not so easy as simply banning logging.

There are a number of questions regarding the effectiveness and impacts of logging bans. For example, will logging bans actually help maintain or expand the natural forest estate, or will logging continue "illegally" and perhaps even more destructively than in the past? Will countries that restrict domestic timber production simply import more wood from exporting countries, which may not have adequate capacities for ensuring sustainable forest harvesting? What will be the effects on income and employment for forest-dependent workers, communities and governments? Is it reasonable to expect timber plantations to substitute for natural forests in supplying wood needs? What are the necessary supporting conditions needed to enhance the success of logging bans and measures to conserve natural forests? The answers to these questions are crucial in guiding government policies related to logging restrictions and ensuring a policy framework that effectively supports forest conservation.

This study, requested by the Asia-Pacific Forestry Commission (APFC), highlights the increasing relevance of regional cooperation in developing forestry policy in Asia and the Pacific. The sharing of national experiences within the regional forum supports more efficient assessment and policy development, while ensuring that analyses retain a high degree of social, geographic and ecological relevance. This study continues a growing tradition of timely, high-quality APFC studies, which FAO is pleased to support as part of its efforts to promote sustainable forest management in the region.

R.B. Singh
Assistant Director-General and
Regional Representative for Asia and the Pacific
Food and Agriculture Organization of the United Nations

PREFACE

At the seventeenth session the Asia-Pacific Forestry Commission (APFC), member countries requested FAO to implement a study of the efficacy of removing natural forests from timber production as a strategy for conserving forests. The objectives were to:

- investigate past and current experiences of Asia-Pacific countries in removing natural forests from timber production as a strategy for conserving forests;
- assess the policy, economic, environmental, and social implications of implementing logging bans and other timber harvesting restrictions; and
- identify conditions necessary for the successful implementation of logging bans or likely to enhance successful implementation.

The APFC requested the study to better understand the role of logging bans and similar restrictions on timber harvesting imposed to conserve natural forests. Such actions have been taken by many countries in the region and are under consideration by several others in the face of continuing deforestation and increased emphasis on forest conservation.

In examining the history and experience of timber harvest bans in natural forests, the study sought to understand the impacts on both conservation and production from the natural forests, including the implications and strategies for timber supply. National consultants carried out studies in their respective countries, covering a variety of experiences with timber harvesting bans. A Senior Study Coordinator provided technical support and prepared the regional overview. Consultants preparing the respective country case studies were:

China: Yang Yuexian, Deputy Director and Senior Engineer, Management Center for Natural Forest Conservation Programme, National Forestry Bureau, State Forestry Administration, Beijing, People's Republic of China

New Zealand: Alan Reid, Senior Policy Analyst, Sustainable Resource Use Policy, Ministry of Agriculture and Forestry, Wellington, New Zealand

Philippines: Ernesto S. Guiang, Natural Resources Management Consultant, Manila, Philippines

Sri Lanka: H. M. Bandaratillake, Conservator of Forests and Director, State Timber Corporation (ex-officio), Battaramulla, Sri Lanka

Thailand: Sureeratna Lakanavichian, Resource Sociology and Policy Analyst, Forest Resources Department, Faculty of Agriculture, Chiang Mai, Thailand

Viet Nam: Vu Huu Tuynh, Deputy Director, and Pham Xuan Phuong, Forest Policy Expert, Department of Agricultural and Rural Development Policy, Ministry of Agriculture and Rural Development, Hanoi, Viet Nam

The FAO Regional Office for Asia and the Pacific, the USDA Forest Service, and the UK Department for International Development (DFID) provided core support for the study. Collaborative support was also provided by two FAO regional projects: "Support to the Reorientation of Forestry Policies and Institutions of Countries of Asia in Reform to Market Economy Project," and the "Forestry Research Support Programme for Asia and the Pacific" (FORSPA). Contributions and in-kind support from the Ford Foundation, the Weyerhaeuser Foundation and the Center for International Forestry Research (CIFOR) also assisted the study.

Patrick Durst, FAO Senior Forestry Officer (Asia and the Pacific) provided overall supervision and technical guidance for the project. Gary Man, Program Coordinator, Asia and the Pacific Program, International Programs, USDA Forest Service coordinated the core financial support. FAO country representatives and senior forestry officials in the countries that prepared the case studies provided coordination and assistance. In-country assistance by the forest industries sector,

environmental organizations and the NGO community helped in defining critical issues and perspectives on timber harvesting bans and forest conservation. Finally, representatives of cooperating international organizations and invited experts provided critical support at the 1999 Manila Technical Workshop and the Policy Seminar held in connection with the eighteenth session of the APFC in 2000. The Department of Environment and Natural Resources (DENR) in the Philippines and the Department of Agriculture, Fisheries and Forestry Australia (AFFA) graciously hosted the workshop in Manila and the pre-APFC Policy Seminar in Noosaville, Queensland, respectively.

Appreciation is acknowledged to those individuals who contributed technical support and guidance throughout the study. Ian Armitage, Forestry Consultant, New Zealand, provided the initial development of the study guidelines and assisted the Senior Study Coordinator in the early project implementation. Rose Braden and Michael Victor provided technical editing support for the reports and Janice Naewboonnien assisted in proofreading the final version. Their professional contributions are gratefully acknowledged.

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International Forestry Sector Analysis (IFSA) International Consulting

Mill Creek, Washington, USA

June 2001

LOGGING BANS IN ASIA AND THE PACIFIC: AN OVERVIEW

Thomas R. Waggener

BACKGROUND

Several countries of the Asia-Pacific region have imposed total or partial logging bans (or similar restrictions on timber harvesting) in natural forests as a response to natural disasters that are widely believed to have been caused by deforestation or degradation of forests. Banning or restricting timber harvests has thus been viewed as a corrective measure and as a strategy to promote forest conservation and protection, and to assure broader forest benefits for the future.

Other countries in the region are currently considering logging bans or restrictions, along with other options such as long-term multiple-use forestry, sustainable forest management, and modified or reduced impact logging (RIL) practices. It is thus important to assess the experiences of various countries in the Asia-Pacific region for indications of the efficacy of removing natural forests from timber production in achieving conservation goals.

The study of the efficacy of removing natural forests from timber production as a strategy for conserving forests, conducted at the request of the Asia-Pacific Forestry Commission (APFC) and coordinated by the FAO Regional Office for Asia-Pacific, sought to review the experiences with logging bans in selected countries. The objectives were to:

- investigate past and current experiences of Asia-Pacific countries in removing natural forests from timber production as a strategy for conserving forests;
- assess the policy, economic, environmental, and social implications of implementing logging bans and other timber harvesting restrictions, and
- identify conditions necessary for the successful implementation of logging bans or likely to enhance successful implementation.

REGIONAL OVERVIEW

Over the last two decades, serious and growing concerns regarding the status and use of natural forests have emerged. In spite of long-term forest management systems and extensive reservations of natural forests for conservation, deforestation and degradation have continued at alarming rates. Successful reservations, which create a variety of protected areas, commonly prohibit commercial timber harvesting, and often strictly limit or prohibit other non-commercial forest uses for both timber and non-timber purposes. Creation of protected areas is normally the result of policy processes where non-timber priorities are deemed to outweigh timber values. Reservations for national parks, wildlife habitats, biodiversity, critical watersheds and other special purposes, remove forests from timber production and thus affect sustainable timber supply. Furthermore, declaration of protected areas does not guarantee effective protection, administration or active management for the intended purposes. Adequate human and financial resources, and, most importantly, a broad social consensus and support are required, particularly where forests have traditionally been a source of livelihood for local families and communities.

Logging bans to conserve natural forests

Despite such deliberate conservation efforts and the creation of protected areas, deeply rooted misgivings about conventional forest management and policies of timber harvesting and utilization abound. These misgivings rest on numerous perceptions about the negative consequences of previous uses of the natural forests and corollary assumptions about the desirability of shifts in policies that give greater priority to “forest conservation.” Many believe

that even more of the natural forests should be allocated to primary uses, e.g. biodiversity conservation, habitat protection, environmental protection, watershed and soil and water conservation. Such uses are often perceived to be incompatible with timber harvesting, thus resulting in growing demands for logging bans even outside existing protected areas.

Continued deforestation and forest degradation are seen by some people as evidence of management and policy failures to provide sustainable timber supply and environmental protection. For them, logging bans have become an expedient mechanism to prevent further damage and to allow for forest restoration.

Questions about whether timber production is in fact compatible with sustainable forestry in the broader economic and environmental context are being raised more frequently. Sustaining timber production may generate negative consequences or reductions in other multiple-forest values, e.g. stream siltation impacting water quality, inducing flooding or reducing hydroelectric capacity of reservoirs. Thus, even if management is "sustainable," a bias toward timber may lead to a less efficient "mix" of overall values than might be obtained from the same natural forest base.

Given the widespread concerns about the consequences of past natural forest uses, as well as the declining area and degraded condition of much of the remaining forests, should more forests be subjected to logging bans in favor of natural forest conservation? If so, where will timber come from in the future? Is the present level of harvesting sustainable and consistent with environmental priorities? Will new supply sources be required? Can forest plantations provide a meaningful alternative to continued deforestation and degradation of natural forests?

Natural forests of the Asia-Pacific region

The Asia-Pacific region covers over 552 million ha of forests, of which 477.7 million ha are natural forests. However, only about 249 million ha are available for harvesting. The distribution by geographic subregion is shown in Figure 1.[1] Insular Southeast Asia and East Asia dominate in terms of both total natural forests and the area available for harvesting. About 236 million ha are unavailable for harvest at present, including 89.5 million ha in legally protected areas and 146.5 million ha that are unavailable due to physical and economic constraints.

The region has experienced continuing deforestation and degradation, showing a decline of almost 16.3 million ha of natural forests, or approximately 3.3 million ha annually from 1990 to 1995. The largest losses were in Indonesia (5.4 million ha), Myanmar (1.9 million ha), Malaysia (2.0 million ha) and Thailand (1.6 million ha). The Philippines had the highest rate of deforestation at 3.5 percent annually, followed by Pakistan (2.9 percent), Thailand (2.6 percent), and Malaysia (2.4 percent). In addition, continued heavy cutting and lack of reforestation and afforestation have added to the problem.[2]

A substantial amount of roundwood, both for firewood and as industrial roundwood, is produced in the region. In 1999, the estimated production was approximately 1 438 million m^3, including 1 075 million m^3 of fuelwood/charcoal and 364 million m^3 of industrial roundwood (Figure 2).

[1] As used here, the Asia-Pacific Region conforms to the general region of the Asia-Pacific Forestry Commission. The Western and Central Asia subregions as used in FAO statistical sources are excluded. See Annex I for countries.

[2] According to the Forest Resource Assessment (FRA) 2000 annual deforestation rates between 1990 and 2000 were 1.4 percent for the Philippines, 1.5 percent for Pakistan, 0.7 percent for Thailand and 1.2 percent for Malaysia. While this may suggest a reduction in forest cover losses, FRA 2000 considered total net forest area, including forest plantations. The figures above refer to natural forests only, excluding forest plantations.

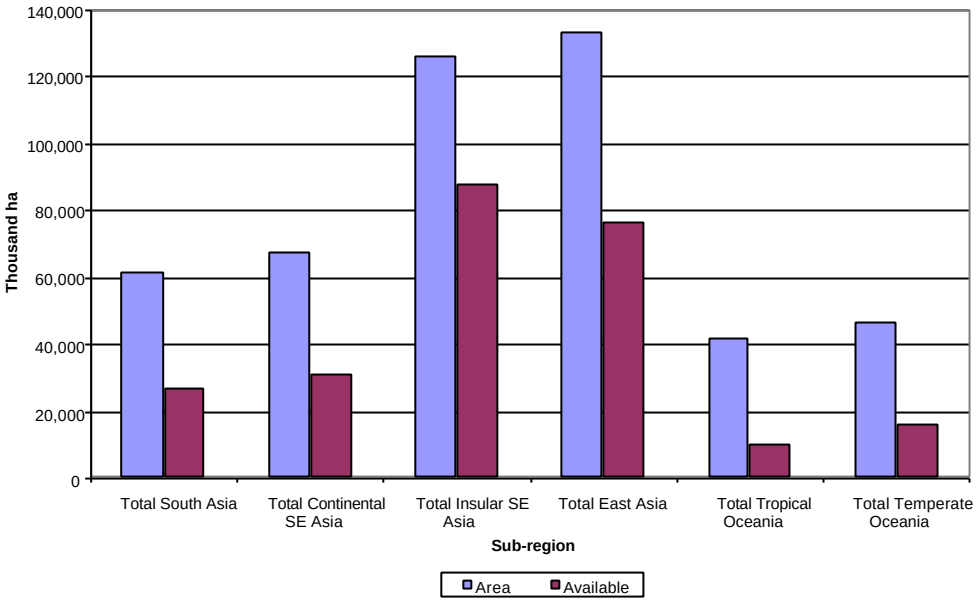

Figure 1. Natural forests in Asia-Pacific: total area and area available for harvesting

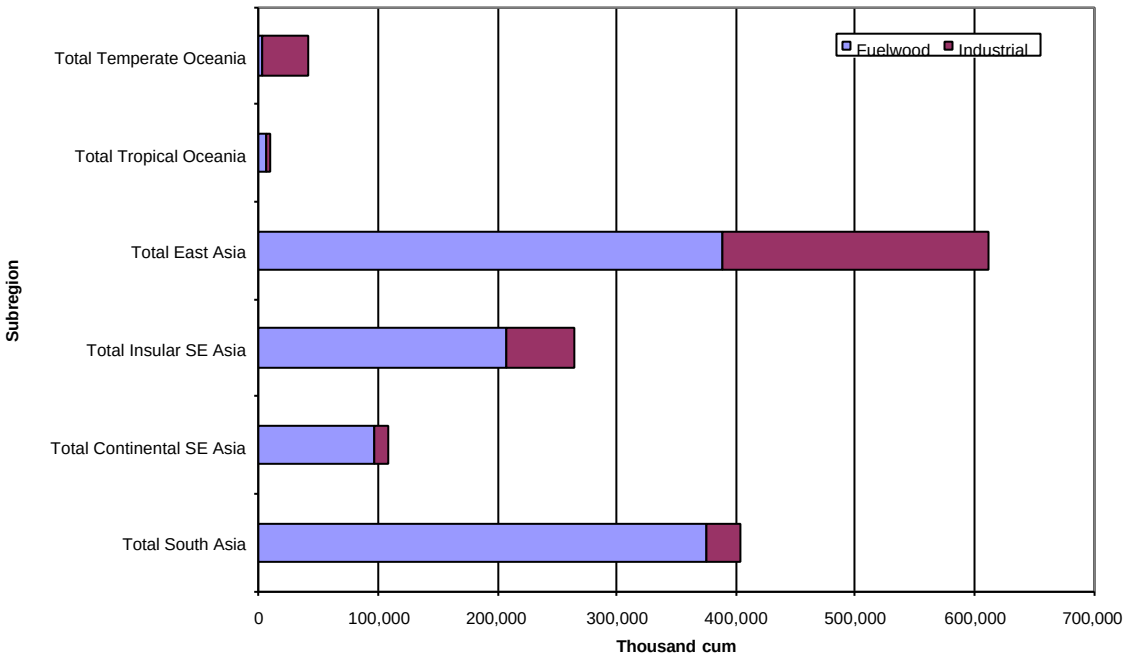

Figure 2. Asia-Pacific production of roundwood by type and subregion, 1999

Fuelwood made up a significant proportion of removals in the region, particularly in India with 297 million m^3 of fuelwood and charcoal used annually. China (204 million m^3) and Indonesia (153.5 million m^3) account for a larger portion of the remaining firewood use.

Industrial roundwood production was primarily from East Asia (China) and Insular Southeast Asia (Indonesia and Malaysia). Oceania production was almost entirely from New Zealand and Australia, with a moderate volume (3.2 million m^3) from Papua New Guinea.[3]

The comparison between industrial roundwood production and the estimated growth of commercial species on available natural forests is summarized in Figure 3. Total growth is estimated at 328 million m^3, and industrial roundwood production is 304 million m^3. While East Asia (China) shows an apparent volume of growth versus harvest, South Asia and Insular Southeast Asia both have large deficits in estimated growth against harvests. These subregions, together with Continental Southeast Asia, demonstrate high rates of deforestation and also face significant challenges in the production of fuelwood and charcoal. Temperate Oceania shows a slight imbalance.

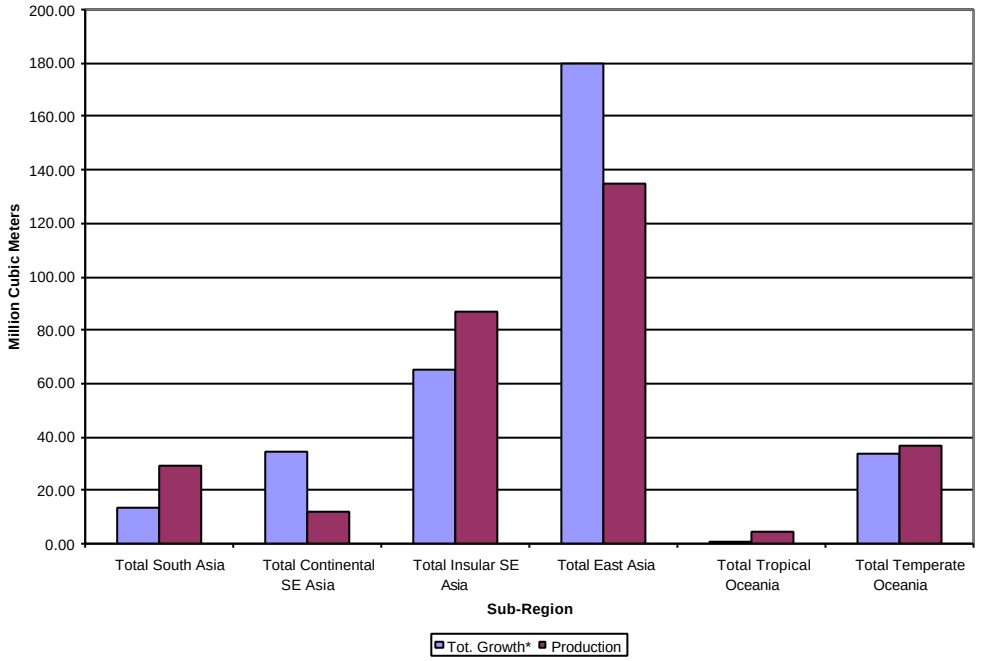

Figure 3. Asia-Pacific net growth of commercial species on available natural forests versus industrial roundwood production

Plantations in the Asia Pacific region

The Asia-Pacific region has a reported 57.4 million ha of industrial plantations, with a net area of approximately 46.8 million ha. However, only 3.5 million ha of industrial plantations are considered presently available for harvest (Figure 4).

Large areas of industrial plantations in India, Malaysia and China are still young and immature, and as yet incapable of significant contributions to timber harvests.[4] The estimated annual growth of the Asia-Pacific industrial plantations available for harvest is 36.1 million m^3 (Figure 5). By subregion,

[3] These data reflect officially recorded and acknowledged harvests. An unknown, but significant, volume of illegal harvest is widely assumed within the region.

[4] Data for plantations are derived from FAO, Global Fibre Supply Model (1998) and were estimated in 1997. National data would indicate both additions to industrial plantations and a higher proportion at or near maturity for industrial harvesting.

the highest share is in Temperate Oceania with a growth of 19.4 million m^3 per year (Australia and New Zealand), followed by East Asia with growth of 10.5 million m^3 per year (primarily China).

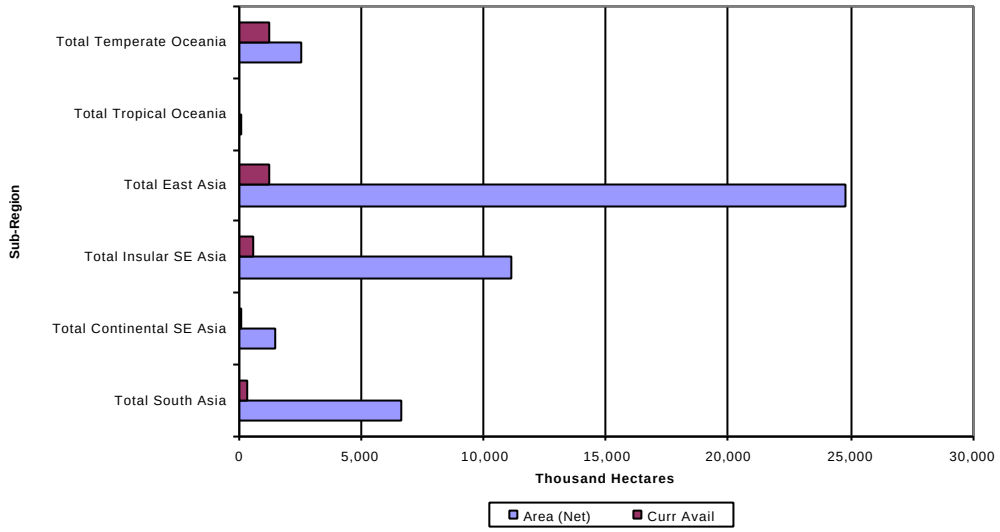

Figure 4. Asia-Pacific industrial plantations: total area versus area available for harvesting by subregion

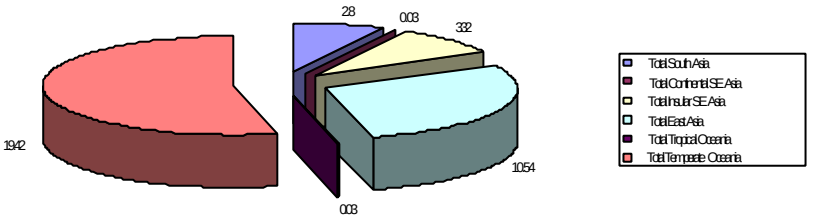

Figure 5. Estimated annual growth of available industrial plantations in Asia-Pacific by subregion

Experiences with logging bans in Asia-Pacific

The goals for timber harvesting bans in Asia-Pacific are seldom well articulated. Most bans are a response to forest policy "failures." The undesirable outcomes from conventional forest practices and utilization are presented in arguing for swift and decisive actions to correct past problems and abuses.

Deforestation and forest degradation of natural forests are common and central themes in logging ban decisions. The problems of over-cutting beyond sustainable levels, the impact on other forest values and the assumed incompatibility of logging with the protection of environmental functions and related uses are typically intertwined. Loss of biodiversity, critical habitats and representative ecosystems, the deterioration of watersheds and water quality, soil erosion, sedimentation and flooding are frequently perceived as consequences of conventional forest practices and harvesting. Inefficient and poor logging technology and related practices have also been identified with damage to residual forest stands. Coupled with the lack of effective reforestation, these factors are often seen as serious consequences of logging. Opening of forests for uncontrolled human migration is blamed for a variety of undesirable, but non-forestry based, land-use consequences.

Logging bans can cause considerable, unanticipated impacts on timber supply. They can indirectly affect sectors and individuals dependent upon forest harvesting, transport, processing and consumption of forest products. Forest plantations are commonly seen as a logical alternative timber supply source. Seldom, however, are such linkages explicit in logging ban policies, legislation or implementation. An assumption of continued national self-sufficiency in timber supply, under conditions of growing demand, is implicit in almost all instances reviewed in this study. The growing role of economic reforms towards more market-based production and consumption decisions, together with the implications of open international trade in forest products, are only indirectly acknowledged in national logging ban policies.

SUMMARY OF COUNTRY CASE STUDIES

As part of the APFC study, case studies for six countries were conducted to assess major efforts in applying logging bans comprehensively to natural forests outside established protected areas. In addition, countries that are considering further restrictions on harvesting, or where bans have been recently announced but not fully implemented, were reviewed to gain further insights. The six countries selected were New Zealand, People's Republic of China, Philippines, Sri Lanka, Thailand and Viet Nam. A brief summary of each case study is provided here as background to the overall findings and conclusions.

The experiences and findings from the six country case studies illustrate the linkage between natural forest conservation (objectives) and logging bans (means) for major policy decisions on natural forests.

New Zealand

New Zealand has approximately 8.1 million ha of forests, including 6.4 million ha of natural forests. Its logging ban will eventually affect 5.1 million ha of State-owned natural forests. Sustained yield restrictions were placed on another 12 000 ha of State-owned and 1.3 million ha of private natural forests as a result of major government policy changes in 1987.

Before 1987, logging was prohibited in some 300 000 ha of State-owned forests, including 80 000 ha that were previously classified as production forests. Policy changes, initiated in 1987, resulted in 4.9 million ha of State-owned natural forests being transferred to permanent conservation status under separate administration, including an estimated 1 million ha of State-owned natural forests with a potential for harvesting under sustainable forest management. An additional 670 000 ha of private natural forests are under voluntary protection agreements and restrictions, although only 124 000 ha are considered to have commercial potential.

In 1987, the Government began to phase out the public sector from the management and development of planted forests, simultaneous with imposing more restrictive measures for logging in natural forests. There are an estimated 1.7 million ha of planted forests, most of which are over 10 years of age. The area of mature plantations is expected to double during the next 10 years. A key aspect of the Government's policy has been to sell the State plantations to private enterprises. Six firms now hold approximately 50 percent of the plantations, with individual holdings of over 50 000 ha each.

The New Zealand plantation program was initiated in the 1920s and 1930s, when it was foreseen that the capacity of the natural forests was being reduced and could not be expected to play a significant role in future timber supplies. Plantations of fast-growing softwoods (conifers), rather than imports, were seen as the logical resource substitute. A second phase of plantation development occurred in the 1960s and 1970s by the State, with the private sector continuing a rapid pace of planting in the 1990s to the present.

Conditions have been positive for plantation development in New Zealand. Relatively flat land is readily available for planting, particularly in the central part of the North Island. Population density is low, and local domestic demand for timber is modest. By early 2000, an estimated 1.7 million ha of commercial plantations, comprising 1.5 million ha of radiata pine and smaller holdings of Douglas fir and other introduced hardwoods, were established.

New Zealand's timber harvest remained below 4 million m^3 through the 1950s. By 1954, harvests from plantations overtook natural forest production at approximately the 1.9 million m^3 mark. In 1970, about 6.8 million m^3 were harvested from State-owned and private plantations, while natural forest harvest fell below 1 million m^3. Plantation harvest has increased steadily to over 16 million m^3 from 1996 to 1999, while natural forest production fell to below 90 000 m^3 (with about 30 000 m^3 coming from residual State-owned natural forests on the South Island West Coast, and the balance from private and Maori lands). Restrictions on private natural forests were progressively introduced with the Forests Act amendment of 1993, allowing for a gradual shift to alternative wood sources until the plantations are mature enough to be harvested.

The annual sustainable cut from plantations is expected to be 30 million m^3 by 2010, compared to the 1999 production of 17 million m^3. While volume is much greater than the declining natural forest harvests, the primary concern is the technical feasibility of radiata pine to substitute for natural forest species. There is currently no consistent supply of specialty or decorative natural forest timbers.

Much of the production from plantations is exported as logs or sawnwood and a range of finished products. In 1998, some 10.7 million m^3 of logs were processed in New Zealand and 8.6 million m^3 were exported. New Zealand is poised to be in a favorable position to supply plantation timbers to the Asia-Pacific region if radiata pine can meet consumer demands.

People's Republic of China

Based on the 1993 forest inventory, China reported a total of 133.7 million ha of forests, with natural forests occupying 99.5 million ha (approximately 74 percent). Natural forests under protection covered 20 million ha in area, with scattered natural forests accounting for 17.7 million ha. China estimates that some 49.6 million ha of natural forests are in need of greater protection. Responding to natural disasters, China has established a priority for natural forest conservation and protection, shifting timber production to forest plantations.

Reflecting concern for the deterioration of the forest environment, and stimulated by severe flooding in the summer of 1998, China imposed a logging ban in State-owned forests to include the upper reaches of the Yangtze River and the middle and upper reaches of the Yellow River. In addition, the Natural Forest Conservation Program (NFCP) stressed the need for afforestation and greening of wastelands, increasing forest cover, rehabilitating forest stand qualities and expanding forest eco-functions.

The estimated total supply for China's timber markets from both State and non-State sources increased from 52.3 million m^3 in 1983 to 83.9 million m^3 in 1987. After a brief decline, supply increased to over 90 million m^3 per year from 1994 to 1996, and totaled 87.6 million m^3 in 1997. Non-State forests have supplied more than 20 million m^3 annually since 1992.

The NFCP aims to reduce natural forest timber production from 32 million m^3 in 1997 to 12.1 million m^3 by 2003. Strict logging bans will be imposed on 41.8 million ha of natural forests.

China is seeking alternative timber supplies by expanding its forest plantations and imports. It has aggressively pursued a program of establishing forest plantations, and has an estimated 34.3 million ha of plantations, of which 17.5 million ha are industrial timber plantations.[5] Current forest plantations are relatively low in quality and their outputs are still below expectation. However, they may become the main source of industrial timber if they can meet the projected 39.3 million m^3 of timber output by 2005. This will require improving forest management practices and adapting the plantation areas and species structure to market demands.

The volume of timber available for domestic consumption averaged 91.3 million m^3 per year from 1993 to 1997. The volume of timber available is declining, while domestic consumption is increasing. Harvest reductions are to be phased in slowly to facilitate production and market adjustments. Initially, the shortfall is to be met by using old timber stocks and imports. Long-term supply is to be derived from both domestic and international sources.

Domestic supply will be stimulated through more intensive forest management (tending and thinning) and through technology and science to improve the utilization rate of forest resources. Substitution of wood-based panels for sawnwood, based on improved recovery and utilization of wood residues, is estimated to have saved the equivalent of 5.1 million m^3 of standing timber.

China's imports of logs totaled 93 million m^3 from 1981 to 1997, averaging about 5.5 million m^3 annually. Maximum import of logs was 10.7 million m^3 in 1988. An increasing proportion of sawnwood and plywood has also been imported. China eliminated tariffs on logs in 1999, leading to a substantial increase in imports of logs (9.1 million m^3, 115 percent increase) and sawnwood (2.4 million m^3, 65 percent increase). Its trading partners have been the United States, Canada, Northern and Western Europe, Russia, Africa, and South America. Within the Asia-Pacific region, China traded most extensively with Indonesia, Malaysia, Philippines, Laos and Myanmar. It has also shown strong interest in the forest resources of Oceania, including Australia and New Zealand.

China concluded that although opportunities exist to increase timber supply outside the natural forests, e.g. through plantations and intensive management, the gap between supply and demand will continue to increase, necessitating more timber imports.

Philippines

The Philippines has about 15.9 million ha of land which is officially classified as "forestland," although most of it is without tree cover. There are a little over 5 million ha of residual and old-growth natural forests, almost all of which are publicly owned. Some 20 million upland residents, including an estimated 6.3 million indigenous people, live in officially designated forestlands. There is widespread poverty in the uplands. The incidence of upland migration and illegal harvesting is high. Low royalty charges, and abuses of logging concessions led to over-cutting of forests. Ineffective operational management and population pressures have resulted in highly degraded natural forests. More than 5 million ha of public timberland have no clear form of tenure or management, essentially creating "open-access."

[5] Recent news releases of the Fifth National Survey results indicated that China's planted forests now total 46 million ha. From 1994 to 1998, the area increased by over 10 million ha, or 2 million ha per year. Plantation development accounted for almost 75 percent of the increase in forest area. Estimated plantation expansion in 1999 is cited at 4 million ha (Source: China Forestry Information Center, 14 June 2000). Data unconfirmed by official Chinese sources.

Annual deforestation reached a high of about 300 000 ha from 1977 to 1980, decreasing to about 100 000 ha annually in the 1990s.

The Philippines has 1.38 million ha of watershed forest reserves. However, these areas generally do not have approved management plans or sufficient budgets for operational management. Most of the 1.34 million ha of protected areas also have no approved management plans.

Logging bans have been selectively imposed since the early 1970s on a case-by-case basis. General bans were initiated in 1983 covering much of the Philippines, with additional specific bans in 1986 and 1989. More that 70 percent of the provinces are now under logging bans or harvesting moratoria. The number of timber license agreements has been reduced from 114 in 1989 to 21 in 1998 down to 18 at present. The area under license has decreased to only 0.5 million ha. In 1991, the DENR issued an administrative order banning timber harvest in all old-growth forests of the Philippines. Similarly, the annual allowable cut was reduced sharply from 5 million m^3 in 1990 to about 0.5 million m^3 at present.

At present, two proposed bills are under consideration. The first, Senate Bill S. No. 1067, "An Act to Protect the Forest by Banning all Commercial Logging Operations, Providing Mechanisms for its Effective Enforcement and Implementation and for Other Purposes" would prohibit all commercial logging operations in all types of forest for a period of 20-30 years. The second, "An Act Providing for the Sustainable Management of Forest Resources and for Other Purposes" (Senate S.B. 1311) allows for logging in some residual forests and would constitute a partial ban (fragile areas, steep slopes, protected areas) and provide for sustainable management.

In 1998, the estimated demand for timber was about 5 million m^3. This is expected to grow by about 2 to 5 percent annually. At present, the timber supply is comprised of about 588 000 m^3 (or 12 percent of demand) from harvests of natural forests mostly under existing licenses and communities, 796 000 m^3 (16 percent) from imports, about 721 000 m^3 (14 percent) from coconut, and only 45 000 m^3 (or 1 percent) from plantations. Over 57 percent are not formally accounted for and are believed to comprise "substitutes" (steel and cement) and illegal supplies of timber.

Plantations have been called the "only reliable source" of timber, together with the sustainably managed natural forest still under timber license agreements. Between 1986 and 1996, the Government and private sector developed 773 000 ha of plantations. However, only about 36 percent of the plantations are presently available for harvest. Current estimated yields are only about 300 000 m^3 annually for the next decade, although projections made in 1990 forecast an output of 2.77 million m^3 by 2000.

Government policies on industrial plantations have changed about 20 times between 1975 and 1995. This has caused instability and uncertainty, and subsequently very low investment. Weak incentives have led to only marginal private sector involvement, discouraging further expansion. Restrictions, lack of long-term financing, the need for local collaboration, and policy uncertainty all contribute to the low level of plantation establishment and management.

In lieu of a stronger role and capacity for plantations, the Philippines has shifted to imports as a source of timber supply. With an initial volume of about 400 000 m^3 in 1989, log imports rose to more than 750 000 million m^3 in 1997. Total imports increased from 5.5 percent of supply in 1989 to 16-20 percent in 1996-1997.

Sri Lanka

The natural forests in Sri Lanka are owned and managed by the State. In 1992, they covered about 2 million ha, out of which 1.5 million ha were closed forests. The State also has a monopoly on harvesting and marketing of timber from these forests and State-owned plantations. The Forest Department manages approximately 60 percent of the natural forests, while the Department of Wildlife Conservation oversees about 30 percent of forests located in protected areas. The Forest Department is also responsible for about 135 000 ha of forest plantations.

In 1989, a "temporary ban" on logging in natural forests was imposed on highly degraded areas to allow them to recover and to develop sustainable management plans, primarily in the wet zone in the southwest of the island. This was extended to a total ban in 1990, at which time another 31 areas, covering 61 300 ha, were added to the protected area system. Overall, the ban affects about 1 million ha of production forests. In 1995, a large proportion of natural forests was given protected area status, and residual natural forests outside the protected areas were set aside for sustainable multiple-use management.

Prior to the ban, the demand for industrial logs in 1985 was approximately 980 000 m^3, of which 425 000 m^3 (44 percent) were sourced from natural forests. Non-forest wood supplies – mainly from homegardens, rubber, coconut and palmyrah plantations – amounted to 455 000 m^3, and forest plantations provided 80,000 m^3 of industrial wood. By 1993, homegardens, rubber and coconut plantations supplied over 70 percent of wood while plantations contributed about 4 percent. The State Timber Corporation (STC) harvests from natural forests have declined sharply, and since 1990 State plantations are the main source of timber for the STC.

Plantation forestry began after the formulation of the first Forestry Policy in 1929, with extensive planting of teak, eucalyptus, mahogany and pine. From the 1950s to 1970s, emphasis was on industrial forest plantations, but the focus shifted to developing private woodlots and forestry farms in the 1980s. Industrial plantations on State lands were extended to local people, rural communities, industry and other private organizations. By 1998, the Forest Department was managing 92 340 ha of State plantations, in comparison to the 5 000 ha of private plantations. Annual timber production from plantations is expected to be about 90 000 m^3 between 1999 and 2005. This will likely cover only 36 percent of the anticipated gap between demand and supply of logs. Actual plantation harvests averaged 37 700 m^3 from 1985 to 1989 and only 27 100 m^3 since 1990.

Sri Lanka was essentially self-sufficient in timber prior to the logging ban, with fuelwood demand accounting for some 90 percent of utilization. Industrial log production in 1985 was about 980 000 m^3. Log imports were modest. Between 1985 and 1995, annual sawnwood imports ranged from 21 000 m^3 to 38 000 m^3; Malaysia, Singapore, South Africa and Indonesia were the main suppliers. Sri Lanka is also a net importer of wood-based panels but in modest volumes. Imports were 30 000 m^3 in 1995.

Lack of proper management and inappropriate species, encroachment, fire damage, elephant damage, and the poor quality of plantations have all limited the plantations' harvest potential. Incentives for private development of commercial plantations remain weak. Non-forest timber from homegardens and increased sawnwood imports have largely met the shortfall in industrial wood supply created by the logging bans in Sri Lanka.

Thailand

Thailand has experienced continuing deforestation over the last three decades, often at rates exceeding 3 percent per year. Forest cover declined from 53.3 percent of the land area in 1961 to 25.3 percent in 1998, leaving approximately 12.9 million ha of natural forests. Thailand has approximately 8.1 million ha of natural forests in protected areas, with additional areas pending approval. The large rural population that inhabits many of these areas is a major concern. Reforestation and rehabilitation of degraded forests are difficult or impossible because of illegal forest encroachment.

The logging ban in Thailand was imposed on 17 January 1989 in response to devastating floods in Nakorn Srithammarat Province in southern Thailand the previous November. Logging contracts and concessions were cancelled, and applications for new concessions were dismissed. In 1991, the Government reoriented its forest policies to emphasize management of some 27.5 percent of the land area as conservation and protected areas.

In 1992, the Government, through its Forest Plantation Act, encouraged forest industries to develop large-scale commercial plantations to supplement the State's efforts. A forest plantation

plan for 1994-1996 aimed to establish 800 000 ha of new plantations by both the private sector and Government. The Act also allowed local private sector groups to use degraded forestland with a special exemption from royalty fees. By 1997, however, it was clear that the goals of the reforestation programs would not be on schedule. Some 437 000 ha had been "reserved," but planting was completed on only about 165 000 ha.

The pursuit of large-scale, industrial plantations has faced strong opposition from local farmers and villagers who believed that commercial plantations would divert land from local use and deprive them of their livelihoods. By the end of 1992, most large-scale commercial reforestation was halted. Since then, efforts to promote small-scale plantations with local participation have been undertaken, but with only little success. Bureaucracy, over-regulation, lack of economic incentives and the long gestation periods are seen as serious constraints to plantation development. Furthermore, the market system for the production, distribution and consumption of privately produced timber is weak, with consequent inefficiencies and loss of value.

From 1906 to 1997, between 850 000 and 900 000 ha of plantations were established, in sharp contrast to the reduction of approximately 14.4 million ha of natural forests from 1961. Thailand has an implicit policy of maintaining self-sufficiency in timber, but has often been accused of turning a blind eye to illegal logging and is increasingly dependent on imports from its neighbors and the expanding Pacific Rim market to meet its needs. The country has promoted an import policy and reduced log import tariffs. Myanmar has been a leading source of timber, leading to armed conflicts among different factions in Myanmar over log trade routes. Along the Thai-Cambodian border, log trade - much of it illegal - is estimated to have reached 750 000 m^3 prior to the Cambodian export ban in December 1996.

Domestic wood production was reported to be 54,800 m^3 in 1998, down from a high of over 2 million m^3 in 1988 prior to the log ban. No separate data are reported for production from natural forests or plantations. However, it is clear that plantations are not yet meeting expectations, nor are they currently supplying a significant volume of industrial timber.

Viet Nam

Viet Nam's forest cover is about 10.9 million ha, comprising one-third of the total land area, including 9.5 million ha of natural forests and 1.4 million ha of planted forests. In 1995, the production forests were about 5.9 million ha, which included 5.3 million ha of natural forests and 631 000 ha of plantations. The remaining forests were set aside as special-use forests (898 000 ha), and protection forests (3.5 million ha).

Between 1943 and 1995, about 110 000 ha were deforested annually. Concerns about the continued deforestation and degradation of the remaining forests led to a variety of restrictions on logging in the natural forests in the early 1990s. By 1995, State-owned production forests were yielding only about 1 million m^3 of wood annually, mainly from depleted secondary forests.

In June 1997, the Government imposed the logging ban in natural forests on 4.8 million ha. It prohibited harvesting in special-use forests, and declared a 30-year moratorium on logging in critical watershed protection forests. Logging in the remaining natural forests is restricted to less critical natural forests in 19 provinces. Annual harvest volumes were expected to drop from 620 000 m^3 in 1997 to 300 000 m^3 by 2000. The number of enterprises permitted to log was reduced from 241 in 1996 to 105 by 2000.

Total industrial roundwood output declined from 3.4 million m^3 in 1990 to 2.2 million m^3 in 1998. Production from the State sector declined from 1.1 million m^3 to only 300 000 m^3 during the same period. Similarly, fuelwood exploitation decreased from 32 million steres to 25.9 million steres. Due to the timber shortages and the logging ban, the volume of illegal logging increased to at least 100 000 m^3 annually.

Current timber supply is estimated at 1.35 million m^3 of large-diameter wood (>30 cm) and 900 000 m^3 of small-dimension timber. Large-dimension timber from natural forests is about

300 000 m^3 under approved licenses, and as much as 100 000 without license. An additional 700 000 m^3 are obtained from plantations (incl. rubber), and about 250 000 m^3 are presently imported. Most of the large-dimension timber is used to produce sawnwood, with small volumes going to the handicraft and other sectors including pulp and paper. Small-dimension wood from plantations is used for basic construction, wood-based pulp and paper, pit props, matches, firewood, wood chips (for export) and boat building. Total demand is estimated to be over 4 million m^3, suggesting shortages of 1.5 to 2 million m^3 until 2005 when more plantation wood should be available.

Total annual wood imports (large and small dimensions) are estimated at 300 000 m^3. It is expected that imports of industrial wood will increase to over 500 000 m^3 per year from Malaysia, Laos, Cambodia, Myanmar, and Russia. Although the Government coordinates the flow of imports, some provinces close to Laos and Cambodia have direct contacts with the suppliers.

According to national policies, future wood supplies are to be secured only from plantations. Development of forest plantations has been slow, but has picked up recently. The volume harvested from plantations is increasing gradually. Most plantations are immature, and are located in the central and northeast regions. Under such circumstances, wood shortages are expected over the next 5 to 10 years.

By 2005, the annual production from natural forests is expected to remain at about 300 000 m^3. With assumed new planting of 200 000 ha of plantations per year, production of 6 to 8 million m^3 is projected by 2005. Scattered privately planted trees are also expected to yield 1 to 1.5 million m^3. Added together, the projected outputs would be able to meet industrial wood demand, which is expected to double to about 9.5 million m^3 by 2005.

In addition to industrial timber utilization, households and industries also consume approximately 14 million m^3 of fuelwood. Approximately 8.7 million m^3 is derived from natural forests, with 5.7 million m^3 taken from plantations and scattered trees. Some rural communities face a shortage of firewood because alternative energy sources are scarce and largely unavailable to them.

The imposition of the logging ban in 1997 was accompanied by development of a plan to regenerate 5 million ha of forestland. If successful, the program will increase wood production to meet domestic demand by 2010.

Viet Nam is allocating land for long-term use (up to 50 years) to households, individuals and organizations. To assist farmers residing in forest areas, the Government allocated up to 3 ha of land to interested families for development of economic forests.

The ability of Viet Nam to adequately meet future demands, particularly after 2005, depends, in no small part, on the successful implementation the logging ban and the 5 million ha reforestation program. Major adjustments to State enterprises and wood industries, and attracting local and international investors, are also important elements necessary for success.

ISSUES AND CONCERNS

The country case studies reveal a highly complex and variable mixture of symptomatic reasons for imposing logging bans and restrictions on harvesting in natural forests. Concern over continuing deforestation is the dominant issue. Action is primarily driven by the aim of halting further deforestation and degradation of remaining natural forests.

Other concerns are also evident, and are often co-mingled with vague or undefined aspects of "forest conservation" or "forest protection." From the case studies and broader review of the Asia-Pacific region, the major issues regarding natural forests include:

- **Loss of biodiversity, critical habitats and representative forest ecosystems**

  Timber harvesting is frequently perceived to be a major contributor to loss of biodiversity, habitats (primarily for wildlife) and representative ecosystems. Where natural forests are logged selectively, only higher-valued species are usually taken, with the consequent loss of seed source or natural regeneration for these species relative to lower-valued residual species. Non-timber components of the ecosystem can also be damaged or destroyed during logging. These concerns reflect the view that non-timber values of retaining biodiversity, habitats and ecosystems outweigh, at the margin, the value of the timber harvested and that timber output should be reduced to "protect" or provide a higher level of such values.

- **Deterioration of watersheds and water quality**

  Removal of all or part of the forest cover reduces water retention capability of watersheds, resulting in increased peak water runoff and reduced water flows during periods of low precipitation. Watersheds with natural forest cover are frequently the source of both domestic and industrial (including agricultural) water. Reduction of vegetation in such watersheds also contributes to soil erosion, and thus to declining water quality.

- **Soil erosion, sedimentation and flooding**

  Vegetation loss can expose soils to both wind and water erosion. In many areas of the Asia-Pacific region, soil loss and declining productivity are major concerns for both forestry and agriculture. Further, the disturbance of soils frequently leads to serious sedimentation of streams, rivers and reservoirs. Severe flooding, as experienced in Thailand and China, in recent years, has led directly to immediate and comprehensive logging bans in natural forests.

- **Forest damage from inappropriate logging and abuse of contractual obligations**

  Use of ground-based logging equipment, and poor roading and skidding of harvested timber, frequently damage soils and residual forest trees. Large volumes of slash and debris also hinder reforestation efforts, and commonly increase the risk of fire. Applying reduced impact logging practices remain the exception rather than the norm across the region.

  Where contract enforcement is lax or ineffective, violations of harvesting guidelines is common, resulting in site damage and deterioration of stand quality. Incentives to comply with logging standards are often weak, while the potential financial benefits of operational short cuts and inappropriate techniques may be great. Over-cutting beyond authorized levels may also yield direct financial benefits to harvesters while contributing to further forest degradation. Illegal harvesting is a common concern, both prior to and following the imposition of logging bans.

- **Inability to effectively monitor and regulate logging operations, including inability to detect and prevent illegal logging**

  Where logging is carried out under permit or license systems, the capacity of governments to effectively monitor and enforce regulations may be insufficient. Even where logging is directly the responsibility of a subsidiary government unit, the lure of greater revenues and/or lower costs may lead to abuses or conscious avoidance of contract or permit conditions. The potential for corruption or complacency in enforcement can also lead to abuses. The lack of measurable criteria for contract conditions (for example, reforestation) can contribute to disputes and uncertainties about standards of performance.

- **Inadequate reforestation and forest regeneration**

  Land tenure arrangements and instruments for assigning use rights vary greatly throughout the Asia-Pacific region. Frequently, rights are allocated for harvesting State-owned and administered forests, but obligations for reforestation or forest regeneration remain with the State. In cases where reforestation by users is required, standards and performance may be vague and inadequately monitored, without effective performance bonds or other provisions to assure compliance. The lack of capacity and funding for State follow-up to regenerate cut-over areas or to reforest barren or degraded lands leads to criticisms of the initial decision to

grant logging permits, even when the logging itself is in compliance with existing regulations and guidelines.

- **Lack of management of cut-over forestlands**

  Inadequate support for management and reforestation, combined with poor enforcement of restrictions and use rights, frequently lead to poor resource conditions and degradation. Logging is again the most obvious contributor to forest disturbance, creating a need for strong management plans and operations, especially in cut-over forests.

- **Uncontrolled human migration and habitation of forested areas facilitated by access created by logging roads and opening of forest stands**

  The natural forests of Asia-Pacific are, in most cases, subject to heavy population pressures. One consequence of logging in these forests is the creation of access through logging roads. In addition, the stand density is reduced by virtue of the logging and land clearing is consequently made easier. Shifting cultivation, small landowner settlement, illegal logging and increases in the forest populations may follow. Without logging roads, these forests would remain more remote and inaccessible. Hence, banning logging activities is seen as one means of preventing or reducing continued encroachment.

- **Inappropriate land clearing and conversion to agriculture**

  Encroachment and opening of forests to settlement also encourage forest conversion. Where conservation or production forests are considered to be the socially optimal choice of land use, such conversions reduce the overall contribution of these lands towards social welfare. They also fragment the remaining natural forests, making the enforcement of forest policies and regulations more difficult, and increasing the potential for further land-use conflicts.

- **Conflicts with rights and cultural traditions of indigenous peoples and local communities**

  The natural forests of much of the Asia-Pacific region are home to significant numbers of people, including many indigenous groups. The social and cultural values of these peoples often conflict with those of the increasingly urban population. Traditional rights and land tenure of local communities and cultures provide for many subsistence and non-timber values that are often unrecognized by commercial forest management operations. While timber production often disrupts traditional local use and dependency, forest protection measures may prohibit access and use. Centralized government regulation and control, together with inadequate recognition of local dependency and traditional rights, can make it difficult to forge consensus on forest management, production or conservation. Banning of commercial timber harvesting, particularly by government or "outside" contractors, is often seen as a viable option for protecting local rights and cultures.

- **Loss of scenic, cultural and aesthetic resources**

  Asia-Pacific countries have sought to protect scenic, cultural and aesthetic resources that frequently depend on undisturbed forest structures and natural topographic features. Forest disturbances caused by logging operations threaten these values which are largely non-market in nature and thus seldom given due consideration relative to the direct financial revenues and profits from logging.

- **Conflicts between management for timber and for non-timber forest products, including medicinal plants and forest genetic resources**

  Increasingly, non-timber and ecological values of forests are given greater weight in forest policies. Protection of biodiversity, conservation of gene pools, the still unknown potential of medicinal plants and other social values of forest fauna and flora are often incompatible with the management of natural forests for commercial timber. Timber production also potentially conflicts with efforts to sustain or increase the yields of non-timber products and services important to local people.

- **Climate change and carbon storage**

  Natural forests are increasingly recognized for their roles in sequestering carbon and mitigating climate changes. Through photosynthesis, forest growth reduces atmospheric carbon dioxide concentrations and generates oxygen. Capture of atmospheric carbon and its storage in forest biomass have become regional and global concerns, increasingly covered under international conventions and agreements. Harvesting reduces the biomass (at least temporarily) and if deforestation results, these values are permanently lost.

NATURAL FORESTS AND POLICY CHOICES FOR IMPROVED PROTECTION AND USE

The policy issues and concerns behind logging bans in the Asia-Pacific region reveal two very different types of policy shortcomings: (i) inappropriate forest land-use allocation, and (ii) inefficiencies in managing and utilizing forest resources.

Forest land use

Forestland use issues involve the allocation of land to forests, and the subsequent decisions on the various uses of those forests. Forestland use often directly conflicts with alternative land uses such as settlements, agriculture or mining. Alternatively, there are many "mixed" land uses involving protected areas, watersheds, recreation and scenic areas, or agroforestry. National policies must reconcile and provide guidance and institutional arrangements for deciding priorities among forest and non-forest uses as well as for the level and "mix" of multiple uses.

"Forest use" and "timber production" have frequently been assumed to be synonymous in the past. Lands which have (or have had) forest cover are most often simply classified as "forestland" in spite of potential alternative uses. This classification has been quite rigid, making changes difficult. The conversion of lands from forests to agricultural land use, for example, is often viewed as "encroachment" on forests.

Land designated for forestry has frequently focused on wood production (both industrial timber and fuelwood). The maximum output of wood and fiber has often been the primary goal of forest policies. Other uses, including environmental protection functions, non-wood forest products, water flow, and so on, has often been relegated to secondary importance.

This conventional pattern of allocating forest use primarily for timber is now considered inappropriate by most people. But while multiple-use forestry is more widely acknowledged and appreciated than in the past, in practice timber is still given priority under most management schemes.

Most Asia-Pacific countries have long-standing policies for designating some forestlands as protected areas, where timber harvesting is prohibited. Sometimes, such designations have been based on intensive studies and analyses of the relative priorities and trade-offs with other land uses and values. In other cases, the administrative designation of protected areas has occurred without comprehensive planning and assessment of priorities. Where the objectives for such designations are not clear and specific, withdrawal of forests from production may have unnecessarily constrained productive sustainable harvests of timber. It is possible that other options could have achieved the desired results, but such options have rarely been pursued in the region. The need for total restrictions on timber harvesting, of course, depends on the actual resource conditions and the specific objectives.

How much forest should be allocated to alternative and mutually exclusive uses is a major policy choice that is usually controversial. Recent history demonstrates that "too much" forest may be allocated to timber and "too little" for other purposes. Resolutions and consensus over forest use are extremely difficult to achieve when "either-or" choices are required between two or more desirable uses that are indeed mutually exclusive. Certain forms of forest conservation and protection, for example, may be technically incompatible with even the lightest intensity of timber

harvesting. In other cases, appropriate protection and conservation may be practical and feasible under broader concepts of "sustainable forest management."

Efficiency in forest resource use

Concerns about inefficiencies in forest management and timber harvesting also frequently arise. Much of the debate centers on inappropriate management schemes, unregulated harvesting, poor institutional arrangements and environmentally damaging logging technology, which often result in unintended loss of environmental values. These inefficiencies and abuses are a primary cause for calls to ban logging. In many cases, the negative consequences of poor logging practices detract attention from viable options for improved practices that could maintain multiple values of forests.

Environmental forest functions may be seriously impaired or destroyed during conventional timber harvesting. Wasteful harvesting and damage to residual stands also negatively impact future forest productivity, and add significantly to private and social costs.

Clearly, there are conflicting opinions regarding the ability to overcome inefficiencies in forest resource use. The technical and economic viability of sustainable multiple-use management and modified management strategies such as reduced impact logging (RIL) to reduce both economic and environmental costs have been discussed extensively. It is evident from experiences throughout the region that modifications to current management practices are required if timber harvesting is to be widely accepted.

THE EFFICACY OF REMOVING NATURAL FORESTS FROM TIMBER HARVESTING AS A CONSERVATION STRATEGY

Recent experiences in implementing logging bans and harvesting restrictions in Asia-Pacific have been mixed. Following the imposition of logging bans, significant areas of natural forests have been classified as protected areas, or the absence of harvesting is taken as equivalent to protection. While limited success of some natural forest conservation objectives is evident, lack of effective protection remains a problem.

The lack of specific conservation and protection goals contributes to an inability to measure performance and achievements, while simultaneously creating confusion and disagreement regarding the objectives. Adverse economic and social impacts have also occurred, further undermining the incentives for sustainable management, conservation and protection of non-timber values. Removal of natural forests from timber production has had significant impacts on the forest product sector, and sometimes disruptive effects on neighboring countries through legal and illegal trade, timber smuggling, and market disruptions.

Finally, a distinction between simply banning logging and the correlated need to formulate and implement strategies and programs for effective conservation and protection is essential. An uncritical assertion that halting logging is either necessary or sufficient to assure conservation has resulted in many natural forests being declared as protected while deforestation and degradation continue largely unaffected. Only where logging bans have been accompanied by transitional adjustment policies for alternative timber supplies, social and economic "safety nets" to minimize local burdens, and sustained and effective conservation management have bans proven effective.

Impacts on timber production

The remaining natural forests of the Asia-Pacific region that are still available for harvesting are experiencing heavy pressures for increased harvests. These pressures also spill over onto natural forests that are "presently unavailable" for harvesting. While the country case studies have illustrated that logging bans reduce harvests, it is also evident that continuation of pre-ban practices would have also led to falls in production as the natural resource declines in area and quality.

With few exceptions, harvest volumes from the remaining natural forests can be expected to decline in most countries in the region. Harvest bans will impact the timing and rate of harvest decline, but not the fact that prior levels of harvests were also unsustainable. Total gross annual growth of commercial species on presently available natural forests exceeds present harvests of industrial timber by about 24 million m^3, compared to the production of 304 million m^3.

Further deforestation and degradation at or near the present rate of about 3.3 million ha annually will reduce the capacity of Asia-Pacific to produce industrial timber from natural forests. With an average cutting cycle of about 38 years, present harvesting intensity is about 34 m^3 per ha for undisturbed natural forests and 17 m^3 per ha for disturbed forests. Based on the ratio for available undisturbed and disturbed forests,[6] deforestation could reduce regional harvest by about 1.8 million m^3 per year.

The present ratio of available natural forests also provides a rough estimate of the impacts of logging bans, assuming that bans impact both undisturbed and disturbed forests by the same proportion. The banning of harvesting on 1 million ha of available natural forests would reduce potential harvesting by approximately 550 000 m^3 annually.[7] For example, China's logging ban affecting 41.8 million ha with an estimated reduction in harvest of 19.9 million m^3 by 2003 implies an average reduction of 476 000 m^3 per 1 million ha.

For the six countries included in this study, the impacts on timber harvests from the natural forests are considerable. The expected impact for China is a reduction from 1997 levels (pre-ban) of some 32 million m^3 from State-owned natural forests to only 12 million m^3 when the ban is fully implemented by 2003. For the Philippines, the production was an estimated 5 million m^3 prior to the 1991 general ban, before declining to about 0.5 million m^3 most recently. Similarly, Thailand's natural forest harvest was about 2 million m^3 prior to the 1988 logging ban, then falling to only about 55 000 m^3 (recorded harvest) in 1998. Sri Lanka saw the harvest from State-administered natural forests fall from 425 000 m^3 in 1990 to nearly zero, creating an almost total dependence on alternative supplies. Viet Nam likewise experienced a sharp drop in natural forest timber production from about 1 million m^3 annually between 1990 and 1995 to a presently authorized level of only 300 000 m^3 after the 1997 general logging ban.

For these five countries, the aggregate reduction following comprehensive logging bans is approximately 29.5 million m^3 per year.[8] New Zealand is the only country among the case studies that did not suffer such a large decrease in the volume of timber harvested. It had anticipated a declining capacity for natural forest harvests over several decades, and had pursued a strategy for both government and private plantations to supply its industrial timber. The transfer of almost all State-owned natural forests to conservation status in 1987, therefore, had only a minor impact on commercial timber supply. Harvest of natural forests was about 2 million m^3 in the early 1950s, falling to below 1 million m^3 by 1970. Natural forest harvest (including West Coast forests) was below 90 000 m^3 in 1999, compared to 17 million m^3 from plantations.

[6] Undisturbed forest is 22.2 percent of available natural forest.

[7] The assumed ratios used here are averages for the Asia-Pacific region as estimated in the Global Fiber Supply Model (FAO 1998) and are used for illustration only. Actual impacts would vary by country, the ratio of disturbed to undisturbed available natural forests, and the details of specific logging ban policies.

[8] As noted, however, the time period for implementation of bans in these five countries are variable and overlap different years from 1988 (Thailand) to 1998 (China). Further, the bans have not yet been fully (or effectively) implemented and an unknown volume of timber from natural forests continues to be harvested illegally.

Alternative timber supplies

The imposition of logging bans in natural forests involves significant assumptions about timber supply from current or future plantations. For example, China's shift of focus is founded on the rapid expansion and maturing of fast-growing industrial plantations, complemented by other NFCP strategies. Viet Nam is relying on the successful implementation of its 5 million ha reforestation program. Serious consequences in both the Philippines and Thailand illustrate the problems when commercial plantations do not develop as planned. Thailand's goal of some 800 000 ha of new commercial plantations has fallen short, reaching only 164 800 ha by 1999. The 773 000 ha plantations in the Philippines are now expected to yield only approximately 300 000 m^3 annually in contrast to 1990 projections of 2.8 million m^3.

The Asia-Pacific region has reached a point where the production of industrial roundwood is very close to the net growth from available natural forests (FAO 1998). Current plantation yields still fall far short of the volumes required to offset logging bans, declining production and increasing demands. The regional relationship between estimated growth of commercial species in available natural forests and industrial roundwood production is shown as the first series ("Nat/Prod") in Figure 6. The corresponding comparison of combined natural forest and plantation growth with industrial roundwood production is displayed as the second series ("Total/Prod").

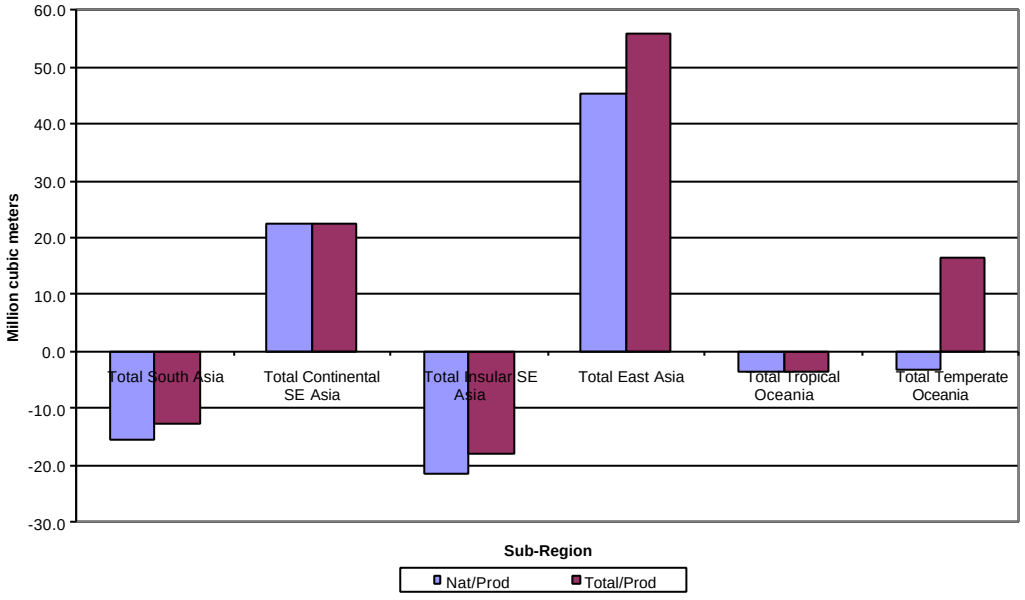

Figure 6. Asia-Pacific balance between estimated net growth from available natural forests and plantations compared to 1996 industrial roundwood production

If it is assumed that both the total growth of commercial species from available natural forests and from industrial plantations are available for harvest, the overall situation for Asia-Pacific would improve. The overall balance between total growth from both natural forests and plantations and the 1996-level of industrial timber production improves to a positive net balance of 60 million m^3. However, there are significant differences between individual subregions and countries (Figure 6).

All subregions show an improved balance when plantation growth is included, although the very small growth for Continental Southeast Asia and Tropical Oceania does not significantly change

the situation for these subregions. South Asia, Insular Southeast Asia and Tropical Oceania continue to show a deficit between estimated total growth and industrial roundwood production. Only Temperate Oceania switches from a deficit to a positive balance when New Zealand's plantation timber is taken into account. Malaysia and India continue to show significant deficits even when the contribution from their plantations are included.

Reduced log production due to the logging bans in the six case countries totals nearly 30 million m^3 annually. Plantations, as an alternative supply, are estimated to provide 36.1 million m^3 (Figure 6), but only if all net growth from available plantations can be efficiently harvested. Additional withdrawals of natural forests together with continuing deforestation and degradation can be expected to further reduce wood supplies. More productive plantations and more effective management of such plantations will be needed *if* the balance between growth and consumption is to be maintained on a region-wide basis under growing demands. However, continuing reluctance to support intensively managed, single-species commercial plantations in many countries, and emerging challenges to genetically altered trees will make such expansions in plantation forestry less likely.

International trade implications

Countries of the Asia-Pacific have long engaged in international trade – both importing and exporting – as resource stocks and markets for wood products dictate. While trade barriers and national consumption policies have frequently distorted true open trade in the past, and trade has been sometimes reserved as a national government monopoly, considerable volumes of wood are traded in the region and worldwide.

The Asia-Pacific region has consistently been a net importer of roundwood (industrial and fuelwood). Already in 1980, the region imported over 70.6 million m^3 while exporting 44.1 million m^3 (a net deficit of 26.6 million m^3 derived from outside the region). This deficit grew to over 32.6 million m^3 by 1994. FAO provisional projections for 2010, based on the "most likely" scenario of development and economic trends, forecast a net trade deficit of 46 million m^3 (Figure 7).

The region also trades sawnwood, plywood and wood-based panels, joinery products, pulp, paper, paperboard and many specialized products. Sawnwood is, by far, the most significant processed solid wood product traded. As shown in Figure 7, the region has also been a net importer of sawnwood; the net trade deficit by volume is smaller than for roundwood but is increasing. In 1980, the region had net imports of 837 000 m^3 of sawnwood. The deficit grew to over 11.1 million m^3 by 1994. In addition to Japan's role as a large importer, both China and Thailand became significant importers of sawnwood. FAO's provisional projections indicate a potential net trade deficit of 17.2 million m^3 of sawnwood by 2010.

While many countries maintain policies of remaining self-sufficient in timber or aspiring to self-sufficiency, the Asia-Pacific case studies indicate the difficulty in doing so in the face of deforestation, forest degradation and lack of adequate plantation resources. In addition, logging bans which are abruptly imposed over a short period without adequate consideration of realistic timber supply alternatives (including trade) and likely growth of demand, create tremendous pressure for increasing imports.

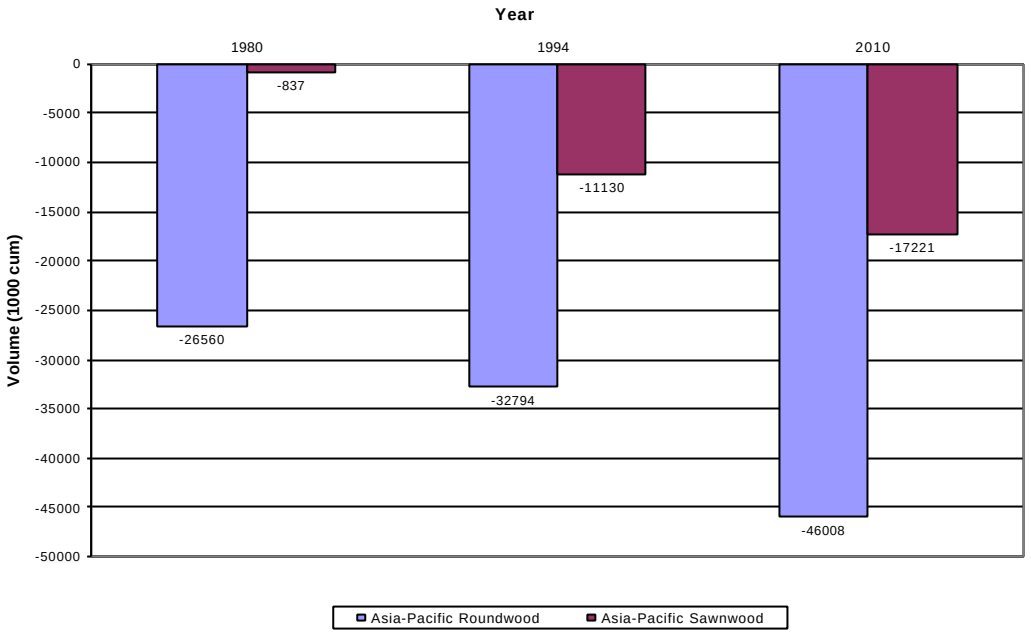

Figure 7. Projected Asia-Pacific net trade in roundwood and sawnwood, 1980, 1994 and 2010

As noted, Thailand, the Philippines, Viet Nam, and Sri Lanka have all had minimal success in developing greater production from plantations to compensate for the loss of production from natural forests resulting from logging bans. While Sri Lanka has significant capacity for timber production from homegardens and other non-forest resources, Thailand, the Philippines and Viet Nam do not have such a supply base. All four nations have become net importers of industrial wood, with imports expected to increase even further. China has identified the need for greater imports, at least for a transitional period. Only New Zealand has sufficient plantation resources to meet domestic demand and for export.

International trade also opens the possibility of "exporting" or "externalizing" the problems associated with timber harvesting to other countries. For example, there have been allegations that Thailand's logging ban has resulted in both illegal logging and greater imports along the borders with Laos, Cambodia and Myanmar. Protection of natural forests in China has led to greater imports from Myanmar and the Russian Federation, potentially contributing to unsustainable harvesting in northern Myanmar and parts of the Russian Far East and East Siberia. Viet Nam also imports timber from Cambodia and Laos, allegedly in part from illegal harvests. While difficult to document, these negative effects raise important issues regarding the environmental and protection policies of exporting countries.

Recent analyses by Sedjo and Botkin (1997) and Sohngen *et al.* (1999) provide some insights into the relationship among natural forests, plantations and the implications of international trade. Although dealing with natural forests in the aggregate, their analyses suggest that declining natural forest harvesting (due to deforestation, degradation or logging bans) on the part of one country alarms both domestic and international markets through costs and pricing, stimulating three potential responses: 1) extended harvesting of natural forests into marginal and inaccessible areas (legally and illegally), 2) more intensive management of natural forests for improved sustained yields, and 3) expanded, intensive timber plantations. As seen in the case studies, the primary assumption is that countries will be able to expand plantations to offset declines in natural forest harvests. In practice, however, plantation development has been generally been disappointing, with shortfalls largely met by increased imports.

Comparative advantage

Reduction in output from natural forests either through deforestation, degradation, logging bans, more stringent management requirements, or enlargement of protected areas also leads to price adjustments and responses by both suppliers and consumers to the extent that market-based prices prevail and influence timber production and output decisions. The impacts are not, however, limited only to the country initiating harvest bans or restrictions.

A country that has enjoyed a comparative advantage in harvesting natural forests may not automatically enjoy such an advantage in alternatives such as domestic plantations. This is particularly true where the domestic economy is undergoing both macro- and microeconomic reforms, giving more influence to market-based incentives and prices. Where prior harvesting and marketing decisions have reflected strong government control or regulation, distortions in both production and prices have frequently developed. When economic reforms unleash free market forces, such distortions become apparent and market-based incentives quickly orient decision-making toward economic efficiency rather than simply resource availability. The ability to address socio-economic impacts through plantations may also shift.

A large number of obstacles constrain economically viable creation of commercial plantations in the Asia-Pacific region, particularly in relatively small-scale operations. The comparative advantage may shift to other areas within a country, or even to other countries. For China, the shift to plantations will have substantial impacts intraregionally. Changing timber supplies pose a serious threat to established forest-based enterprises in the traditional State-owned natural forest regions of the Northeast, Inner Mongolia and Southwest China. Plantations will result in new production capacity in the southern coastal provinces that have more favorable conditions for high-yielding, fast-growing species and better access to markets.

New Zealand, as a prime source of intensively produced plantation timber, may well exploit export markets in Asia-Pacific at the expense of potential plantation development within individual developing countries. An emphasis on small-scale, community-based or individual household plantations may ultimately prove difficult, if not uneconomic, in light of international trade potential from outside a country's borders. Industrial-scale plantations may meet increasing challenges from local interests, environmental organizations and others. Lack of investment capital, available productive land for planting, equipment, marketing structures, transport and technical knowledge can all contribute to difficulties in developing domestic plantations as alternative sources of timber.

Comparative advantage is an elusive concept, largely based on market economics, prices and costs, and relative resource endowments. The specific conditions of species composition, stand volumes and quality, efficiencies in timber growing and harvesting, transport, scale of operations, and a number of other such considerations, determine costs and returns, and consequently where and how plantations will develop most efficiently throughout the region. In the past, non-economic factors, including biophysical forest and species characteristics and political considerations, have influenced many decisions regarding plantations. Free market forces, however, increasingly influence (if not determine) such decisions.

New Zealand illustrates the potential for a major reallocation of harvesting away from natural forests for timber production towards conservation objectives (in the public sector), and a transition to greater harvests from the mature plantations (increasingly private). Sri Lanka also demonstrates the possibility of restricting harvests in natural forests by shifting output to economically viable alternative timber supplies derived from homegardens, plantations and imports. The availability of suitable land and the incentives for non-State plantations have been instrumental in offsetting the reduction in natural forest timber output.

Thailand and the Philippines continue to struggle to effectively implement their long existing bans on harvesting in natural forests. In spite of the bans, the achievement of effective protection and conservation remains elusive. The lack of effective institutions and policies to deal with reduced natural forest timber supplies (and enforcement of harvesting restrictions), together with

substantial unanticipated adverse social and economic impacts, have made the realization of natural forest conservation difficult. At the same time, the institutional, policy and investment infrastructures in both countries have adversely impacted the potential for commercial plantation development as an alternative timber supply.

As a consequence, both Thailand and the Philippines have become major net importers of timber since imposing harvesting restrictions. The shift towards imports indicates, at least indirectly, that the comparative advantage for increasing timber supplies may reside with countries that have viable, maturing intensively managed plantations or those still allowing the export of timber from their natural forests (for example, the Russian Far East). Such developments are leading to greater concerns over the harvesting practices and the ultimate sustainability of harvesting in supplier countries. Pressures on neighboring countries create incentives for increased harvesting and exports (including illegal harvesting and smuggling) in spite of policies in those countries to also restrict harvesting to sustainable levels or to set aside their forests for protection and conservation.

China is now in the early phases of introducing new logging bans intended to conserve and protect much of the remaining natural forests. In the past, China has relied heavily on natural forests for timber production, resulting in widespread over-harvesting and environmental degradation. A long-term strategy has been adopted for increasing plantations for future harvesting (timber base) while allocating much of the remaining natural forests for environmental protection and the restoration of degraded forests. Closing much of the natural forests in the headwaters of major river systems as an emergency measure was introduced in 1998 under the country's NFCP. China has also developed substantial plantation resources for both protection and production. It remains unclear, however, how much additional plantation development will prove to be technically and economically viable under the ongoing economic reforms.

Viet Nam is also at an early stage of further restricting timber harvests in its natural forests. The success of this effort will be largely determined by the simultaneous implementation of the country's 5 million ha reforestation program. Funding and transitional adjustments will remain critical issues over the next decade or longer until the presently inadequate plantation resources are sufficient to meet both industrial and fuelwood needs. To date, many technical, social and economic issues remain unresolved, and thus the comparative advantage of plantation establishment within Viet Nam relative to other opportunities in the Asia-Pacific region is still uncertain.

New Zealand represents the clearest example of comparative advantage for commercial plantations as a substitute timber resource. As natural forest supplies declined, plantations were in place to supply both domestic and export markets. Favorable conditions of land availability, technical development of fast-growing radiata pine, market development, and a strong private industry willing to invest in plantations have given New Zealand an edge over other countries. This, of course, represents conditions and economics of the past decade, and may well change in the future if and when other countries formulate viable plantation policies and the supporting technical and economic frameworks.

Achieving conservation

Asia-Pacific has been a leader in the designation of legally protected areas, having so classified a total of some 89.5 million ha, effectively removing these natural forests from harvesting. The largest aggregate protected natural forest is in Insular Southeast Asia, with some 43.3 million ha, including almost 40 million ha in Indonesia and 2.8 million ha in Malaysia. East Asia accounts for 15.4 million ha of protected area, with over 13 million ha in China. Temperate Oceania and South Asia each has over 10 million ha in protected areas. Continental Southeast Asia accounts for about 6.8 million ha (mainly in Cambodia and Thailand). These areas include, of course, some natural forests that would otherwise be available for harvest, as well as areas that would be unavailable due to physical and economic limitations.

Despite the legal designation of protected natural forests, there is substantial concern about the adequacy of the on-the-ground protection of these areas. As well, controversy about the need to

set aside additional areas for protection of representative biodiversity, critical watersheds and habitats for rare and endangered fauna and flora continues. Unfortunately, qualitative assessments of protection and conservation are largely lacking. This is in part due to the non-specific policy objectives not translatable to measurable actions beyond area statistics, and the lack of adequate indicators of conservation, protection, biodiversity, ecosystem health, and so on. Monitoring and evaluation are thus weakened, and relatively little factual information is available to assess whether the various forms of legal designations are effective.

Over 236 million ha of the natural forests of Asia-Pacific are presently unavailable for harvesting due to physical and economic factors. Figure 8 shows the breakdown, led by Insular Southeast Asia (55.1 million ha), East Asia (45.7 million ha), Continental Southeast Asia (38.6 million ha) and South Asia (35.0 million ha). Some 89.5 million ha of this area are legally protected.

Over 146.5 million ha are unavailable without being legally "protected." In many instances, these "unavailable" natural forests are at the most risk for continuing deforestation and degradation. Even available natural forests (not yet closed to logging) face pressures from over-cutting and encroachment, leading to further degradation. Figure 9 classifies three categories of such constraints as follows:

- Category I: physical and terrain conditions
- Category II: remoteness and lack of access
- Category III: low productivity, degraded forests and other site conditions

Category I presently restricts harvesting on some 58 million ha in the region, primarily in the Tropical Oceania subregion (Papua New Guinea - 17.6 million ha) and Continental Southeast Asia (Laos 4.5 - million ha; Myanmar - 5.7 million ha; Thailand - 2 million ha). Other countries with substantial physical constraints on their natural forests include India (4.8 million ha), China 5 million ha) and Australia (9.7 million ha).

Remoteness and lack of access are less of a constraint in Asia-Pacific due to generally heavy population pressures in the rural areas and developed infrastructure. Category II accounts for 9.5 million ha of natural forests being unavailable for harvesting at present, with Indonesia (3.4 million ha), Papua New Guinea (4 million ha), Laos (1 million ha) and Nepal (0.9 million ha) accounting for almost all of this area.

Category III limits harvesting on a total of 79.1 million ha. East Asia, led by China (16.3 million ha) and Japan (4.5 million ha) accounts for about 23 million ha in this category, with South Asia (India – 15 million ha) accounting for an additional 17.9 million ha. In Continental Southeast Asia, Thailand has an estimated 6.8 million ha of such natural forests followed by Laos (4.4 million ha) and Viet Nam (3.9 million ha). In Temperate Oceania, Australia has about 8.5 million ha of such areas.

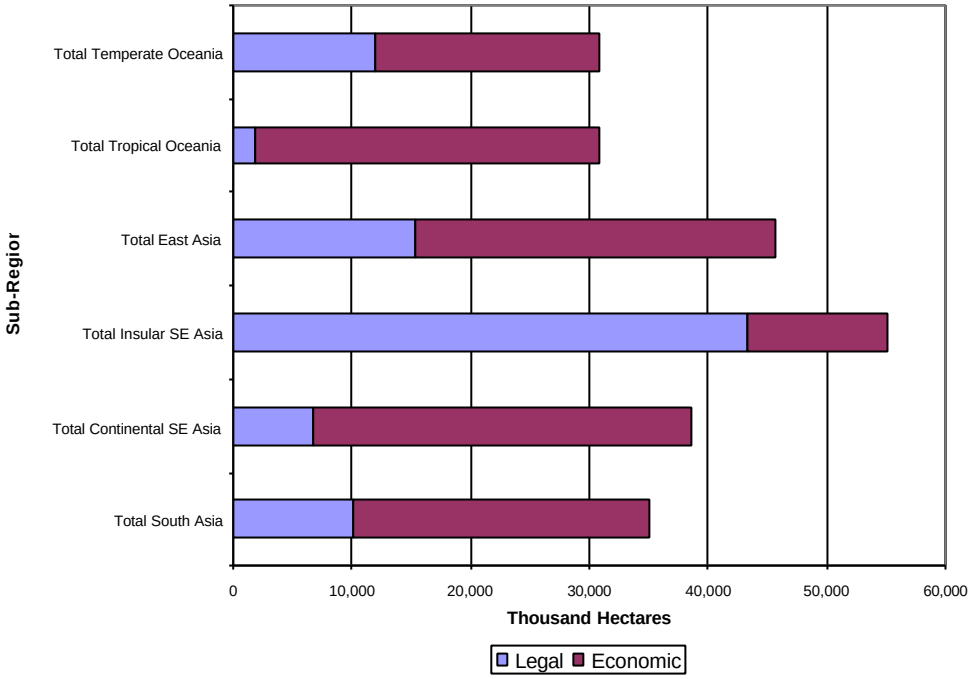

Figure 8. Natural forests unavailable for harvesting due to legal closure and technical/economic constraints

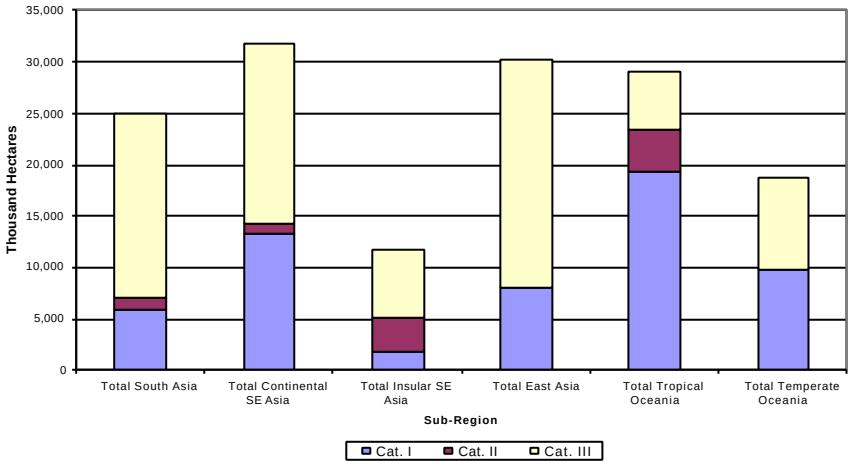

Figure 9. Asia-Pacific natural forest unavailable for harvest due to technical/economic constraints

Despite being "unavailable," much of the natural forests are continually exposed to pressures leading to deforestation or further degradation. A simple change in legal status from "available for harvesting" to "unavailable" or "legally protected" status does not in itself assure either protection or conservation. Much of the 89.5 million ha of legally protected natural forest are at risk of further deforestation or degradation due to ineffective policies for protection, inadequate resources for management planning and implementation, presence of rural people dependent on forests, and other constraints.

The country case studies indicate that substantial areas of natural forests have been brought under legal protection status or *de-facto* protection. Some of these are included in the totals reported above for legally unavailable forestland. The recent implementation of the NFCP in China will initially encompass some 41.8 million ha of natural forests most critically in need of protection and rehabilitation. About 5 million ha of natural forests in both New Zealand and the Philippines were reclassified as protected – under separate legal administration as conservation forests in New Zealand but as *de-facto* conservation in the Philippines. About 8.1 million ha in Thailand were closed to logging and are either declared protected areas or are awaiting formal designation. Sri Lanka increased legally protected natural forests by about 1 million ha under the logging ban. Finally, Viet Nam has added some 4.3 million ha to protected areas as a result of the total logging ban. Over 64 million ha in the six countries have, as a result of logging bans, become, theoretically at least, subject to protection.

The extent to which these lands will be actually protected in the long run is yet unclear. New Zealand and Sri Lanka have transferred administration of the protected natural forests to separate State institutions, thus clearly separating protection and production functions. In the other countries, such separation of functions is not fully defined in their organizational structures or practical operational management, potentially creating confusion or conflicts within traditional forestry-natural resources units. The "timber culture" of traditional foresters frequently casts doubts about their commitment to protection and conservation.

As noted, measures of conservation achievement attributable to logging bans or other restrictions are largely lacking. "Success" is usually expressed in terms of area administratively or legally closed to logging. Reduction or elimination of harvesting, if actually achieved, may avoid (at least temporarily) some of the negative consequences of inappropriate harvesting methods. However, as demonstrated by the experiences in many parts of Thailand and the Philippines, ineffective enforcement of bans and the failure to provide adequate resources and innovative participatory management for conservation and protection of the closed areas hinder the realization of the intended goals. Lack of participation in designing and implementing conservation and protection, or in recognizing local dependency on forests, often discourages consensus and support. It also frequently results in local resistance to protection measures and to continued "illegal activities" for household survival in the absence of "safety-net" policies that address adverse social and economic impacts.

Conservation and protection require much more than the simple elimination or reduction of timber harvesting. Protection is most successful where strong supportive policies and institutional capacity exist (or are created) to effectively carry out the desired conservation mandate. For example, New Zealand's natural forests have been placed under the separate administration of a Department of Conservation with supporting policies, operational support and professional staffing. Even there, however, the elaboration of specific conservation and protection goals is still somewhat indirect, leading to difficulties in monitoring and quantitatively measuring conservation success.

STRATEGIES AND SOLUTIONS

A common assumption is that halting logging is an effective (if not the only) direct means of avoiding or minimizing the negative consequences of inappropriate forest use and practices. The case studies clearly illustrate that this is only partially true, and that a logging ban is only one of a number of possible policy instruments in support of forest conservation. Numerous questions remain as to whether logging bans can be efficiently implemented, whether they achieve desired results, and whether they are as effective as other possible strategies. Unfortunately, the feasibility and efficacy of alternative strategies are seldom evaluated relative to logging bans.

Major adjustments in natural forest conservation policies imply drastic changes. Under logging bans, significant changes are made in how forests are managed and utilized, impacting government, communities, individuals, households, and consumers of wood and non-wood products. Furthermore, changes are implicit for the physical and biological conditions of forests,

closely linked to forest ecosystem health, biodiversity, stand characteristics, yields and growth. When social, economic and environmental impacts are not assessed, nor ameliorating strategies developed, the policy changes may lead to unexpected or unintended impacts.

Logging bans imposed in the Asia-Pacific region in crisis situations or as emergency responses to natural disasters have seldom included supplemental strategies to effectively manage the withdrawn forests. In most cases, the intended conservation and protection goals themselves are only very generally specified, making monitoring and evaluation of "success" very difficult. Without planning and longer-term programs beyond the harvest bans, and actively managing the forests for protection and environmental values, logging bans may be in vain (Poore 1998). Further, without the political commitments, staffing and funding resources, effective conservation is improbable (Anon 1999).

The use of logging bans as a "one-approach-fits-all" strategy for conservation can confuse the complex and multiple factors at work in deforestation and degradation, and can obscure the cumulative nature of consequences of past policy decisions and management practices. The typical response has been to focus on the immediate tasks related to enforcing the logging bans or harvest restrictions, rather than working towards the implementation of a comprehensive conservation strategy or realistically addressing issues of adverse social, economic or environmental impacts. Such comprehensive strategies require a "systems approach" and should include careful evaluation of alternatives.

For long-neglected issues underlying deforestation or degradation, and in the face of consequent crises, corrective action in the form of a total logging ban may be desirable as a first step towards developing long-term strategies and solutions. Such bans, if effectively implemented, may buy time to assess long-term forest management goals and objectives, develop appropriate criteria, selectively adjust forest uses, and implement sustainable forest management (for both protection and utilization).

Temporary or short-term logging bans ("time-out strategies") also allow degraded forests a respite from further damage and an opportunity to recover. Ensuing harvest reductions or elimination may be for relatively short duration (10 to 15 years), or longer term (50 or more years), until such time as forest health is restored and growth is adequate to sustain modified harvest levels while maintaining forest ecosystem integrity. The initial logging ban in the natural forests of Sri Lanka in 1989, for example, was intended to be a "temporary" measure to allow the degraded forests to recover and to develop sustainable forest management plans.

Some forests may need to be permanently closed to timber harvesting (or other specific uses) if such activity is deemed incompatible with preferred uses. In this case, a major land-use change is implicit (e.g., Sri Lanka, in 1980, extended the "temporary ban" to a comprehensive logging ban and formally placed the withdrawn forests into protected area status). Other sites, however, may need only temporary or partial closure to accommodate forest restoration, or may be subject to continuing harvest under modified adaptive management techniques such as RIL to ameliorate the negative environmental impacts of conventional logging technologies. In some instances, more effective guidelines for forest practices (e.g., codes of practice) and more rigorous monitoring of logging can provide acceptable standards of improvement so as to allow continued harvesting.

A "time-out" strategy, as adopted by China, might first involve temporarily closing broad areas of natural forests to harvesting. This will be followed by systematic analyses and "forest zoning" whereby natural forests are stratified according to priorities for permanent protected area (land-use change), forest restoration, reforestation, intensive but sustainable timber production, or multiple use (potentially including limited timber production). During this closure, forests could be categorized based on forest health, and the conditions and requirements for future utilization specified. Some forests will likely be closed permanently where environmental values clearly outweigh timber values. Some may be closed only temporarily pending recovery of forest health and renewed capacity for sustainable multiple-use management. Still others may be found sufficiently healthy to allow continuing harvests under appropriate management adjustments. Such an approach could provide the basis for sustainable use of natural forests, pragmatically linked to site-specific circumstances and resources.

MAKING POLICY CHANGES AND RECOGNIZING IMPACTS

The need for clear policy objectives has been emphasized. The terms "conservation," "protection," "biodiversity," "environmental values" and so forth, invoke broad support but do not directly convey or identify the expected results or practical outcomes from policy changes including logging bans. There is substantial disagreement as to what specific form "conservation" should take in the case of natural forests. Perceptions vary widely from practicing sustainable management and utilization to absolute preservation of natural forest ecosystems. "Sustainable management" and "multiple use" also mean different things to different individuals.

Logging bans are not normally the end objective of policies, but rather represent one of many choices to achieve something else – in this case, conservation of natural forests. But what is "natural forest conservation?" Policy makers, governments, private organizations and the general public must first agree on goals appropriate to the actual resource conditions before consensus on the most effective policy instruments to achieve those goals can be determined.

Virtually all forest utilization creates social and economic linkages and dependencies. Any change in forest utilization patterns, even when deemed socially desirable, inevitably results in impacts – both favorable and unfavorable. Some consequences, of course, may be the very reasons behind the policy and management changes, such as reduction of sedimentation, reduced flooding, and enhancement of endangered species habitats.

Other consequences of changing forest utilization patterns may be indirect and unintentional (e.g., loss of employment, declining community incomes, disruption and relocation of households, increased illegal harvesting, and other social and cultural consequences. Depending on present economic and market factors and the size of the forest area closed under logging bans, domestic consumption of wood products and prices may also be affected. With increasingly open trade, international consequences may be seen through adjustments in imports and exports. Protection of natural forests in one country can result in increased harvests (perhaps in an environmentally damaging manner) in other countries. The comparative advantage of investing in domestic plantations as an alternative timber supply source may prove elusive due to a variety of constraints and may be adversely affected by increased competition from imports.

Many such consequences (intended and unintended) have been identified in the individual country case studies[9]. For example, government revenues may decrease due to lower harvests, declining royalties and reduction of tax revenues. At the same time, government expenditures may increase, due to necessary investments in reforestation, personnel, new management schemes for conservation management, monitoring and evaluation. Laid-off workers may need retraining and, perhaps, income supplements in the short run. Profitability of operations may decline, discouraging private sector investments. Unfortunately, detailed analyses of potential impacts rarely augment political decisions on timber harvest bans or restrictions, and the magnitude of adverse impacts (particularly the unintended impacts) becomes obvious only when the impacts have taken their toll.

Mitigating adverse impacts of forest conservation policy changes is a necessary part of successful policy implementation, along with generating public consensus and active participation. The disappointing experiences of Thailand and the Philippines illustrate the consequences of strategies that fail to address the full range of planning needs, required financial resources, institutional capacities and public participation in decision-making related to implementation of logging bans.

In contrast, New Zealand benefited from a gradual transition over a considerable period of time that enabled plantations to be established in anticipation of the decline in natural forest production. While the actual removal of natural forests from harvesting was somewhat abrupt under national policy shifts, the transition had essentially occurred much earlier. The establishment of a separate national Department of Conservation with distinct goals, funding and

[9] See the individual country case study reports for detailed discussion of social, economic and environmental impacts of the specific logging bans.

staff assured follow-up management and planning according to conservation objectives. It was perhaps incidental that the Government also chose to privatize State-owned plantations and withdraw from commercial timber production.

LESSONS FROM COUNTRY CASE STUDIES

Society's expectations and demands for forest management have changed

The findings from the case studies reflect the complex and highly variable nature of the issues and concerns involved in adjusting and balancing forest uses. The dynamics of policy adjustments in response to changing socio-economic conditions and environmental awareness suggest that public values have shifted at the same time natural forests have declined in both area and quality. Although forest products continue to be economically important and timber production plays a large role in some national economies, non-timber and environmental values have gained increasing recognition and public endorsement in recent years. There is growing popular demand for natural forests to be set aside for conservation and environmental purposes that are often incompatible with conventional timber harvesting practices. Although timber values are high, the potential loss of environmental and other benefits is considered even more significant by many people.

The case studies also reflect the outcry against lax natural forest administration, poor enforcement of existing regulations and guidelines, and the external consequences of careless logging, over-cutting, and the often disregard for environmental values. Together with ineffective and inappropriate management practices and wasteful utilization, problems of land-use and timber harvest abuses have grown to levels now deemed politically and socially unacceptable in many countries.

Logging bans are viewed as simple and logical policy instruments for conserving forests

It remains unclear whether these abuses and institutional failures can be sufficiently corrected to permit continued timber production while simultaneously guaranteeing acceptable levels of forest conservation and protection. Logging bans have become the policy instrument of choice in light of continuing mistrust and skepticism regarding the actual ability or willingness of timber producers to implement more benign management regimes.

Dispassionate considerations of moderate, deliberate and incremental management adjustments in response to adverse forest conditions have often given way to highly visible top-down political actions, often in response to crises or natural disasters. Under such conditions, planning and lead time for implementation of harvesting restrictions are frequently inadequate, contributing to confusion, conflicts and adverse impacts on forest-dependent stakeholders.

Banning timber harvests alone is insufficient to conserve forests

Logging restrictions and bans alone have not corrected the underlying problems of misuse, unsustainable natural forest management and destructive conventional harvesting. While the symptoms of poor forest use are evident, the actual causes and issues are much more difficult to evaluate and mitigate with workable policy alternatives. Without an adequate framework for subsequent support of ongoing conservation and protection policies, and appropriate management capacity, the closing of natural forests imposes inequities and hardships on communities and commercial enterprises that have relied on forests, and gives rise to continuing abuses and illegal forest activities.

Clear tenure and use rights are critical for forest conservation

Most governments recognize the importance of close cooperation with local people and communities to conserve natural forests and to expand the area of planted forests. Where customary and traditional use rights are threatened, or rural households are excluded from commercial opportunities, livelihoods are at risk and government plans may face stiff opposition. On the other hand, where participation is effective, local dependencies on forests can be better understood and recognized in strategic planning. Active involvement of local people in development and conservation efforts also helps to alleviate concerns about employment and income generation. Too often, governments monopolize decision-making, while expecting local communities and industries to bear much of the burden of forest use changes and socio-economic impacts.

With few exceptions, governments in Asian countries claim ownership of natural forests, and may also control significant areas of deforested or degraded land potentially available for new plantations. Governments may exercise direct rights of use and management, or alternatively may privatize some or all aspects of use. Forests may be retained under public ownership, but made available to others for use under various contracts, leases, grants, or infrequently through sale.[10] "Collaborative" forest management, involving both government and non-government entities, can also take on many different forms. When available to non-government entities, forest use is often characterized by poorly defined ownership or tenure, with both direct and indirect governmental regulations influencing forest management and production, decision-making, investment, harvesting and marketing of outputs. Insecure tenure or use rights, together with the absence of functioning economic systems (credit, finance, transportation, etc.) can also dissipate potential economic returns and reduce or eliminate incentives for private sector participation.

Sometimes, allocated forestland may be too small in size to make operations economically viable (as perhaps in the case of Viet Nam's forest allocation program), reducing the practical feasibility of private plantations. In Thailand, local communities and individuals strongly resisted development of large-scale industrial plantations because it was seen as transferring resource control to the "rich" and "outsiders" at the expense of local welfare. In many cases, only the poorest or degraded forestland is allocated to local people, while healthier forest stands are reserved for State administration and control. Although it may be desirable to regenerate degraded sites, they may not be the most optimal sites for establishing profitable forest-based activities for either local or commercial uses.

In countries with a large population and high level of poverty, competition and conflicts over forestland are common. In the Philippines, Thailand and Viet Nam, for example, social conflicts frequently erupt between indigenous people and others who have occupied forestlands for many years and new migrants who are perceived as trying to wrest control of the land. Conflicts also develop between those who wish to maintain traditional forest use patterns and those who desire commercial development of forestlands.

New Zealand's extensive private plantations, subsequent government withdrawal from production forestry, and the transfer of State plantations to the private sector, have demonstrated the feasibility of placing plantations on "a totally independent commercial footing" and encouraging private foreign investment. However, this requires mature market-based economic structures and transactions, vibrant financial and capital markets, and strong managerial capacities.

Sri Lanka has also shown the feasibility of fostering tenure arrangements that permit homegardens to become a significant source of commercial timber. Open markets for land, including forests and potential plantation lands, are clearly the exception in much of Asia-Pacific.

[10] New Zealand is the notable example where use rights to planted forests, but not natural forests, were sold to private enterprises. Lands outside of forests, such as homegardens in Sri Lanka, may also function as "privatized" timber production areas.

Likewise, market reforms are leading to new and innovative schemes for allocating forest-use rights in China. While short of formal ownership, these schemes facilitate long-term private use of forestlands still technically owned or retained by the State. They also allow for leasing of lands to business enterprises, including joint venture investors. Conditions of use, decision-making authority, investment choices, and the ability to capture economic returns need to be clearly identified and guaranteed if confidence and commitment are to be achieved and maintained under these new schemes.

The long-term transferability of tenure and use rights is an important pre-condition for non-State forest development. Without such rights, the willingness to provide capital and labor for growing trees is constrained. Legal protection of such rights, and access to courts or other legal instruments to ensure these rights over time, need to be considerably strengthened and codified.

Monitoring and assessing of outcomes need improvement

Conservation and protection policy goals must be more explicit and translated into measurable, realistic and operational terms. Without effective monitoring and assessment, it is difficult or impossible to know whether the conservation and protection goals of logging bans are being accomplished or not. Simple tallying of forest areas removed from harvest or legally protected is almost exclusively used as indicators of forest conservation, but they are poor measures of actual protection success. Similarly, the area of land reforested is implicitly cited as progress in addressing deforestation and degradation of natural forests, while standards for assessing forest health and stand restoration are largely absent. Overall, qualitative indicators of various conservation and protection goals, as well as programs to monitor and assess policy and management, are badly needed to augment basic statistics.

Mitigating social and economic impacts is important for success

Compensation and other forms of transitional social security ("safety nets") for those most seriously impacted (both economically and socially) are fundamental requirements for successful natural forest conservation and protection. Lost jobs, reduced household and community incomes, and restrictions on traditional local consumption and subsistence use rights - if ignored - can lead to conflicts, resentment of government policy, and increase illegal activities. Programs to alleviate poverty in areas near forests can go a long way towards complementing forest protection efforts. Scarcity of viable job alternatives characterizes much of the rural forest regions. Retraining and teaching new technologies, encouraging new livelihood opportunities and possibly migration, are all features of social adjustment policies.

Adverse impacts may also spread to distant production centers and consumer markets. Government tax revenues, incomes, employment, distribution and marketing, and ultimately consumers may be affected. Policies to assure that the costs of changes in forest use are equitably borne by all segments of a society are necessary.

Comprehensive policy implementation, rather than incremental measures, is required

Important differences exist between incremental or partial policy changes (such as logging bans) and more systematic and comprehensive approaches. Bans born from crises, such as floods and landslides in Thailand and the Philippines, tend to be incremental, action-oriented steps that deal only partially with the system's underlying problems. Although the new logging ban in China was also precipitated by serious flooding, it reflects a more deliberate planning process under the NFCP to comprehensively address the multiple dimensions of change, including recognition of likely adverse impacts.

It should be noted that the logging bans reviewed in the case studies are not isolated actions, suddenly developed and imposed. The underlying issues and concerns first discussed in this report

are long term and cumulative in nature. Crisis can serve as the impetus for action, after long periods of passive tolerance or neglect of the fundamental underlying causes. Properly formulated and implemented, logging bans can contribute to desirable long-term natural forest conservation and protection while stimulating new and positive responses for assuring a continuing flow of benefits from both wood and non-wood forest products.

Logging bans are simply one policy instrument, albeit an important tool, in the spectrum of options for assuring that future forests will continue to contribute to environmental values and human welfare for the people of the Asia-Pacific region.

ACHIEVING NATURAL FOREST CONSERVATION: NECESSARY CONDITIONS

Achieving natural forest protection and conservation is extremely complex and unique to each country's social and economic conditions. This makes it difficult, if not impossible, to define a single strategy or policy that will be successful in all circumstances. From the case studies, however, it is possible to identify a set of conditions that are likely to contribute to the success of logging bans in support of natural forest conservation. Some general principles based on findings of this study provide helpful insights and general guidance for modifying current logging ban in Asia and the Pacific:

1. *Policy objectives and goals must be clearly identified, specific, measurable, and consistent with local forest conditions*

   Government policies should reflect high-level national goals and objectives, as well as the basic strategies or means for achieving these goals. Where natural forest conservation and protection goals are absent or unclear, meaningful implementation will be seriously hampered, debate and disagreement regarding the intent will prevail, and the inability to determine the appropriateness of logging bans as a central policy instrument will prevent a consensus on operational programs of action.

2. *Conservation policy goals should be incorporated into, and be consistent with other forest policies, legislation and operational guidelines*

   Merely announcing a forest conservation policy is insufficient to achieve desired results. The policy needs to be embedded in legislation or statute, and the subject of clear, written guidelines and regulations so that transparency will be possible for the government, professionals, interested businesses, NGOs, international organizations, and most importantly, the general public to understand both objectives and implementation. Further, existing laws, statutes, policy directives, and operational regulations and guidelines must be regularly reviewed and updated to assure consistency and congruence in purpose and prioritization of the programs.

3. *Policies should promote stability and be consistent with national policies and guidelines regulating other sectors*

   Uncertainty regarding public policy, and the associated risks of unanticipated changes, undercut long-term efforts for sustainable management, conservation and environmental protection. Forests are an important part of the broader policy framework of most Asia-Pacific countries, supporting macroeconomic goals of growth and development, environmental protection, social stability, education and public welfare. Forest sector policies must be consistent and supportive of these higher-level national aspirations and goals. While dynamic in nature, such national policies and goals should avoid abrupt, unpredictable, and continuous changes or re-interpretations. Forest production and conservation are long-term goals, requiring stability and consistency.

4. *Institutional reform of forestry organizations should be consistent with new roles and expectations*

   Professional forestry has a long history in the Asia-Pacific region, rightfully proud of its contribution to the welfare of the public at large. That professionalism is, however, also the source of bias and frequent "elitism" in terms of "knowing what is best." The growing public distrust of professionals involved with forestry highlights the need to differentiate the broader task of determining social goals (a public matter) and the scientific and technically superior ways of achieving those goals (professional management). A historical bias emphasizing timber as the primary forest output has also led to questions of the professional capacity to adjust to changing circumstances and forest valuation.

   Within the Asia-Pacific region, most forests are owned or controlled by governments, and public institutions have direct (often monopoly) control over forest decision-making and management. This authority frequently extends to harvesting, processing and marketing of forest products and services.

   Changing expectations now call for greater public participation in both policy and operational matters involving natural forests. New roles are being defined for professional and technical foresters, who will increasingly assist in policy formulation but will likely be less involved in direct operational matters. While State and cooperative forestry will continue to be widely practiced, joint management, contract agreements, and even privatization of some forestry functions will likely expand. Government foresters will guide, but not conduct, many of the management tasks. Staff skills and levels of personnel, financial support, and roles must be adapted to the changing institutional structures for participatory forestry in the future.

5. *The real costs of forest conservation must be recognized and consensus built for sharing of costs*

   Conserving and protecting natural forests is potentially a costly proposition. Where logging bans are imposed, there are often large transitional costs of implementing and enforcing new policies, rules and institutional changes. Further, new management strategies, plans, and operational activities must be undertaken on a long-term basis to achieve and maintain the desired resource conditions and assure continuing public benefits. The costs of monitoring and evaluation may also be significant.

   Forest conservation is not a free "good" simply obtained by not logging. Provisions for meeting the costs of conservation and protection are normally regarded as a public cost, although in practice much of the cost is borne by local households, communities and other stakeholders that are "encouraged" to participate in joint management and protection activities – often without adequate compensation. Public budgets have been, in the case of the countries studied, very limited or lacking for sustained long-term conservation management.

   Policies to assure adequate resources for operational conservation and protection management, and equitable sharing of costs are required if greater public participation and joint management schemes are to be realized successfully. Opportunities to obtain benefits from management and revenues from entrepreneurial activities must be consistent with responsibilities. Logging bans frequently take away the single most important potential source of revenue for forest management, and must be consciously replaced with other dependable, secure sources. Without such sustained support, *in situ* conservation may well fail due to inadequate institutional and human resource capacities.

   Shifts in natural forest use and management necessarily involve changes from the existing *status quo*. Although there may be strong consensus regarding the purposes and objectives behind the changes, there will inevitably be negative impacts on some individuals, organizations, communities and local governments. Without provision of "safety nets" to assist in the transitional burdens, equity and fairness issues may well stall or stop the necessary changes. Individuals who lose their jobs may not easily find alternative employment, and may not have the required skills to adapt to new and different work.

Retraining, income supplements, government assistance to communities and secondary dependent businesses, tax concessions, and numerous other forms of assistance are frequently required.

6. *Greater recognition and incentives should be provided to the private sector*

   Throughout the Asia-Pacific region, governments have dominated forestry as a centralized policy maker and as the operational manager of forestlands and resources. The engagement of the private sector and its recognition of the potential role of markets to guide forestry activities are largely ignored, except in a few countries such as New Zealand. To date, most community-based participatory schemes rely heavily on a continuing strong role for governments. While limited efforts to decentralize management responsibility are widely discussed, effective transfer of resources and control are less evident.

   Where market systems permit, the role of private initiatives and incentives can be a powerful motivation for responsible, productive involvement in forestry (Landell-Mills 1999). The discipline of markets in rewarding efficiency and penalizing inefficiency can also provide clearer indicators of the various types of goods and services that can be economically produced and distributed, as well as recognition of the actual cost structures and output values involved. For such market-based reforms to succeed, direct forest ownership is not required, as demonstrated by New Zealand's privatization of forest plantations. However, granting secure rights through enhanced land-use provisions, stable resource tenure, increased independent private decision-making, equitable economic participation in forest management and open access to markets for forest products, can all help to mobilize human resources and capital. New Zealand's plantations, Sri Lanka's homegardens and increasingly China's contract management systems offer important lessons on public-private linkages designed to enhance the contributions of private initiative and resources.

7. *Land use and forest monitoring, and resource assessments must be given higher priorities*

   The country case studies indicate a significant weakness in the monitoring and evaluation of conservation and protection strategies, including specific logging bans. Little is known about the actual impacts on timber harvest or overall timber supply. Conservation success is largely gauged in terms of area designated rather than qualitative changes in valid criteria and indicators for specific conservation objectives. The overall inability to measure performance objectively limits the analysis of policy implementation and weakens the ability to adapt and change policies and strategies as required. Consensus based on reasonable and objective assessments should assist in guiding operational management under approved plans as well.

8. *Strong political commitment must lead to practical, long-term policy and institutional reforms and implementation of effective forest management*

   Logging bans have frequently been imposed in response to political pressures for action, following long-term degradation of forests and/or natural disasters. Leadership in government must show concern and take actions in response to such pressures. However, more is needed. A meaningful commitment to support and sustain new initiatives, including natural forest conservation and protection, is necessary. Without political support, public consensus and adequate resources, the hoped-for accomplishments can easily erode even if the responsible forestry institutions are capable of responding to the new challenges. However, political support will require a better understanding and demonstration of technical concepts and underlying issues, more evidence of success, and continued public consensus on the goals and objectives related to proposed policy changes, institutional reforms, and management reorientation.

9. *Forest planning and land-use planning should be integrated and conducted as a dynamic process*

   Natural forests are an important component of land resources in the Asia-Pacific region. Overall, forests account for about 19 percent of total land area, with natural forests comprising almost 88 percent of all forestlands. Land use is a dynamic process, constantly adjusting in response to population growth and changing social values. The growth of environmental awareness and concern about sustainability are fundamental issues of land use, increasingly suggesting the

potential desirability of shifts away from timber production in favor of greater environmental protection. The rigidity of land-use planning and the traditional separation between forest planning and land-use planning have delayed critical decisions regarding the appropriate scale and mix of forest allocations for timber and non-timber priorities. Resistance to changes in forest uses is perhaps stronger than in agriculture where use is frequently more adaptive. Imbalances in forest use can grow over time, and corrective actions (such as expansion of protected areas) become more complex, difficult and controversial.

10. *Dependencies of local people on forests need to be recognized and people need to be involved in forest management decision-making*

    Centralization of natural forest policy and management has often resulted in "top-down" decision-making that can easily ignore or misrepresent the legitimate interests and concerns of individuals and local communities dependent on forests. The intimate nature of traditional and customary forest uses (and traditional use rights) for indigenous populations can conflict sharply with prevailing national sentiments and demands. Forest dependency on non-wood goods and services may also be poorly understood. Reductions of harvesting, while perhaps justified to maintain overall forest values, nevertheless can threaten the existing dependencies and leave large numbers of individuals at risk. Participation in forest planning, policy development and implementation can provide new perspectives and understandings to both decision-makers and forest users. Recognition of legitimate local interests and dependencies can provide an initial point for building consensus.

The lessons learned and the identification of the necessary conditions for successful natural forest conservation are not unique to logging ban policies alone. They underscore the universal need for careful strategic analysis, strong preparation for new policy implementation, recognition of legitimate interests, provisions for addressing adverse impacts, and adequate support and resources to follow through on goals and objectives.

Logging bans are neither good nor bad as natural forest conservation and protection policy instruments. If adapted selectively, and in combination with other options, they can help assure that natural forests will be sustained and continue contributing multiple forest values for the well-being of the people of the Asia-Pacific well into the future. If implemented in isolation of other supporting policies and programs for conserving forests, they are likely to be ineffective, and may even be counter-productive.

RECOMMENDATIONS

It is recommended that the APFC work with FAO, the international forestry community and member countries to encourage further development of appropriate integrated policy frameworks for natural forests, recognizing the legitimate needs for both production and conservation. These frameworks should reflect the unique conditions of each member country, and should encompass the following key lessons from the experiences with logging bans in the region:

- Practical conservation and protection goals should be clearly defined and expressed in both qualitative and quantitative terms.
- Forest land use must be acknowledged as a dynamic process, and policies must recognize dominant (often incompatible) uses requiring zoning or exclusive classifications for management, as well as multiple (integrated) uses where outputs and forest values may change over time.
- Adaptive management regimes will be required for each management alternative consistent with intended goals and priorities.
- Rehabilitation for highly degraded natural forests may require temporary or short-term closures independent of long-term future use based on restored sustainability.

- Overall environmental quality and public values require recognized "safe minimum standards" of forest practices, regardless of specific uses; such standards are frequently embodied in codes of practice or forest practice regulations, representing a consensus of public and technical viewpoints on a broad spectrum of forest practices and uses.
- Public participation in policy formulation and land-use activities is essential to generate consensus and/or broad support on issues of land-use tenure, use rights, and other options to complement government control and management.
- Roles of government forestry agencies may need to be redefined to provide guidance and technical support, but not monopoly management, of both production and conservation forestry.
- Effective monitoring and evaluation of various forestry programs, using well-defined criteria and indicators, are required to measure progress and to guide modifications needed to achieve well-defined goals and objectives.

The APFC, working together with FAO and other regional and international organizations, should support and coordinate future efforts to build upon the lessons learned from the case studies. It should also direct efforts towards gaining a better understanding of the following issues impacting natural forest protection and conservation:

- Mechanisms and options for allocating forest use rights under government ownership and control.
- Impacts of expanded international trade in timber and other forest products on natural forest conservation and protection.
- Roles of forest plantations and alternative resources as substitutes for natural forest timber in meeting national and regional market demands.
- Mechanisms for improving the technical and economic performance and efficiency of forest management, logging, timber distribution and transport, wood processing, and marketing of forest products to enhance productivity and to reduce environmental impacts.
- Ongoing and effective monitoring and evaluation of natural forest conservation and protection based on operational-level criteria and indicators complementary to internationally developed criteria and indicators for sustainable forest management.

CONCLUSIONS

The issues and concerns related to natural forests – their use, management and conservation – suggest that the forestry sector has often failed to meet the changing demands and expectations of society. Consequences of ineffective past forest policies have sometimes been direct and immediate, such as flooding and sedimentation, or indirect and cumulative such as the loss of endangered species, habitats, or whole forest ecosystems. As a result, public pressures and governmental concerns in several countries of the Asia-Pacific region have reached a point where swift and major policy changes are demanded without a detailed analysis of alternative ways to conserve forests and use them sustainably.

Over the last decade, several countries have resorted to banning any form of harvesting in natural forests – an extreme measure with sometimes unpredictable or unintended impacts. Other countries are contemplating similar actions, along with alternatives such as long-term multiple-use forestry, sustainable forest management, and improved timber practices. It is thus useful to assess the experiences of various countries in the Asia-Pacific region for indications of the effectiveness of removing natural forests from timber production in achieving conservation goals. As long as the impacts of logging bans are not better understood, it remains difficult to either promote or reject bans as a policy option.

The experiences of Asia-Pacific countries, including some that have imposed logging bans over a decade or more, provide valuable insight into the questions of "why, how, and when" logging

bans can be effective policy instruments. Examination of individual cases reveals that even though logging bans have mainly been political reactions to crises, desired conservation and protection goals have seldom been clearly defined. In actual practice, the operational objective following imposition of logging bans has been to halt logging rather than create and implement new and innovative forms of sustainable management.

Destructive logging practices may be slowed or stopped by effective bans. But ineffective implementation has often contributed to further deforestation and degradation through the lack of enforcement and control, and through the inadvertent creation of perverse incentives and impacts. Frequently, unanticipated impacts and perverse incentives have risen both within the country imposing harvesting restrictions, as well as in neighboring countries or new emerging timber exporters as far away as Africa or South America.

The complexity and number of issues and concerns surrounding natural forests in the Asia-Pacific region suggest that solutions must be specific and based on a comprehensive understanding of the causes of the symptoms of failure observed. Furthermore, the diversity of issues and concerns imply that the desired outcomes from policy changes are also diverse and can be conflicting.

A key conclusion to be drawn from the Asia-Pacific experience is that logging bans are neither inherently good nor bad as natural forest conservation and protection policy instruments. Logging restrictions are simply one set of policy tools available to decision-makers within a spectrum of options and alternatives. If bans are adapted selectively and used in combination with other complementary policy instruments, they can help assure that natural forests will be sustained and will continue to contribute to enhancing the well-being of the peoples of the Asia-Pacific.

The experiences of Asia-Pacific countries point towards several conditions that are necessary for successful natural forest conservation. These requirements are not unique to logging ban policies alone, but rather reflect the broad principles needed for success in all aspects of forest policy development and implementation. These include the need for careful strategic analysis and solid preparation prior to policy implementation. Also necessary is recognition and balanced consideration of all stakeholder interests, and provisions for addressing adverse impacts. Underlying all efforts, there must be adequate support and resources – including political will – to follow through on clearly established goals and objectives.

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FAO Policy & Planning: http://www.fao.org/forestry/fon/fons

FAO Regional Office for Asia and the Pacific: http://www.fao.or.th/default.htm

FAO Asia-Pacific Forestry Sector Outlook Study: http:// www.fao.org./forestry/fon/fons/outlook/Asia/APFSOS/APFSOS-e.stm

Forest Networking: (Forest Conservation Archives): http://Forests.org/web/

International Tropical Timber Organization (ITTO): http://www.itto.or.jp/index.html

New Zealand: http://www.nfa.org.nz/slides.htm

New Zealand: http://www.timberlands.co.nz/

POLEX (Forest Policy Experts List): polex@cgiar.org

RILNET (Reduced Impact Logging): tlc@loxinfo.co.th

Suite101.com: http://www.suite101.com

World Bank: http://wbln0018.worldbank.org/Research/workpapers.nsf

Annex I. Forest statistics for the Asia-Pacific region

Asia Pacific Forests	Land Area	Total Forest		Natural Forest									
	(Th. Ha)	Area	% Land	Natural Forest	% of Forest	Available		Unavailable					
		(Th Ha)		(Th Ha)		(Th Ha)	% Nat For	Total	Legal	Economic	Cat. I	Cat. II	Cat. III
South Asia													
Bangladesh	13,017	1,010	7.8	700	69.3	0	0.0	700	87	613	0	0	613
Bhutan	4,700	2,756	58.6	2,748	99.7	1,242	45.2	1,506	356	1,150	500	0	650
India	297,319	65,005	21.9	50,385	77.5	21,935	43.5	28,450	8,700	19,750	4750	0	15000
Maldives	30	n.a.	n.a.	n.a.									
Nepal	14,300	4,822	33.7	4,766	98.8	2,806	58.9	1,960	350	1,610	380	900	330
Pakistan	77,088	2,033	2.3	2,033	100.0	1,273	62.6	760	45	715	220	260	235
Sri Lanka	6,463	1,796	27.8	1,657	92.3	0	0.0	1,657	565	1,092	0	0	1092
Total South Asia	412,917	77,422	18.7	62,289	80.5	27,256	43.8	35,033	10,103	24,930	5,850	1,160	17,920
Continental Southeast Asia													
Cambodia	17,652	10,532	55.7	10,532	100.0	4,984	47.3	5,548	3,548	2,000	0	0	2000
Laos	23,080	12,435	53.9	12,431	100.0	2,495	20.1	9,936	0	9,936	4500	1000	4436
Myanmar	65,755	27,151	41.3	26,875	99.0	20,442	76.1	6,433	293	6,140	5740	0	400
Thailand	51,089	11,630	22.8	11,101	95.5	0	0.0	11,101	2,300	8,801	2000	0	6801
Vietnam	32,549	9,117	28.0	8,613	94.5	3,052	35.4	5,561	663	4,898	1020	0	3878
Total Continental SE Asia	190,125	70,865	36.9	69,552	98.1	30,973	44.5	38,579	6,804	31,775	13,260	1,000	17,515
Insular Southeast Asia													
Brunei Darussalam	527	434	82.4	434	100.0	427	98.4	7	4	3	3	0	0
Indonesia	181,157	120,600	60.6	120,600	100.0	74,166	61.5	46,434	39,858	6,576	990	3288	2298
Malaysia	32,855	16,325	47.1	16,325	100.0	11,255	68.9	5,070	2,784	2,286	790	0	1496
Philippines	29,817	6,766	22.7	5,798	85.7	2,202	38.0	3,596	690	2,906	0	10	2896
Singapore	61	4	6.6	4	100.0	n.a.							
Total Insular SE Asia	244,417	144,129	54.2	143,161	99.3	88,050	61.5	55,107	43,336	11,771	1,783	3,298	6,690
Total Tropical Asia	847,459	292,416	33.0	275,002	94.0	146,279	53.2	128,719	60,243	68,476	20,893	5,458	42,125

Asia Pacific Forests	Land Area (Th. Ha)	Total Forest		Natural Forest									
		Area	% Land	Natural Forest	% of Forest	Available		Unavailable					
		(Th Ha)		(Th Ha)		(Th Ha)	% Nat For	Total	Legal	Economic	Cat. I	Cat. II	Cat. III
East Asia													
China	932,641	133,323	14.3	99,452	74.6	65,160	65.5	34,292	13,004	21,288	4991	0	16297
HK SAR (UK)	99	n.a.	n.a.	n.a.		n.a.							
DPR of Korea	12,041	6,170	51.2	5,300	85.9	2,800	52.8	2,500	900	1,600	800	0	800
Japan	37,652	25,146	66.8	13,380	53.2	6,468	48.3	6,912	912	6,000	1500	0	4500
Macau (Portugal)	2	n.a.	n.a.	n.a.		n.a.							
Mongolia	156,650	9,406	6.0	9,406	100.0	n.a.							
Rep of Korea	9,873	7,626	77.2	4,200	55.1	2,200	52.4	2,000	600	1,400	700	0	700
Total East Asia	1,148,958	181,671	15.9	131,738	72.5	76,628	58.2	45,704	15,416	30,288	7,991	0	22,297
Total Eastern & Trop. Asia	1,996,417	474,087	23.1	406,740	85.8	222,907	54.8	174,423	75,659	98,764	28,884	5,458	64,422
Oceania													
Tropical Oceania													
American Samoa	20	0	0.0	0									
Cook Islands	23	n.a.	n.a.	n.a.		n.a.							
Fiji	1,827	835	45.7	757	90.7	307	40.6	450	30	420	90	0	330
French Polonesia	366	0	0.0	0									
Guam	55	0	0.0	0									
Kiribati	73	0	0.0	0									
New Caledonia	1,828	698	38.2	689	98.7	n.a.							
Niue	26	6	23.1	6	100.0	n.a.							
Pacific Isl. Trust Terr	178	0	0.0	0									
Papua New Guinea	45,286	36,939	81.6	36,909	99.9	9,000	24.4	27,909	1,784	26,125	17625	4000	4500
Samoa	283	136	48.1	127	93.4	n.a.							
Solomon Islands	2,799	2,389	85.4	2,371	99.2	601	25.3	1,760	0	1,760			
Tonga	72	0	0.0	0							1500	0	260
Vanatu	1,219	900	73.8	893	99.2	193	21.6	700	7	693	200	0	493
Total Tropical Oceania	54,055	41,903	77.5	41,752	99.6	10,101	24.2	30,819	1,821	28,998	19,415	4,000	5,583
Temperate Oceania													
Australia	768,230	40,908	5.3	40,719	99.5	15,905	39.1	24,814	6,614	18,200	9700	0	8500
New Zealand	26,799	7,884	29.4	6,228	79.0	268	4.3	5,960	5,415	545	0	0	545
Total Temperate Oceania	795,029	48,792	6.1	46,947	96.2	16,173	34.4	30,774	12,029	18,745	9,700	0	9,045
Total Oceania	849,084	90,695	10.7	88,699	97.8	26,274	29.6	61,593	13,850	47,743	29,115	4,000	14,628
Total Asia-Pacific	2,845,501	564,782	19.4	495,439	87.7	249,181	50.3	236,016	89,509	146,507	57,999	9,458	79,050

Source: State of the World's Forests - 1999

IMPACTS AND EFFECTIVENESS OF LOGGING BANS IN NATURAL FORESTS: NEW ZEALAND

Alan Reid

INTRODUCTION

New Zealand's natural forests have been the subject of protracted public and political debate regarding the role of Government in forestry and the future use of natural forests during the last three decades. This review covers the evolution of the country's logging ban since the early 1970s, when public interest and disquiet over natural forest management became prominent, through late 1999 when the Government decided to phase out the last logging operations on State-owned natural forests in the West Coast region.

Some events played major roles in the way logging restrictions have been implemented. One was the development of planted forests of introduced species, which eventually became the main source of timber in New Zealand. Another was the reorganization of the Government natural resources administration in the mid-1980s, which resulted in the separation of commercial planted forests and natural forests.

Prior to these events, large areas of natural forests covering New Zealand's rugged and erosion-prone terrain were also set aside for water and soil protection. Such reservation became a feature of forest management when the first Government policy on natural forest management and timber sales was formulated.

The exclusion of timber harvests from other natural forests, as a matter of national policy for conservation reasons, is a relatively recent development in New Zealand. Logging restrictions followed growing public interest in natural forest management in the 1970s, and subsequent political changes affecting forestry administration. The Government reorganized the natural forest administration in 1987. Maturing planted forests provide alternative raw material in many parts of the country, cushioning the effect of these changes in the forest industry.

After 1987, new policies and legislation focused on private forests. Timber harvests have not been banned in these forests. Commercial timber harvests are, however, restricted by export, sawmilling, and sustainable forest management constraints.

Natural forest areas affected by logging bans

Logging restrictions eventually will apply to about 5.1 million ha of New Zealand's State-owned natural forests. An additional 142 000 ha of State-owned natural forests and about 1.3 million ha of private forests are subject to restrictions that limit commercial timber harvest according to sustainable forest management guidelines. However, much of the natural forests in all ownerships cover steep land and other protection areas. After forests within catchment protection areas, national parks, and other key reserve areas are removed from the available harvest area, an estimated 930 000 ha of logged and unlogged forests on State lands remain directly affected by the logging ban. Similarly, about 670 000 ha of private forests are potentially available for commercial management, although only about 124 000 ha of this area are currently of commercial interest.

GENERAL BACKGROUND

New Zealand lies between latitudes 34° and 48° South, and comprises two main islands, extending 1,600 km from north to south, and 250 km east to west. The total land area is just over 27 million ha. About 50 percent of the land is steep, including the main mountain systems and adjacent lands.

The climate ranges from sub-tropical in the north to sub-Antarctic in the south. The prevailing westerly winds give rise to a rainfall gradient from west to east. Rainfall is generally between 600 and 2 500 mm per year.

New Zealand's population is 3.6 million (1996 census). The doubling time for the population is estimated to be about 75 years and the population is projected to be 5.4 million by 2010. The majority of New Zealanders live in urban centers and enjoy a high standard of living.

Forests and the forestry sector

Forests cover about 8.1 million ha, or 30 percent of New Zealand. The forests are made up of 6.4 million ha of natural forests and 1.7 million ha of planted forests. The planted forests comprise mainly radiata pine with lesser areas of Douglas fir and other species (Table 1). The natural forests reflect a long period of separation from major landmasses, evolving a unique flora and fauna with a high percentage of endemism among the higher plant species and bird-dominated fauna. The forests also reveal patterns of destruction and renewal following major volcanic eruptions and glacial advances in recent geological time, and more contemporary influences of erosion, destructive storms, and earthquakes.

Table 1. Planted forest areas in New Zealand (April 1999)

Species	Area (thousand ha)	Percent of total
Radiata pine	1 520	90.5
Douglas fir	81	4.8
Other introduced softwood species	32	1.9
Introduced hardwood species	46	2.8
Total	**1 679**	**100.0**

The natural forests are ecologically complex but are generally classified into sub-groupings of two broad types: podocarp (conifer) forests and hardwood and beech ("false beech," Nothofagus) forests. Timber species include the traditionally favored conifers, and to a lesser extent beeches and other hardwoods. Conifers are relatively slow growing and long-lived, whereas beeches grow faster and regenerate readily.

Prior to human settlement by Polynesian explorers in about 1250 AD, approximately 75 percent of New Zealand was forested. Major clearance commenced with the arrival of Europeans in the mid-nineteenth century. The current distribution of natural forests reflects the development of the last 150 years. The most extensive natural forest tracts are in the State-managed conservation estates, which are located primarily in the hills and on higher altitude slopes. Smaller natural forests remain on private lands in the lowlands. The total natural forest area includes unlogged and logged forests in various stages of regeneration, as well as reforested farmlands.

A reassessment of the extent of total forest cover, including regenerated areas, is almost complete following work on the revised New Zealand Land Cover Database. Project findings indicate that the current estimate of forested land area (6.4 million ha) is conservative in light of the cumulative contribution of regenerated forest remnants.

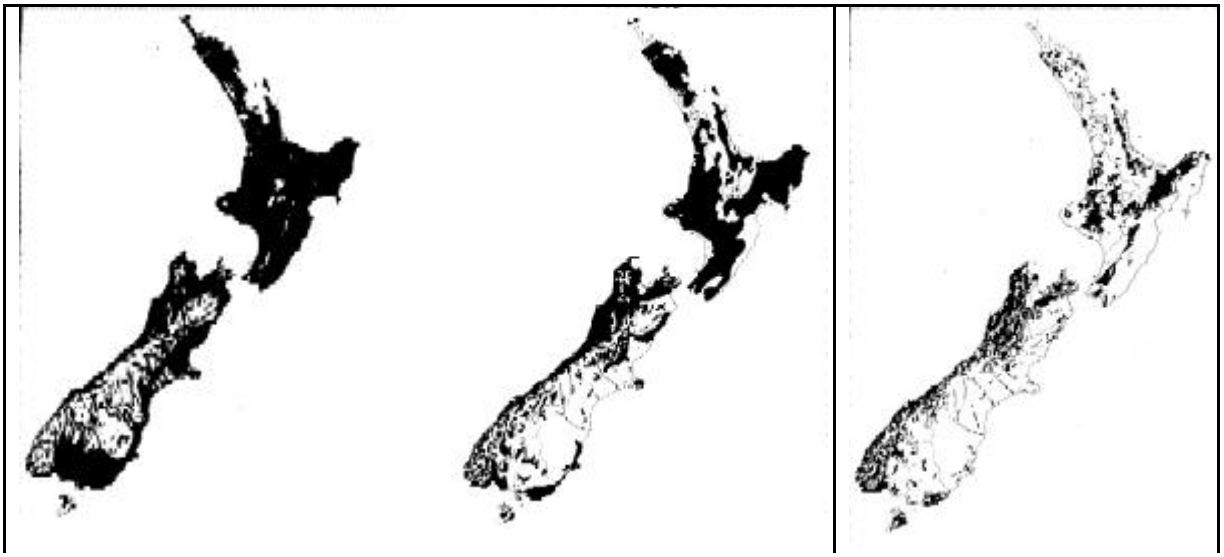

Figure 10. Estimated forest cover in New Zealand, (from left) 1000 AD, 1840 and 1976

Planted forests have steadily replaced the natural forests as the mainstay of the wood processing industry since the 1950s. The industry has emphasized the utilization of increasing volumes of relatively fast-growing radiata pine. In 1998, 16.3 million m^3 of roundwood (over 99 percent of the total) were harvested from planted forests and less than 0.1 million m^3 came from natural forests. Much of the radiata pine is in the "post-tending" age class range (10 to 25 years). Maturing stands mean that the total production is likely to double within the next 10 years.

Six companies, with individual holdings totalling over 50 000 ha each, own over 50 percent of the planted forests. The balance is held by smaller companies, forest investment companies, private groups and partnerships, and farm-scale growers. About 50 percent of current plantings are by small-scale growers and over 98 percent of the area planted in the last three years has been with radiata pine. The management objective is to produce high-quality clear wood. Intensive pruning and thinning are complemented by increased use of improved planting material.

Much of the harvested planted forest timber is exported as finished components, sawn timber, and unprocessed logs. In 1998, 10.7 m^3 of timber were processed domestically, while the roundwood equivalent of 8.6 million m^3 were exported as raw logs and processed products valued at NZ$2.4 billion.[1] Forestry directly provides jobs for over 25,000 people and contributes 3.9 percent to New Zealand's GDP.

Processing industries include integrated sawmills with drying and finishing facilities, panel producers including medium density fiberboard (MDF), plywood and particleboard, and pulp and paper producers. A number of smaller sawmills produce rough sawn, and planed and dried timber.

The natural forest timber industry has undergone significant transition as a result of continuing uncertainty over future resource availability and major changes to the legislative and regulatory framework governing both State and private indigenous forests. Over the last 50 years, the industry moved from a dominant position to a small, specialist industry, the result of diminishing

[1] US$ 1 = 2.25 NZD (January 2001)

supplies of natural forest timber. The total annual timber harvest from natural forests declined from about 500,000 m^3 in the mid-1970s to approximately 82 000 m^3 currently. About 30 000 m^3 come from State-owned forests on the South Island West Coast and the balance from private and Mâori-owned forests.

A large number of generally small individual mills, over half of which are portable mills, process the natural forest timber harvest. Approximately 180 mills qualified for the 1992-1996 allowable cut. This allocation enables the mills to either progressively wind-down or to use alternative timber sources. However, about 260 mills are currently registered, many of which process very small volumes of timber. Despite the consistently high number of registered mills, many have ceased processing indigenous timber. Six larger companies now process logs from natural forests into veneer and other products.

There is a small but high-value export market for natural forest timber. The Forests Act restricts commercial exports of indigenous timber to rimu and beech sawnwood. Finished products made from any species can also be exported. Sawnwood exports totaled about 1 900 m^3 in 1996 and 1 700 m^3 in 1997.

POLICY ENVIRONMENT CONCERNING THE FORESTRY SECTOR

Historic context of policy development

Forest clearance

After the mid-1800s, European settlers substantially cleared natural forests in the lowlands for farming. Forests were considered an obstacle to agricultural development and land clearance priorities dominated Government policy until nearly 1920. Much of the land initially cleared was converted to pastures. Substantial areas of forest were simply destroyed by fire. Later, commercial logging also occurred. Early exploitative timber trade was for the sought-after kauri used in shipbuilding. There were early efforts to assess the remaining resource and impose timber-harvesting standards. These efforts were coupled with experimental planting of non-indigenous species to offset predicted supply shortfalls from depleted natural forests. The Europeans also released non-indigenous domestic and feral mammals into forest areas. Wild populations of deer, goats, pigs, mustelids and Australian brush-tailed possum caused widespread damage to forests, and reduction and loss of native bird species.

As forests were progressively converted, calls increased to restrict the uncontrolled felling, burning, and clearing of forests. The first legislation regulating access to forests and restricting the use of fire was passed in the 1870s. In the latter part of the nineteenth and early twentieth century, there was further regulation to set aside steep forests on the watersheds above agricultural land. However, clearing forests for agriculture remained the main policy priority.

Early forest policy development

Resource surveys in 1909 and a Royal Commission on Forestry in 1913 led to the recommendations for “climatic reserves” in river headwaters, standards for timber measurement and sale, and forest classification. The Commission noted the slow growth of the timber species and also noted the damage by introduced animals.

In 1920, the Government established the State Forest Service and formulated the first New Zealand forest policy dealing with timber sales control, the setting of stumpage rates, forward planning, survey of resources, and management of protection forests. These measures were implemented under the fourth Forests Act passed in 1921. The fifth Forests Act passed in 1949 detailed Forest Service responsibilities, including the identification and designation of protection forests, and measures for managing large areas of soil and watershed protection forests.

Planted forest development

The establishment of planted forests with fast-growing non-indigenous softwood species in the 1920s and 1930s by the State, and parallel programs by private companies, sought to offset future timber supply shortfalls that were predicted in 1913.

By the 1950s, harvests from maturing planted forests increased and their annual timber production overtook the natural forest cut. Further State-funded planting occurred during the "second planting boom" of the 1960s and early 1970s. Concurrently, the Forest Service began to review the options for future larger scale and regional processing of the planted forest wood resource.

Issues that lead to logging bans as a conservation measure

The issues that led to the sequence of logging restrictions gained prominence in the early 1970s, although their onset can be traced to earlier forest policies. Once the first logging restrictions were invoked during the 1970s, the growing public disquiet over natural forest management drove the restrictions that followed.

The issues that lead to the logging restrictions can be grouped into four distinct time periods:

- policies pre-dating the 1970s;
- policy changes in the 1970s;
- political changes in the 1980s, including the split of forestry functions in 1987; and
- post-1987 policy changes.

Natural forest policy change and conservation concerns prior to 1970

The National Forest Survey, a nation-wide survey of natural forests conducted by the Forest Service, commenced in 1946. It was completed in 1955 and provided information on the characteristics, extent, and timber volumes of remaining natural forests throughout New Zealand. The survey results confirmed predictions that the natural forest resources were rapidly declining under the prevailing harvesting rate, particularly on the North Island. Although there was increasing use of timber from maturing planted forests, the Forest Service policy during the 1950s and 1960s focused on conserving natural forest timber resources through monitoring and control of timber sales. A major change to forest management at that time was hampered by timber sale commitments and continuing Government price controls on natural forest timber. The controls were maintained to ensure that timber would continue to be freely available for house construction.

Events in the 1970s

By the 1970s, the public interest in management of natural forests was increasing and it influenced subsequent forest policies. Public involvement at a national level was a relatively new development, although public protest in earlier years led to the 1952 preservation of remnant kauri forests at Waipoua Forest on the North Island. By the time a number of multiple-use, sustainability, and other policies for State-owned natural forests gained official acceptance in the 1970s, public concerns about forest conservation had also gained momentum. Public protest was directed particularly at the practice of replanting logged forestland with introduced pine species. Well-organized and informed groups opposed the Government policies. These groups argued the case for forest conservation on ecological, aesthetic, and recreational-use grounds.

The forest policy changes of the late 1970s and 1980s reflected the changing and turbulent political climate and popular support for forest conservation. The Government was faced with conflicting goals. On one hand, there were logging contract commitments and timber price controls, reflecting a legacy of priority on timber production. On the other hand, the contemporary thinking favored forest sustainability that would in turn require a reduction in wood-processing

levels. Pressure emerged, both within the Government and publicly, for increased forest preservation and the designation of prominent forest areas as national parks.

The policy goals of the period were generally oriented toward finding solutions to land-use conflicts. Thus, the Government moved to close out existing logging contracts, reduce timber cuts, and impose logging moratoria. In addition, it published forest management plans and sought public input in developing the plans. Logging restrictions during the period were primarily the result of public campaigns mounted to prevent further logging in specific State-owned natural forests on the West Coast and the central North Island.

Public opinion hardened after the announcement of the 1973 "beech project" that proposed major industrial processing of timber from the extensive beech forests of the West Coast and Southland. It included proposals to convert substantial areas of logged beech forests to pine on the basis that the level of processing could not be supported in the future by natural forest growth alone. The overall beech forest scheme, and especially the conversion proposals, attracted strong and well-organized public opposition and generally set the course for the following years of debate. The proposals themselves disclosed some of the priorities of the time and set out the Government's intent to invite commercial proposals to utilize the beech forests in Southland and the West Coast regions. The Government's approval of the scheme reflected pressure for regional development through "wise land-use" but with "the fullest consideration given to all objections raised."

For example, the proposal stated:

> *"While the Government recognizes the genuine concern expressed by conservation organizations and many individuals it has concluded that with the environmental constraints originally incorporated by the Forest Service, and others put forward by the Minister of the Environment, the proposals present an opportunity for wise use of forest land and resources."*

And further:

> *"Both schemes have the potential to contribute greatly to the development of the regions. Social considerations have a big bearing in the Government's decision."*

By the time the "Management Policy for New Zealand's Indigenous State Forests" was published in 1977, the increased emphasis given to conserving and managing natural forests was evident. The period of change and uncertainty was also evident. The 1977 Policy stated, for example:

> *"It [the Policy] recognizes that indigenous forests can fulfill a range of desirable purposes and that these need to be defined for specific areas."*
>
> *"Unless the need is adequately demonstrated, clearing of indigenous forest will not be practiced."*
>
> *"It gives much more emphasis to maintaining indigenous forest as such, although modified in some cases, leaving options open for management decisions in accord with circumstances prevailing in the future."*
>
> *"The object of management of State indigenous forests shall, in general be to perpetuate indigenous forests both as natural forests and as managed stands."*

The 1977 New Zealand Indigenous Forest Policy sought to realign forest management with a stated objective of "perpetuating indigenous forests both as natural forests and as managed stands." The policy also provided for greater public participation in forest planning, sustainable management, identification of scientific reserves, and multiple use. However, it explicitly retained the option of clearfelling where land shortages necessitate the development for planted forests.

In 1978, separate policies for forests on the central North Island and the West Coast were formulated. These were based on the principles set out in the 1977 policy, but dealt with specific regional issues.

In 1977, environmental groups presented the "Maruia Declaration," a public petition carrying 341 159 signatures, to the Parliament. The petition set out the groups' forest conservation objectives. It became the basis for a continuing public campaign against natural forest logging until the major forest administration changes following the 1984 general election. While not an expression of Government policy of the time, the petition nevertheless illustrated the gulf between the official policy and the goals of the environmental movement at that time.

The six principles set out in the Declaration were:

1. Native forests, wherever they remain, need recognition and protection in law.
2. The wholesale burning of indigenous forests and wildlife has no place in a civilized society.
3. The logging of virgin forests should be phased out by 1978.
4. Our remaining publicly owned native forests should be placed in the hands of an organization that has a clear and undivided responsibility to protect them.
5. To reduce commercial pressures on native forests, the growing of fine quality exotic and native timbers on land not presently forested should be given encouragement.
6. It is prudent to be conservative in our consumption of these forest products, especially newsprint and packaging paper, which make heavy demands on our precious resources of land, energy and water.

The Government's initial reaction to the Maruia Declaration was relatively low key but the proposals endured to become incorporated in some policy changes of the 1980s. Specific policy goals were developed during the 1981 political campaign. These were further reinforced in policies of the Government elected in 1984 and the subsequent administration's policy changes made in 1987.

Political changes in the 1980s

The 1980s are regarded as a political and policy watershed for New Zealand. Past events had strongly shaped the decisions made and the future course of forestry thereafter. The role of the State in forestry was dominant before 1987. The New Zealand Forest Service had jurisdiction over the Government-planted forests and carried out an array of multiple-use management roles for natural forests and forest research. Other agencies involved in the management of State natural forests included the Department of Lands and Survey, which controlled farm development and farm leasehold on State lands, national parks, scenic reserves and other unallocated Crown lands; the latter often including forested lands. The New Zealand Wildlife Service within the Department of Internal Affairs also managed habitat reserves, protected species, and freshwater fisheries.

Concerns that drove the 1980s policy changes included:

- a perceived lack of concerted environmental advocacy;
- mounting public opposition to Government departments managing the environment with multiple and apparently conflicting roles;[2]
- a political mood that the development-oriented philosophy guiding land-use in previous years should make way for a stronger conservation ethics; and
- mounting criticism of the accounting practices of Government departments and of State subsidies for land development.[3]

[2] For example, The Lands and Survey Department managed farm development programs and forest reserves. Both this agency and the Forest Service performed similar environmental management roles over separate state land categories.

[3] This criticism was fuelled by growing support, after the 1984 election, for a market-driven economic approach in New Zealand. There was also a call for clear and separate accountabilities for Government departments and the removal of state subsidies.

The 1984 newly elected Government affirmed its policy to halt logging in North Island forests and extend protection to all other natural forests. The Government also committed to restructuring the entire Government administration of natural forests.

In 1985 the Commission for the Environment reviewed the legislation, policies and natural forests management issues and concluded:

- existing legislation and policies had varied and often conflicting provisions for natural forest management, providing for protection and conservation in general, but encouraging forest clearing in some cases;
- there were conflicts between regional employment goals and national objectives for conservation; and
- fiscal provisions and policies encouraged clearance and none provided for protection of under-represented lowland forests, largely located on private lands.

The 1987 Government restructuring of forest agencies dissolved the Forest Service, and Lands and Survey Departments. It also set up new agencies: the Department of Conservation (DOC) established under the Conservation Act of 1987, the Ministry of Forestry, which assumed the role of a policy advisory department, and the Ministry for the Environment, instituted under the Environment Act of 1986, dealing with broad national environmental policy.

The change resulted in the conversion of most State-owned natural forests to protected area status. Production shifted to planted forests then held by the New Zealand Forestry Corporation. Since 1990, only very limited volumes of timber were removed from State-owned natural forests by Timberlands West Coast Limited (TWC) – a State-owned enterprise.

Post-1987 events

The post-1987 administrative structure is characterized by a strong separation between fully protected forests and timber production. A fundamental shift in the role of Government in 1987 included the phasing-out of the State from management and development of the planted forests and a series of restrictive measures specifically aimed at logging in natural forests.

After the 1987 changes, the Government began developing a broader policy for natural forests with the objective of maintaining or enhancing, in perpetuity, the area of indigenous forest through protection, sustainable management or reforestation with indigenous species. The policy sought to cover ownership through controls and positive incentives for private owners to conserve and protect their forests or sustainably manage them. Provisions were also made for accords, exchanges and export controls.

Following the separation of forestry functions and the establishment of full conservation management under the DOC in 1987, a further review focused on private natural forests. These forests had been unaffected by the legislative changes although they included a high proportion of lowland forest types which were under-represented in protected areas. The Government thus considered a forest policy covering both State and private natural forests, in conjunction with the proposed Resource Management Act. The 1989 policy framework was based on the following key principles:

- recognizing the rights and responsibilities of private owners;
- recognizing the rights and obligations of the Crown to maintain wildlife habitat and reflect international agreements involving the Crown;
- recognizing the rights and obligations of Mâori landowners and the Crown under the Treaty of Waitangi; and
- being efficient, cost effective and equitable.

Considerations included Mâori land values, dealing with uncontrolled woodchip felling (as was occurring on some private forestland), future specialist timber supply, lack of forest information, and the prospect of increased timber imports potentially required to meet the continuing demand for high-quality wood products. The proposed policy contemplated provisions for sustainable management that allowed timber production but controlled unsustainable felling and export, and incentives for conservation of private forests. A forest policy was announced in June 1990 and a further discussion paper was prepared that covered a broad set of desired outcomes related to planted and natural forests.

In response to the public submissions sought on this policy, and the increasing public opposition to the chipping and export of beech forests from private land, the Government imposed an interim ban on the export of unsustainably harvested timber and woodchips in 1990, with the intention of introducing legislation to replace the export ban. Due to a change in the Government in 1990, the policy did not progress further until the Forests Act was subsequently passed in 1993.

The Forest Heritage Fund (later renamed the Nature Heritage Fund) and Nga Whenua Rahui arose from the 1990 policy development. These funds were established to enable covenanted or purchased protection of private natural forests.

CURRENT FOREST POLICY AND LEGISLATION IN RELATION TO NATURAL FOREST MANAGEMENT

Statutes that directly or indirectly affect natural forest management (Table 2) can be broadly divided into legislation related to:

- fully protected State natural forests; and
- commercial sustainable management of other natural forests.

Table 2. Summary of legislation currently applicable to natural forests in New Zealand

Land tenure category	Applicable legislation
Conservation estates	Conservation Act, Resource Management Act (RMA), Reserves Act, National Parks Act, Wildlife Act, Wild Animal Control Act
State-owned production natural forests managed by TWC	RMA, State-owned Enterprises Act
Private natural forests	Forests Act, RMA, Biosecurity Act

Management of fully protected natural forest

Legislation covering these forests includes the Conservation Act of 1987 that governs the operation of the DOC. The DOC manages the bulk of State-owned natural forests, approximately 4.9 million ha, under the Conservation Act of 1987. These forests are located in national and forest parks, reserves and conservation areas and other protected natural forests. The key role for DOC is management of the protected natural forests that includes both the long-established reserve and national park systems and the additional lands conserved by the 1987 reforms.

In a broader context, the Government of the 1990s developed policies and strategies to protect and enhance New Zealand's environment. These are based on:

- principles covering sustainable management of natural and physical resources;
- integration of environmental, social and economic values;
- consideration of regional and global environmental impacts; and
- imposing the lowest cost on the economy and the environment.

The Environment 2010 Strategy brings together these principles in the broad context of the "biophysical environment." This includes urban and rural environments, commercial primary production based on introduced species and natural species biodiversity, protection from and control of pests and diseases, and social and heritage issues of the Mâori. The strategy emphasizes sustainable land management that recognizes issues such as hill erosion and protection of biological diversity.

A number of international initiatives relating to forests and the environment also drive New Zealand's environmental policy. This includes initiatives relating to climate change, international conservation of biodiversity, and sustainable management of forests. The current Government has broadly followed similar policies although it has moved to strengthen environmental and biodiversity conservation aspects of its environmental policy.

In addition to management of the protected conservation estates, the Government also introduced the Nature Heritage Fund and Nga Whenua Rahui schemes to assist private owners of natural forests to enter into voluntary protection agreements with the Government. Other voluntary covenanting schemes have been made between private landowners and the Government-funded Queen Elizabeth II National Trust. Lease or management contracts are also arranged through the DOC. Private land protection arrangements currently cover over 300,000 ha.

Management of natural forests subject to commercial timber

Two key pieces of legislation govern the modification or clearance of natural forests. These include the Indigenous [natural] Forest Provisions of the Forests Act of 1949 and the Resource Management Act (RMA) of 1991.

Indigenous Forest Provisions of the Forests Act of 1949

The Indigenous Forest Provisions of the Forests Act of 1949, inserted by amendment in 1993, apply to about 1.3 million ha of private natural forests and about 12 000 ha of State-owned forests that remain available for timber production. The Act also restricts exports of wood products from natural forest timbers. This provision largely replaces a previous export ban imposed in 1990.

The Act restricts milling to only the harvest of timber under sustainable forest management and requires mills wishing to cut natural forest timber to be registered. The Act provided a transitional four-year period of harvesting from 1992 to 1996 based on the mills' pre-legislation cutting levels so that the industry could adjust to the change in supply. The Act offers some opportunity for landowners to benefit from timber production and provides for a continuing role for specialist timber species. However, it also imposed specific restrictions, including explicit prescriptions for the sustainable management of natural forest timber species. For landowners wishing to harvest timber, the Act requires the preparation and approval of sustainable forest management plans. Less elaborate approvals can be obtained but only for lower timber harvest levels.

The Ministry of Agriculture and Forestry administers the Act's provisions. The approval process requires a forest owner to provide documentation and information to demonstrate how timber production (volumes, harvesting methods, rate of cut and other silvicultural information) and, non-timber natural values, will be managed. The Ministry of Agriculture and Forestry also consults in each case with the DOC, which in turn may request amendments to the plan or provision for reserves. An approved plan under the Forests Act is registered against the land ownership title.

The Act also provides for "sustainable forest management permits," which require less detailed approval documentation but restrict the cut. Timber can also be taken for personal use and to salvage dead and dying trees, and under other specific circumstances, when the forests need to be cleared. Some forests exempted from the Forests Act include:

- forests under the Conservation Act of 1987;
- approximately 36 000 ha of forests on some Mâori lands in recognition of continuing settlement or historic issues;
- planted forests; and
- remaining State-owned production natural forests in the West Coast region of the South Island and managed on behalf of the State by TWC.

Further amendments to the Forests Act are currently before a Parliamentary Select Committee. These proposed additional reforms seek significant changes to the Forests Act. They include the liberalization of the current export restrictions to allow export of any forest product provided it originates from sustainably managed forests. The reforms also propose the removal of exemptions for State-owned natural forests on the West Coast. The changes to the Act mark a settling-in period, increasing public confidence that forest management under the Act can meet the sustainable forest management requirements without the additional fetter of export restrictions. The amendments reflect a move to simplicity and equity under the Act.

Resource Management Act (RMA)

The Resource Management Act of 1991 promotes sustainable management of natural and physical resources. The RMA is administered by local Governments through district and regional plans. The Act follows a process of plan preparation, public participation and submissions, and implementation through regional and district councils. Restrictions on natural forest management for timber harvest can be imposed by restrictive rules arising from this process.

Accords

Accords, in the form of negotiated and signed agreements between several parties of opposing interests, gained some prominence in New Zealand in the late 1990s. These can be locally focused and typically embody agreement on specific conservation issues, yet they also add greater certainty to forest use and management. They may involve Government or only non-government parties. Two of the most prominent accords relating forest conservation are the 1986 West Coast Accord and the 1991 New Zealand Forest Accord.

The 1986 West Coast Accord and the New Zealand Forest Accord

The 1986 West Coast Accord sought to end previous years of debate between disparate parties over the use of West Coast forests. The Government-brokered Accord is an agreement between a number of regional, community, industrial, and environmental interest groups. The Accord defined an agreed-upon allocation of State-owned natural forests to be managed by DOC. It also defined forests allocated for timber production under sustainable management and forests allocated for a limited period of unsustainable logging to maintain local sawmills. The production forest was exempted from the Forests Act and includes about 130,000 ha of State-owned forest managed for production on behalf of the crown by TWC.

The New Zealand Forest Accord is an agreement between non-government forest industry and environmental organization representatives. Members of New Zealand's Forest Owners' Association and several conservation groups signed the agreement in 1991. It recognizes the important heritage values of natural forests and the need for their conservation, maintenance, and enhancement. The Accord acknowledges the role of commercial planted forests and the need for protection and conservation of natural forests. It sets protocols and defined limits for establishing planted forests on natural forest areas. The Accord also supports the scope for sustainable management of natural forests to harvest timber and produce added-value solid wood products in New Zealand.

Recent policy developments

Following the November 1999 national election, the incoming Government affirmed a policy that logging in State-managed natural forests on the West Coast would be banned. This position had been published in the Labor Party pre-election manifesto and reflects the Government's view that remaining State-owned natural forests should be fully protected. The previous Government was already implementing a gradual harvest reduction to sustainable levels. This would have reduced timber production to about 122 000 ha and replaced rimu harvests with beech.

The Government has already halted proposals to harvest timber from beech forests managed by TWC. The beech proposal included about 80 000 ha of forests with a proposed annual roundwood yield of about 60 000 m^3. The Government has proposed measures to phase out harvests of rimu under existing contracts and has introduced legislation to cancel the West Coast Accord. However, the Government has also agreed to support the continuing scope of the Forests Act by allowing private forest owners to harvest timber under Forests Act approvals.

Impacts of current forest policy and legislation on development of wood industries and the production of wood products

Following the passage of the Forests Act amendments in 1993, the natural forest timber industry underwent major adjustments. During the 1992-1996 transitional phase, the industry positioned itself to compete for scarce forest resources, adapt to other species, cut for grade, and turn to smaller capacity and portable mills, with increasing interest in veneering and other value-added processing.

Markets for natural forest timbers include traditional domestic users such as the furniture makers. Specialist users such as woodturners, continue to seek podocarp timber. A great reduction in supply is likely as stocks from previous forest cuttings get depleted. There is also a market for products of recycled timber. Stumps are exported and manufactured locally into items such as tables. Veneer from the increasingly expensive premium grades is also being sought to take advantage of the decorative and popular indigenous timbers.

Until the late 1990s there was a small hardwood chip export market based on Southland beech species. This market is likely to be replaced by supplies of planted hardwood (*Eucalyptus* spp.) coming on-stream in Southland. Beech timber has been sought for traditional uses such as brush handles. Red beech from sustainable forest management areas has gained some localized market acceptance for both decorative and structural uses.

The uncertainty over future supply has elicited a mixed response from manufacturers. Some specialist processors are adapting to capitalize on the small volume, high-value, end-use markets. Others are waiting to see the effect of the logging ban on prices and supplies. The State supply of rimu, substantially reduced in the last decade by policy measures, has provided a steady supply together with uncertain cutting rates from private forests and unsustainable cut from Mâori-owned forests. It is apparent that the rimu market niche will change as the processing sector either reduces in scale or finds rimu substitutes or alternative timber sources. In May 2000, the Government announced that it proposes to end rimu harvests on State-owned natural forests on 31 March 2002, allowing a lead time of less than two years for the rimu-using processors to find alternative supplies.

Effects of current policy on conservation values

The passing of the 1987 Conservation Act resulted in the protection of approximately 4.9 million ha of State-owned natural forests in much of the hill and high country. The quality of conservation measures relating to the DOC-managed conservation estate relies very much on the status of the resources and the actual implementation of programs by the Department.

The 1987 legislation did not cover the 1.3 million-ha of privately owned natural forests, which include much of the lowland forest remnants throughout New Zealand. The conservation of these forests is therefore achieved through the covenanting arrangements, sustainable management, and representative area provisions under the Forests Act of 1949 and provisions for protection through local Government council plans under the RMA.

Forest clearing for chipwood production occurred in some privately-owned beech forests in the late 1980s. The 1990 export ban sought to curtail this trade. The transitional provisions under the 1993 Forests Act amendments also resulted in unsustainable cutting in private forests as mills and forest owners ensured that they reached their allowable timber volumes during the limited period provided.

Provisions in the 1986 West Coast Accord also allowed for over-cutting[4] in specified areas of the State-owned natural forests of the region. Current policy provides for all unsustainable cutting in State-owned natural forests to cease by the end of 2000.

The approximately 36 000 ha of Mâori-owned natural forests are exempted under the Forests Act and current policy provides for negotiated settlements with the owners to either grant the forests full protection or to sustainably manage them. The Government has already arranged for full protection of some of these areas through specific compensation deals.

The Government's policy emphasis has been to limit the loss of natural forest areas. However, there is currently a shift towards measures to enhance biodiversity conservation. The Government is reviewing a range of measures through the Biodiversity Strategy to improve and expand the quality, area, appreciation, and understanding of key natural habitats (including natural forests). The scope of the strategy relates to both State-owned and private forests.

[4] The 1986 West Coast Accord provided for specified period of cutting in some West Coast podocarp forests at rates in excess of the sustainable level of cut. The "overcut" applied to forests the North Westland, Karamea and Buller regions of the West Coast and recognised a need to maintain some interim level of supply to mills in these areas. The term "overcut", therefore, refers to a timber supply strategy rather than primarily to a forest management-linked cutting strategy. Currently, only the Buller overcut remains active. In contrast to the overcut, timber harvests from other West Coast podocarp forests have been sustainable.

GOALS AND OBJECTIVES FOR FOREST CONSERVATION SOUGHT THROUGH LOGGING RESTRICTIONS

The goals and objectives for forest conservation were initially a response to the strong and nationally focused public concern since the early 1970s. The public campaigns, the Government's political and policy responses, changes to forest administration and post-1987 policy development all served to shape the major goals for conservation. Some fundamental goals have endured as the leading issues throughout the period. These include:

- decline of lowland natural forest remnants;
- damage and modification by introduced invasive plant and animal species; and
- loss and threat to endangered endemic fauna and flora species.

Government policy after 1984 strongly reflected the broad public concerns of earlier years, resulting in administrative restructuring and the emergence of fully protected natural forests. Subsequent goals reflected similar conservation issues but were directed at the balance of private and State-owned natural forests considered still at risk. The thrust of post-1987 Government policy has been to maintain and enhance the remaining natural forests by halting major forest clearance and phasing out unsustainable milling.

The Government's stated goals in relation to the operation and outputs of the DOC, relating to State-owned conservation lands, including natural forests, are:

- safeguarding New Zealand's ecosystems and biological diversity for the enjoyment of future generations;
- recognizing the importance of the Treaty of Waitangi,[5] building relations between the Crown and Mâori and negotiating and implementing fair durable and affordable settlements; and
- celebrating, fostering and protection of the cultural, historical and environmental heritage.

POLICY, ECONOMIC, ENVIRONMENTAL AND SOCIAL IMPLICATIONS

Overview of the logging restriction measures

Two groups of measures specifically restricted commercial logging: a) the pre-1970 West Coast Accord, and b) four policy and legislative measures from 1987 up to the present (Table 3).

While each measure is identified separately, these restrictions are part of a complex span of forest policy history in New Zealand. This period includes several Government changes that resulted in significant shifts in policy. The 1984 election resulted in the 1987 administrative changes. The 1990 election probably curtailed some policy developments of the latter 1980s, and the 1999 election resulted in the most recent decision of the Government to phase out remaining logging on State-owned natural forests.

[5] In 1840, New Zealand was established as a colony under the British Crown. More than 500 chiefs of the Mâori tribes of New Zealand signed the Treaty of Waitangi, an agreement between the Mâori people and the British Crown. The Treaty of Waitangi is recognised as the founding document of the nation. Today, the Treaty continues as a "living document" and is the subject of much debate on race relations in New Zealand. It has an important position in many Government activities.

Table 3. Measures to restrict commercial logging as a conservation strategy since 1970 and area of natural forest affected in New Zealand

Forest affected	Measure applied	Year	Forest area affected (ha)
State forest administered by the former Forest Service	Logging moratoria, selection harvest, and forest zoning restrictions.	1978-86	80 000
State forest administered by the former Forest Service	Forest permanently reserved under gazetted forest sanctuaries, ecological areas and other dedicated reserves.	1978-86	300 000
State forest administered by the former Forest Service	Transferred to reserve, or potential reserve, under the West Coast Accord.	1986	180 000
State-owned natural forest not already within national park or reserve or in watershed protection	Transferred to full protection within the conservation estate under the Conservation Act 1987.	1987	750 000
Private and State forests	Export ban on unsustainably milled timber and woodchips – as interim measure until legislation was in place.	1990	1 465 000
Private and State forests	Timber milling constrained by sustainable management provisions of Forests Act 1949.	1993	1 312 000
West Coast State-owned production forests	To be removed from timber production under current Government policy.	2000+	130 000

Note: The areas listed are not cumulative as a number of the separate measures in many cases applied to common areas of natural forests. For example, State-owned forest areas in the pre-1987 measures were also affected by the 1987 changes. Again, the forests affected by the 1990 export ban were also subject to the later 1993 Forests Act measures.

The restrictions generally applied to forest practices, although the export ban was an indirect measure to limit the scope for unsustainable commercial milling of timber for export. Other policies also served to limit logging in natural forests such as the RMA and the 1991 New Zealand Forest Accord.

Through the 1986 West Coast Accord, the Government withheld decisions on the future of about 300 000 ha of forests in the remote South West Coast area and 28 000 ha of beech forests in Southland. In 1988, 12 000 ha of the Southland forest were allocated to production, and in 1989, the South West Coast area was placed in the conservation estate.

Approximately 37 000 ha of forests on Mâori lands and 130 000 ha of West Coast Accord production forests were exempted under the Forests Act. The Government subsequently negotiated protection for an estimated 9 000 ha of natural forests with the Mâori owners in 1995 and 1999.

Policy implications

The Forests Act amendment introduced in 1993 established specific controls on commercial timber harvesting, milling and exporting. The Act sought to establish a balance between a limited sustainable timber harvest and the retention of natural forest values. Sustainable forest management is defined in the Act as:

> *"The management of an area of indigenous forest in a way that maintains the ability of the forest growing on that land to continue to provide a full range of products and amenities in perpetuity while retaining the forest's natural values."*

Debate at the time of the Act's introduction focused on the rights of property owners and their responsibilities to ensure long-term conservation of forests on their lands. The Act exempted some forest categories including forests on Mâori land, which had been set aside under legislation in 1906 in recognition of lands taken by the Crown during the nineteenth century. The Act also exempted State-owned production forests under the West Coast Accord, managed by TWC under a separate Deed of Appointment with the Government. The Act provided transitional allowable timber volumes to mills cutting natural forest timber to enable a progressive reduction in cut.

After the end of transitional measures in 1996, the Act restricted export to specific sawn timber dimensions of two species, beech and rimu. The export restrictions sought to limit woodchip felling which generally resulted in near-clearfelling. The Act reflected a policy of encouraging low-volume, but high-value, specialty use of timber for the domestic market.

The Act's provisions are very prescriptive for timber management, but are not explicit regarding methods and limits for sustainable management of non-timber values. There is continuing debate over the extent to which timber harvest can modify the forests without compromising their natural value.

The Forests Act was amended several times but did not substantively alter the key restrictions on landowners, mills and exporters. However, further proposed amendments would allow export of timber provided it is from approved sustainable management operations. Amendments to remove exemptions under the Act have also been proposed. This would include removing the exemption on State-owned natural forests under the West Coast Accord. This exemption was created because of the existing arrangements (including unsustainable logging) provided for under the Accord when the Forests Act was amended in 1993. The exemption generated tensions over the "different rules applying" to State-owned forests. Nevertheless, TWC's work on refining techniques in sustainable forest management is considered by many to be at least up to the standard achieved on private forests under the Forests Act.

In 2000, the Government considered that State-managed natural forests have a key role in conservation and moved to halt all remaining logging in these areas. The forests affected by this policy were all within the West Coast region. The forests included those where unsustainable logging had continued for a specified period in the interests of the regional economy under the West Coast Accord. The new policy also included the intent to phase out even the sustainable management harvest. Forests under this regime include about 9,500 ha of podocarp forests that were designated for sustainable management in 1984.

Supporters of sustainable management argue that there are fundamental differences between the two categories – unsustainable logging (as a transitional accommodation), and sustainable forest management. Nevertheless, the policy change is driven by the Government's view that the State-managed West Coast forests are of sufficient conservation importance to warrant their total exclusion from logging.

The policy change will effectively lead the Government to remove itself from any involvement in production forestry, although it continues to support sustainable forest management provisions which regulate harvest on about 1.3 million ha of private lands under the Forests Act. The policy change has also fueled the public debate. Much of the pro-logging support is from the affected West Coast region. However, there is also support from some representatives of the scientific community for the recent work on sustainable management of natural forests by TWC. Some argue that the Government should at least offer the opportunity for critical review and discussion of the TWC work.

Role of the West Coast Accord

The West Coast Accord was seen at the time of its signing as a solution to the earlier years of protracted debate over the region's forests. However, recent court action has resulted from challenges to the Government by West Coast interests to uphold Accord provisions that allowed the "overcut," or unsustainable logging of rimu from part of the region (see footnote 3). This drew judgments that the Accord was contractual in nature and its main provisions binding on the Government as a party to the Accord. However, portions or "recitals" under the Accord were also judged to be matters related to Government policy and not bound by contract. Following the court decision, the Government changed the policy to shorten the period of the "overcut" provision in the Accord.

The litigation by the West Coast Accord parties and Government policy changes subsequent to the agreement raise questions about how long such an agreement, involving the Government as a party, can remain effective. Despite its importance in 1986 as an agreement between disparate parties on issues of the time, the provision under the Accord for production natural forests is now counter to Government policy following its decision to phase-out logging on the Accord forests. The Government is, therefore, currently proposing to cancel the Accord.

Consistency of the logging ban with New Zealand's positions on international agreements

New Zealand takes an active role in a number of international forums including the Intergovernmental Forum on Forests, Montreal Process, and International Tropical Timber Organization (ITTO). The main thrust of the country's position is mainly to emphasize New Zealand's dependence on timber largely from planted forests and to ensure the conservation of remaining natural forests.

New Zealand has argued strongly that its planted forests, natural forests that are not already fully protected (including those subject to the Forests Act) and State-managed forests under sustainable management are in accordance with international agreements. In general, the standard of sustainable management sought in the natural forests is well within guidelines of international conventions.

The decision to cease logging in the natural forests under the West Coast Accord reflects the Government's view that despite the development of environmentally sound timber harvesting techniques, the uniqueness of these forests warrants their full protection.

Effectiveness of the timing of implementing the logging ban

The changes that occurred in the1980s followed a protracted period of closures of mills dependent on wood from the natural forests. So, although a large State-owned area was transferred to full protection under the Conservation Act of 1987, the impacts on the industry were less severe than might be expected. (Figure 11).

Despite changes to its State forests, previous rationalization of mill cuts and the agreement under the 1986 West Coast Accord had helped the West Coast region establish its future level of timber supply when decisions on apportioning forests to full protection and production were made.

The 1990 export ban, applying to both State and private forests, was introduced relatively quickly to restrict clearfelling for woodchip export. With no progressive introduction, the Government provided compensation in proven cases of frustrated existing contracts. On the other hand, private forests under the Forests Act Amendment of 1993 were granted transitional allowable cuts based on the individual quotas of mills. In giving the industry a chance to adjust to lower cuts, the landowners also had a chance to sell their timber before the full sustainable forest management provisions came fully into force. The relatively large volume of timber produced concurrently from the State-owned forests cushioned the effect of the reductions from private forest milling.

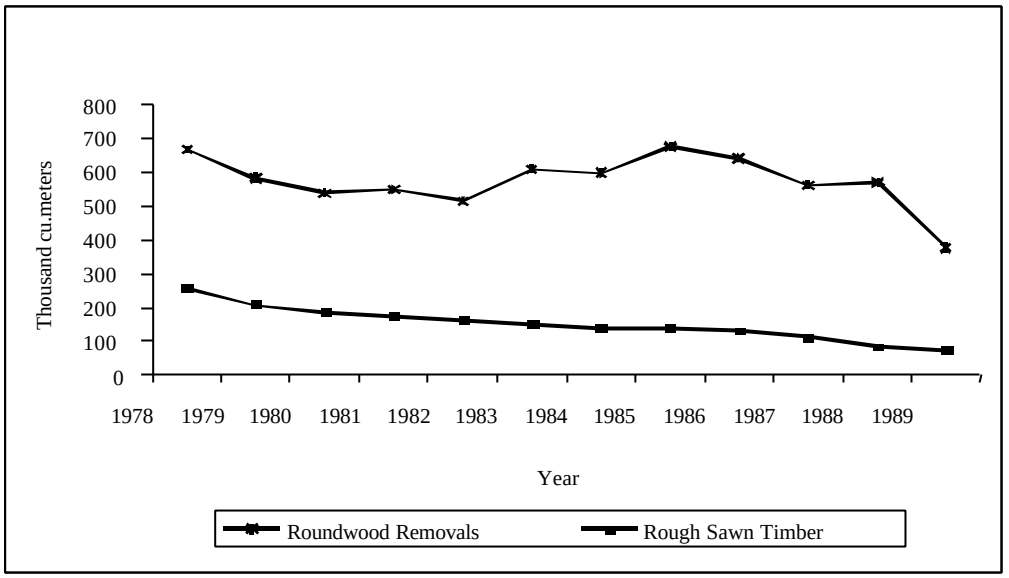

Figure 11. Timber production from New Zealand's natural forests, 1978-1989

The allowable cut mechanism provided registered mills a volume of timber over a four-year period equivalent to two years' cut in a preceding period. Many mills took advantage of the provision, with close to 400 mills being registered, many of them portable mills with small individual cuts. Progressive reductions also applied to production from the remaining State-owned West Coast forests managed by TWC (Figure 12).

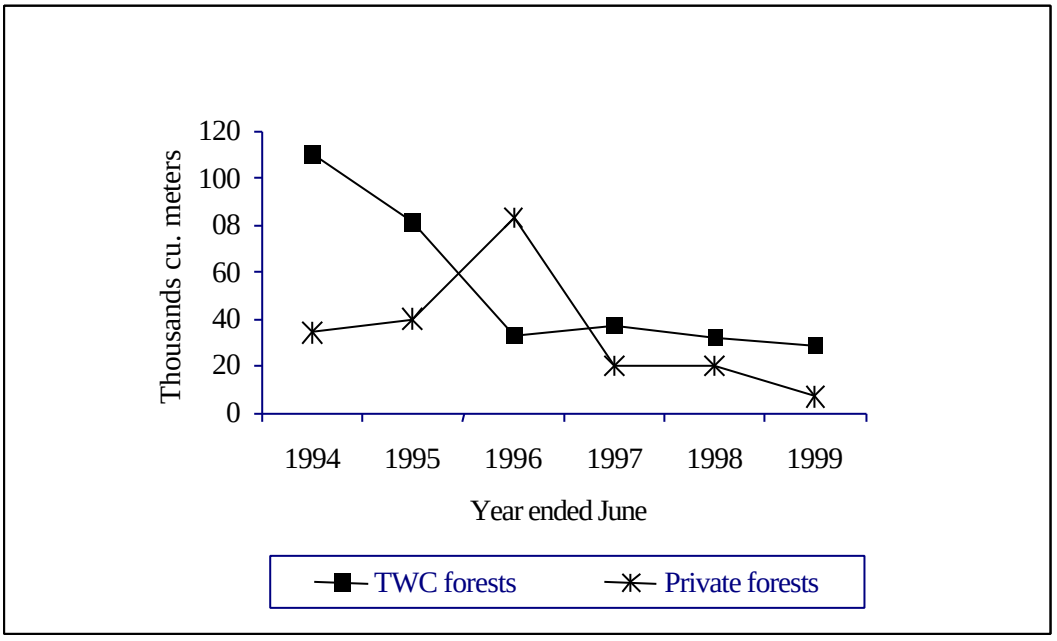

Figure 12. Production from TWC and private forests in New Zealand, 1994-1999

The role of planted forests as a substitute wood supply

The prospect that fast-growing introduced tree species grown in planted forests would, in large part, substitute for a dwindling supply of natural forest timbers was known after the first review of the forest resource in 1913. At that time, the known slow growth rates of native softwoods, coupled with the rapid rates of forest removal, hastened the concern to provide for alternative future timber supplies.

By the time concern over natural forest depletion had grown significantly, the place of planted forests was well established and New Zealand was beginning a "second planting boom," which was building on the successes of the maturing first rotation. By 1970, about 470,000 ha of planted forests (State and private) had been established and roundwood production from planted forests was about 6.8 million m^3, or six and a half times the production from natural forests.

Over several decades, planted forest timber progressively replaced the natural forest cut (see Figures 13 and 14). Under the pre-1987 forest administration, substitute volumes were made available through the Government timber sale process. The relatively large volumes of planted forest timber easily replaced the reduced natural cuts in most areas. Planting targets established and implemented in separate regions of New Zealand by the Government from the late 1960s ultimately provided a replacement resource in most areas.

After the sale of its planted forest timber in the late 1980s,[6] the Government was no longer involved in selling timber to processing mills. Large companies with planted forests began to supply their own processing outlets. Other growers, including those owners of small- and medium-sized forests, have continued to supply other mills, including the regionally-based mills that previously relied on natural forest timber.

Enforcement of logging restrictions

The Forests Act provides for penalties imposed for illegal cutting of timber from private lands, which are administered by the Indigenous Forest Unit of the Ministry of Agriculture and Forestry. The DOC has powers under the Conservation Act 1987 to prosecute for the removal of timber from conservation lands. There have been isolated incidents of timber trespass on public lands and private forests. The Indigenous Forestry Unit of the Ministry of Agriculture and Forestry has successfully prosecuted six illegal timber trespasses since the Forests Act came into force. The prospect of substantial or continuing illegal trade in wood products is considered unlikely on private land within New Zealand. Export restrictions are controlled through approval provisions and port controls.

Additional measures, resources and capability building

Policy changes to halt State-owned forest timber supply will put pressure on private forest resources as current mills and processors investigate new sources of supply of specialty timbers. Capability building is likely to be needed to ensure that adequate and consistent supplies of preferred species are available from these alternative sources, which will probably include imported timber, private natural forests, and planted forests in New Zealand. There is also a developing and buoyant market for recycled timber, although the life of this resource is unknown. At present, there is little detailed information about New Zealand's planted species of alternative hardwoods and other specialty species. Private growers on a farm-forest scale undertake most planting of these species. Research on management and processing of these species is limited.

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[6] The Government sale of the forests, also termed "privatisation," involved sale only of the forest assets – the tree crop, buildings etc. The land remained under Crown ownership with provisions for lease of the land to the new owners for a rotation (35 years) and in some cases, a longer period. There was also provision for review of any claims to the land and, in the case of successful claims, return of the land after the lease expiry. The forest sales commenced in 1989 and were largely completed by 1996.

Economic implications

Timber products from natural forests

Natural forest timber production declined steadily after a peak in 1953. The main output of milling has been sawn timber for a range of purposes including construction and finishing. Softwoods from the natural forest have long been favored over hardwoods for their range of utility and finishing purposes, including the popular podocarp species: rimu, totara, and matai. Tawa and beech are popular for specialist and finishing purposes. Beech has also been sought as hardwood pulp, principally for export markets.

Veneer production has been less significant. In recent years, veneer has been produced by a small number of mills located primarily in urban areas. The increasing price and scarcity of timber during the 1990s has resulted in better prospects for veneer, particularly for display end-uses.

Other uses for natural forest timber are limited, although some trade in export logs arose during the 1970s. Fuelwood is sourced from the natural forests, but harvesting operations are generally small in size and favor native hardwoods such as manuka and kanuka.

Natural forest areas available for production

In 2000, the area available for natural forest timber production comprised about 142 000 ha of State-owned forests, including both logged and unlogged areas. This area will be reduced to about 12 000 ha following the removal of 130 000 ha of West Coast forests from production. The total area of private natural forests is about 1.3 million ha, but much of the area is not accessible or has been placed under protection. Approximately 670 000 ha of private forests were previously considered potentially available for production. Currently only about 124 000 ha are considered economically accessible for timber production.

Natural forest roundwood removals

Roundwood logged from natural forests is about 90 000 m^3 annually. About one-third of this is harvested from State-owned forests on the West Coast. Half is harvested from Mâori lands not subject to sustainability restrictions. The balance is harvested from Forests Act-approved cuts on private land.

An overall downward trend in the harvest of natural forests since 1995 is the result of the reduction in the harvest from State-owned forests in 1995, and the reduced cut on private lands at the close of the Forests Act transitional period in July 1996. The supply from private lands is now entirely from the Forests Act approvals. There has been a steady increase in the area of private forests approved for harvest under the Forests Act. Still, the supply from private forests is only about 14 percent of the total roundwood production derived from natural forests.

Production of roundwood from natural forest has been declining steadily over a much longer period, in part largely due to the substitution of planted forest resources from the maturing plantings established in the 1930s. Later reductions, however, can be attributed to logging restrictions on State-owned forests in the 1970s and 1980s and on all forest tenures after 1987 (Figure 13).

Timber processing

Most natural forest timber is processed into sawn timber. Veneer takes a small proportion from the increasingly expensive premium grades. In recent years, some hardwood (beech) has been exported as chipwood.

Current estimated annual production of rough-sawn timber from the natural forests (year ended 31 March 1999) is 50 000 m^3, also exhibiting a steady long-term downward trend in volumes

produced. The comparison of sawn timber and roundwood shows the former follows a steadier decline over the same period, probably reflecting an eking out of supplies by smaller mills cutting indigenous timber as forest resources diminish (Figure 14).

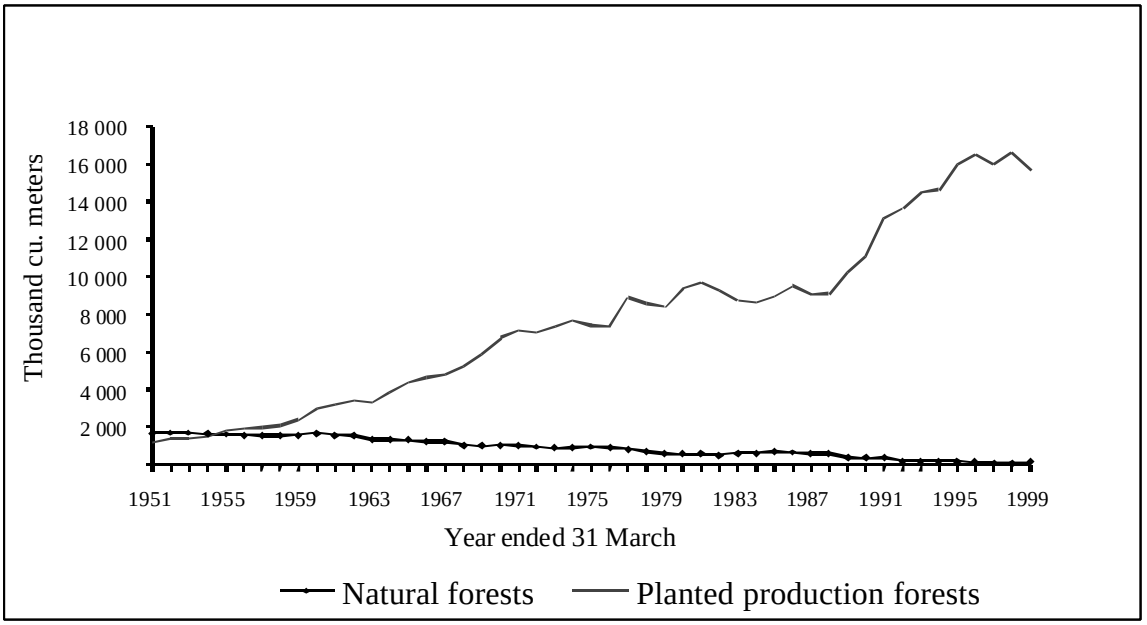

Figure 13. Roundwood removals from natural and planted forests in New Zealand

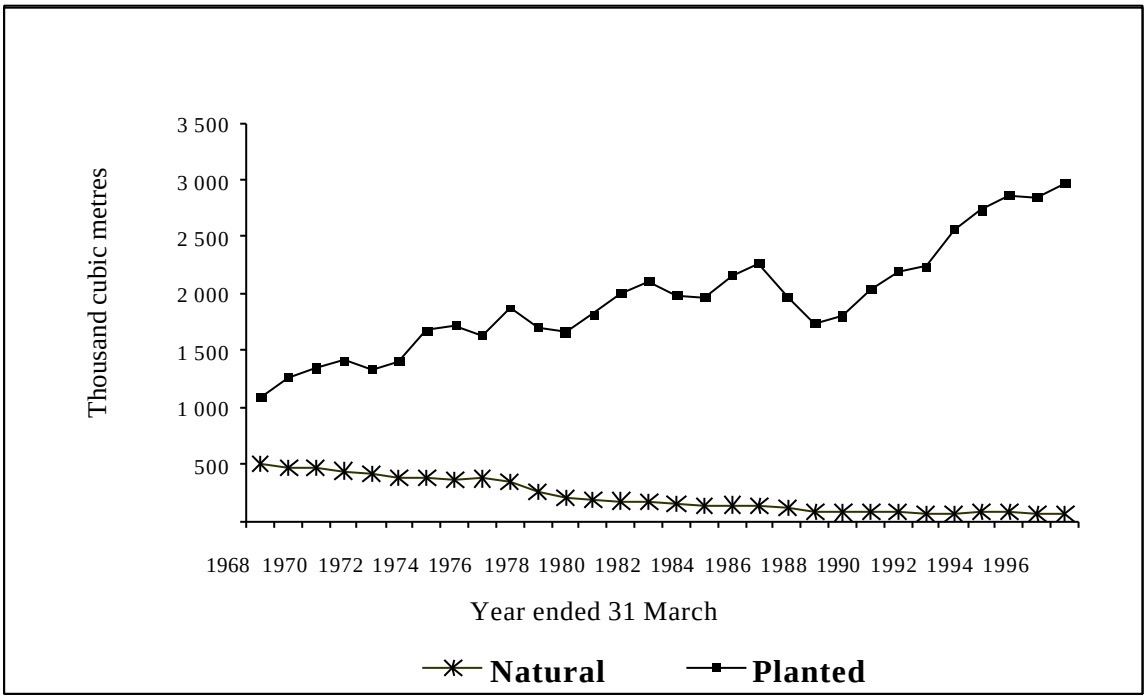

Figure 14. Production of rough-sawn timber in New Zealand

Other sources of timber

Restricted supply from the natural forests has generated incentives to obtain timber from other sources. Podocarp stumps salvaged from previously logged forestland produce a small amount of timber for various decorative end uses. Former kauri forests, long buried in wetlands, also provide "swamp kauri" timber for specialist decorative end-uses. Recycled timber from demolished buildings is a further source generally used in furniture or building renovation materials.

Price effects

The overall log price has shown a steady and gradual increase. The Forests Act restrictions undoubtedly caused price changes, although these were cushioned by the high timber stocks generated by forest sales towards the end of the transitional period. Evidently, some forest owners sold at lower prices while they were allowed to cut. The supply from State-owned West Coast forest maintained relatively high timber stocks, although prices increased following the reduction in cut from these forests after 1995.

By 1998, prices for processed softwood sawn timber had approximately doubled since the Forests Act came into force in July 1993, with the popular and sought-after rimu costing an average of NZ$2 000 per m^3. The price increase has been affected by the premium for high-quality decorative grades. A recent study of rimu prices indicates a consistent increase from 1995 to 2000 as supplies diminished (Figure 15). In comparison, prices for radiata pine have fallen over the same period – a factor of international price trends. This indicates the special market enjoyed by rimu, which is strongly favored by the domestic furniture market.

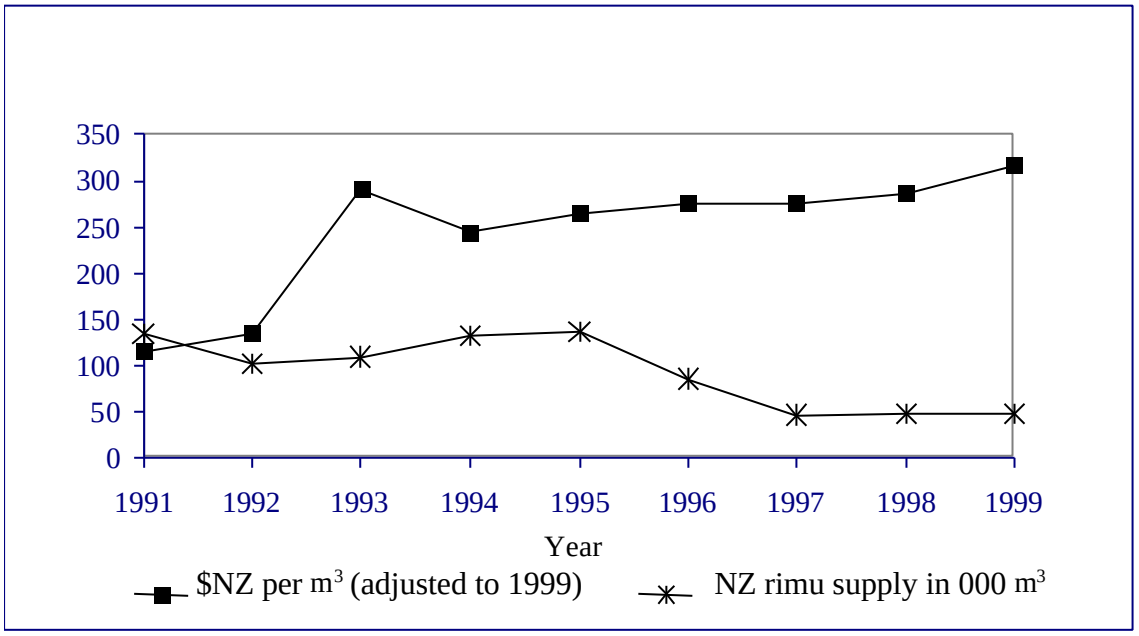

Figure 15. Comparison of New Zealand's rimu price and log supply

Hardwood species comprise about 10 to 12 percent of sawn timber production volumes. Their prices have moved more slowly. Beech timber supplies a small but established niche market, but TWC expanded the market at the end of 1999.

Economics of planted forests

During the 1970s, intensive work was undertaken on existing stands to optimize management of, and the timber production from, radiata pine planted forest. By the 1980s, the economic benefits of planted forests, particularly shorter rotation radiata pine, were well understood. Sophisticated economic modeling techniques, improved knowledge of the benefits of tending, improved quality planting stock, and the increasing availability of higher quality sites (often previously restricted by land-use controls favoring farming), all served to enhance the economic prospects for planted forests. Based on current information from a range of New Zealand sites, radiata pine can achieve average internal rates of return (IRR) of between 6 and 9 percent.

IRR information for other planted forest species such as Douglas fir, cypress, acacia, and eucalyptus suggests that similar returns can be achieved. They require longer rotations than radiata pine and some need good quality sites, but the wood can potentially command premium prices.

Growth rates of natural forest species are comparatively slow. Rotation lengths are generally over 100 years, although research has indicated that on optimum sites beech can be managed successfully from natural regeneration to produce millable trees after 60 years, and in less than 100 years for kauri.

Substitution of planted forest species

Due to their comparatively high productivity, planted forest species have substituted for the natural forest species in many utility and specialty roles. The excellent timber properties of radiata pine were well known and accepted by the construction industry well before restrictions on logging natural forests became prominent. Despite its lack of natural durability, features such as better drying, ease of nailing, development of treatment processes, weight, and handling of radiata timber all served to favor it over natural softwood species in general construction. It is also appropriate for the manufacture of reconstituted wood products, pulp and paper and various engineered solid wood products.

There is little doubt that these features were a strong economic incentive for the construction industry to use radiata pine. Its place as the mainstay utility timber was well established before the price controls maintained by the Government on natural forest species were lifted. In the South Island, however, the use of rimu in construction persisted for a longer period due to its relative abundance and lower prices.

More recent data also indicate that there have been marked changes in the recovery of premium grades of rimu, pointing to a continuing reduction in the use of rimu for construction, and efforts to maximize the amount of timber for high-value display uses. For example, between 1988 and 1995 the percentage of industrial grades reduced, on average, from 50 percent of total recoverable yield to about 5 percent, and display grades increased by a comparable amount.

The annual sustainable cut from planted forests is projected to increase from 17 million m^3 in 1999 to over 30 million m^3 by 2010. In volume terms, planted forest resources will be more than adequate to meet the declining natural forest cut. More pertinent for New Zealand is the future supply of timber species that can substitute for natural forest timbers.

Role of the private sector in planted forest development

The privatization of State-planted forests after 1987 was undoubtedly facilitated by the existence of an established private sector forest industry. Private planting of radiata pine and other species paralleled the efforts of the State during the first decades of the twentieth century focusing on sites in the central North Island. The area of private planted forests initially exceeded that of the State and through to the 1980s continued to expand, lagging only slightly behind the State during the period. By 1987, private forestry had well-established commercial forest management, processing and marketing practices in place.

Supply shortfall of specialist species

Radiata pine cannot substitute easily for specialist or decorative timber species. There is currently no consistent supply of other planted species to effectively substitute for the sought-after natural forest softwoods.

About 91 percent of the total planted forest area comprises radiata pine and 4.5 percent with Douglas fir. The balance is made up of a range of other softwood and hardwood species, including cypress, eucalypt and acacia, which are potential substitutes for specialty natural forest timbers. However, many existing stands are of variable or uncertain quality and produce inconsistent volumes. For example, cypress is sought for its high-quality decorative finishing characteristics. Quality grades can command high prices although much of the existing mature resource is in poor-quality untended farm shelterbelts.

There is, however, interest among small (farm-scale) and medium-size forest growers in these species with research and management co-operatives targeting improved species, stand management and timber quality. New planting rates have indicated an increase in the percentage of area planted with Douglas fir and eucalypts, especially in the south, due to the activities of a number of overseas companies that are strategically positioning themselves as growers of these species.

Larger companies, which manage the bulk of the existing planted forests, continue to favor radiata pine. The choice of the "mainstream" species reflects the strong legacy of research, established management knowledge, and current technical developments for the species.

The silvicultural regimes for planted forests are also changing. Some growers perceive the intensive management typically associated with high returns as financially risky. Alternative regimes with minimal tending are possible with the use of genetically modified tree stocks.

There is continuing debate over the need for a more diversified forest estate (in terms of choice of species, silvicultural regime and location) compared to the existing predominantly radiata pine forests. Some argue that a more diversified forest estate may reduce future growing, marketing, and processing risks and uncertainties, creating a potentially more robust and stable industry. The counter argument is that radiata pine provides its own diversity, inherent within its suitability for a wide range of end markets, and that radiata pine is a proven, highly profitable species. By diversifying its forests, New Zealand may actually reduce profitability.

The cessation of State-owned natural forest timber supplies will lead to greater dependence on private land resources or other alternatives. A supply shortfall concerns processors such as furniture makers who have relied on natural forest softwoods, particularly rimu.

Effect of the logging restriction on imported substitutes

The main categories of sawn timber imports are Australian hardwoods and North American softwoods. Only about 18 percent are from Pacific Islands and Southeast Asian sources. Imported sawn timbers generally have specialist applications such as for industrial construction, weatherboards with a natural finish, decorative furniture, paneling, and boat building. Imports of forest products for the year ending June 1998 were valued at NZ$880 million (NZ$830 million in 1997). Current prices for imported sawn timbers, across a range of species, average a little over NZ$1 000 CIF per m^3. Specialty pulps, paper, and paperboard accounted for 77 percent of imports.

Import volumes have not changed for five years and there is no evidence of substitution for natural forest timbers as a result of logging restrictions over that period (Table 4). Furniture makers claim, however, that a cut in rimu supply from State-owned forests will lead to import substitution since there is no reliable supply from any other natural species timber source or no suitable alternative domestic species.

Table 4. Volume of New Zealand's timber imports (thousand m^3)

Year ending 30 June	Hardwoods	Softwoods	Total	Logs and poles
1994	8	23	32	3
1995	10	23	34	2
1996	13	24	38	2
1997 P*	10	21	32	3
1998 P*	11	19	32	3

Source: Ministry of Agriculture and Forestry

* P = provisional figure

Timber processing industry – impacts of logging restrictions

In the 1970s the Government began to rationalize or renegotiate existing long-term contracts for timber supply from State-owned forests. In part, the mounting pressure to conserve the forests and the resulting limits on supply were pushing the Government to encourage the smaller mills with circular-saws to merge with larger capacity bandsaw-equipped mills with drying and finishing capabilities. However, substitution of planted forests and introduction of newer products such as wood-based panels were also factors of change. The limits on timber supply merely hastened the process of inevitable change. In 1954, there were 500 registered sawmills cutting natural forest timber. By 1972, less than 100 of these mills depended solely on natural forest timber.

Mill closures affected the milling-dependant communities of the central North Island, South Island West Coast, and Southland. In some regions, planted forest resources were available to maintain supply, although this was not the case in the West Coast area where the small area of largely immature planted forests meant a continued dependence of the industry on natural forest timbers.

Many significant changes to mills dependant on State-owned natural forests took place when the Government agencies were restructured in the 1980s. The West Coast Accord provided long-term sustained supplies for some remaining mills within the region. It also made additional timber volumes available from unsustainable operations to maintain supply until planted timber was available. However, further restrictions on cutting in the West Coast led to additional mill closures in the late 1980s.

Mills utilizing private forest resources tended to be smaller units. By the late 1980s, the handy portable sawmills were popular for small on-property operations. Sawmill registrations under the Forests Act amendment of 1993 varied between 350 and 400 mills. About two-thirds of these were portable units with small annual quotas.

Current capacity

Current processing capacity includes conventional sawmills and a number of specialized manufacturers producing veneers, components, and other products. In 1998-1999, 82 676 m^3 of indigenous logs were milled from all sources (including Forests Act-exempt tenures).

In December 1999, 260 mills were registered under the Forests Act. Approximately 25 percent were fixed mills; the rest were portable mills. Twenty-eight registered sawmills each milled in excess of 100 m^3 of logs annually, producing a combined log volume of 79 293 m^3, or 96 percent of the total log volume milled. Six companies produce specialist timbers.

On the West Coast, the only region where State-owned forest timber production continued, the levels of cut were adjusted to those specified under the Accord. Currently, there are 16 mills cutting between 500 and 5 000 m^3 per year, drawing on both State-owned and private forest resources.

In 1990, TWC assumed management of West Coast State-owned natural forests. Some further cut reductions in the region occurred with the closure of some interim unsustainable operations in softwood milling in 1995. Existing unsustainable operations were scheduled to cease in December 2000. Contracts secured in 1996 by TWC, based on both interim unsustainable and sustainable softwood resources, supply the local mills and specialist manufacturers outside the region.

Exports

There is a small but high-value export market for timber from natural forests. Government regulation under the Forests Act restricts the commercial export of indigenous timber to rimu and beech sawn timber. Final products of any species can also be exported. Natural forest sawn timber exports were about 1 100 m^3 (NZ$1.2 million FOB) for the year ending 31 March 1996 and 1 900 m^3 for 1997 (NZ$1.6 million FOB).

Furniture industry

New Zealand furniture makers have voiced concern at the prospect of reduced supplies of rimu, sought for high-quality furniture. The industry relies on an annual supply of 20 000 to 30 000 m^3 and considers that securing and maintaining this will be difficult without State-owned forest supplies. The industry also argues that reduced tariff barriers will increase the prospect of competing imports.

Other issues facing the industry

The Forests Act provided transitional allowable cuts for the industry to adjust or exit the business. Many forest owners took advantage of the transition and sold timber. Four years after the transition ended approximately 58 000 m^3 of timber were under the Forests Act approval for harvest, covering 52 000 ha on 230 separate private land holdings. The current annual production from these private lands is, however, barely 5 000 m^3. The uncertainty of future supply is creating difficulties for processors seeking continuity of supply.

Some processing specialists have updated their equipment for producing veneer. Most express doubts about investment given the uncertainty in supply. Export markets are likely to remain small and specialized. International pressure to ensure "green labeling" may be a factor. Imported specialty timbers currently compete on price and first stage processors are concerned about this. The extent to which international pressure for sustainable management standards affects these imports is still unclear.

Impact on Government revenue

Government revenues arise from taxation and from income generated from Government assets. The logging restrictions applying to private lands are likely to have resulted in some reduction in tax revenues due to the reduced capacity for forest owners to sell timber. Local Government continues to impose taxes on such lands, but the level varies by location.

TWC pays royalties and dividends (Government Ministers as shareholders). Royalties of NZ$150 000 to NZ$165 000 were paid to the Crown during 1998 and 1999 although no dividend was paid.

Costs of implementing logging restriction

Identifiable costs to the Government include about NZ$4 million in compensation payments for logging restrictions prior to 1987 and about NZ$30 million paid to compensate timber exporters affected by the 1990 export ban. The Government is currently offering NZ$120 million as

development assistance to the West Coast region. This coincides with the decision to phase out the State-owned natural forest milling in the region, although the assistance is not regarded as direct compensation. Other measures generally did not include direct payments, although indirect assistance to landowners, in various forms, accompanied the implementation of the 1993 amendments to the Forests Act.

Environmental and conservation implications

The success in achieving protection can be assessed as follows:

- The effectiveness of restrictions applied to State-owned lands, including its full protection of most forests and continued timber production on limited areas in the West Coast and Southland.
- The effectiveness of restrictions applied to private lands.
- Physical success in protecting the forests, measured in terms of area reserved, and protection of specific habitats or forest types; and the quality of the protected forests relative to the losses that would likely have occurred if the areas had been logged.
- Recognition for the protected forests measured in terms of public education, international recognition for protected areas and the devotion of management and resources to ensuring that conservation values are maintained.

Pre-1987 measures

Assessing the effectiveness of the pre-1987 measures is difficult because of the administrative changes that followed. There is no way to know with certainty whether or not the logging restrictions applied prior to 1987 would have achieved the degree of forest protection sought under the prevailing administration. Approximately 300 000 ha of State-owned forests had permanent logging bans imposed prior to 1987. These forests later became national parks or similar protected areas and included gazetted forest sanctuaries, ecological areas, and other dedicated reserves and recreation areas. Whether these forests would have had the sustained management input or conservation focus to achieve the objectives cannot be determined precisely.

Approximately 80 000 ha of State-owned production forests were subject to logging restrictions through required changes in harvesting techniques from the time of the 1977 Forest Service Indigenous Forest Policy. Techniques included selection-logging methods and the adoption of zoning to identify harvestable and non-harvestable stands. The impact on protection values is variable and current conditions depend on both harvesting and roading techniques used at the time, as well as forest and soil conditions and the extent to which the forests have recovered. Such areas could be compared with forests subject to earlier clearfelling, although no precise or nationally consistent measures can be applied. Factors such as forest type, species, regeneration rate, influx of introduced weeds and pests affect recovery and current forest condition.

Post-1987 measures covering State-owned forests and their effects

The effectiveness of the post-1987 measures can be reviewed in the context of the DOC management of natural forests, including the estimated 1 million ha of State-owned forests previously having the potential for timber production but subsequently placed under the DOC's administration. Timber production was effectively diverted to planted forests and the 142 000 ha of State natural forests that were set aside for this purpose.

The newly established DOC had a stated mission to "conserve the natural and historic heritage of New Zealand" under three goals which sought to:

- protect and preserve the intrinsic values of the natural and historic resource heritage of New Zealand;

- promote and provide for the sensitive use of the natural and historic resource heritage of New Zealand; and
- promote public understanding of and create support for the protection of the natural and historic resource heritage of New Zealand.

The DOC operates under two broad financial programs concerned with conservation management and science and advocacy. With a single agency managing a total of about 4.9 million ha of State-owned forests, and focusing on conservation management, some key opportunities exist, such as:

- assembling information on the full ecological diversity of New Zealand represented through a network of protected areas covering the natural forests; and
- enabling conservation management including recreational, pest/weed control and other management issues concerned with protection, over about 75 percent of New Zealand's natural forests.

The new department was faced with some complex administrative issues. In particular, it had to draw together the conservation functions of three former departments as well as address issues of establishing management systems and identifying tasks under the new Conservation Act.

The 1987 changes can be considered a success in the context of a large and significant area of natural forests being placed in reserve. These areas include the steep land forests, and the lowland protection and former lowland production areas. There is, however, poorer representation of certain lowland forest types more common on lands in private ownership.

Conservation by the DOC has achieved some notable successes. These include the endangered species breeding programs, restoration programs, research, education and a heightened public awareness about natural forest conservation. Other programs include development of the "mainland islands", areas where efforts are made to restore natural flora and fauna habitats, and control of introduced pests and weeds. However, some adverse effects continue, notably damage to both forest vegetation and native bird populations by pests and introduced species, particularly the widespread damage caused by the Australian brush-tail opossum.

Post-1987 measures covering private forests and their effects

The Forests Act indigenous forest provisions prohibit unsustainable commercial timber harvest from private forests. The Act is not a land-use control since owners may choose to clear forest for other reasons, although such generally expensive operations are greatly restricted by removal of commercial incentives. Other restrictions on forest clearance or logging are imposed on private forests through the local Government-implemented RMA. Currently 52 000 ha of private natural forests are under Forests Act-approved plans and permits.

Private owners of natural forests can also choose to fully protect their forests through covenanting arrangements such the Queen Elizabeth II Trust, Nature Heritage Funds and Nga Whenua Rahui. Many landowners have taken advantage of the incentives offered to fence and protect forest remnants on their land and currently about 300 000 ha of private land are reserved under these arrangements.

Impact of logging restrictions on watershed conservation

New Zealand is geologically active and approximately one-third of the land area is considered "steepland." The need to minimize soil erosion and catchment damage was recognized during the extensive land development era and large areas of forested land in these steep areas were established as protection forests. Protection forests cover about 4.3 million ha, mainly within the Conservation estate. Damage to steep land forests by introduced mammals, has been a major cause of induced erosion in many areas.

The first systematic approach to soil erosion control was under the 1941 Soil Conservation and Rivers Control Act. Subsequently, timber-harvesting operations became subject to controls under regulations, legislation and guidelines setting standards for operations. Local Government-administered control through planning was under the Town and Country Planning Act 1977. This was replaced by the current RMA, administered by the 7 Regional Councils throughout New Zealand. Many of the larger urban areas rely on forest catchments, protected under local Government legislation, for water supplies.

Land clearance for farming during the nineteenth and first half of the twentieth century resulted in widespread erosion and soil loss in the North Island East Coast. The problem prompted the establishment of planted forests in critical headwater areas of the region. Current tree planting incentives are targeting 60 000 ha of erosion-prone lands in the region.

The logging restrictions are not considered to have had a major effect on the incidence of erosion or on water supply or quality, although the reservation of the extensive State-owned forests in 1987 may have had local benefits. Contemporary methods of timber harvest, in some cases by helicopters, further minimize ground disturbance and the likelihood of other adverse effects.

Impacts of logging restrictions on biodiversity conservation

Biodiversity loss is a key issue in New Zealand. The 1997 State of the Environment Report listed the following as key requirements:

- halting the loss of species biodiversity which has resulted from the extinction of many species from New Zealand's unique flora and fauna due to human influences particularly in the last 200 years;
- devising ways to maintain biodiversity values outside public protected areas;
- restoring the condition of ecosystems and indigenous species within them affected by introduced pests and weeds;
- improving technical knowledge and community understanding; and
- balancing the introduced species-based primary productive environment (farms, forests and horticulture) with natural forests and habitats.

New Zealand has prepared a draft Biodiversity Strategy reflecting its ratification of the 1993 International Convention on Biodiversity. The Strategy sets out the issues, objectives and proposed actions to be taken. The Government is currently reviewing the preparation of a national policy on biodiversity, which will consider the approach for biodiversity on private lands.

The 1997 Report and the Biodiversity Strategy both reflect a continuing concern about the extent and quality of New Zealand's indigenous species habitats. The report states that although one-third of the land area is under the conservation estate, at least 1.8 million ha of the natural forests are threatened by introduced species. A further concern is the loss of biodiversity through reduction of lowland forests to smaller remnants by land development.

Legislation provides specific protection requirements. The Forests Act sustainable forest management provisions require forest owners under approved plans for timber harvest to also provide for the retention of natural forest values. The Act also provides for the reservation from logging of up to 20 percent of forest areas when specific needs are identified.

Under the RMA, councils are required to provide for protection of nationally important natural forest areas and significant habitats of indigenous fauna.

Social implications

The impacts on employment and income generation from logging restrictions have been felt most in the smaller milling-dependant communities. The pre-1987 restrictions especially affected people living in communities in the central North Island, South Island West Coast, and Southland, which served older mills cutting natural timber. Some smaller isolated towns, notably those serving larger mills, lost substantial populations or closed completely. Some regional communities also supported farming and other activities, or alternative employment was available in the planted forest operations.

The social impacts of the post-1987 restrictions have been largely from the changes to the State-owned forest administration. The South Island West Coast was particularly affected because it is geographically isolated from other regions and about 80 percent of its land area is State-owned, much of which is natural forests. The area has a wet climate, generally poor soils, with a relatively small area of good farmland. At the time of the 1987 changes, arrangements provided for both conservation of natural forest areas and some continuing harvesting from the State-owned natural forests. The West Coast Accord allocated forests for both protection and continued sawmilling. At present, it is the only region with State-owned forests still producing timber, although the Government has now determined that this timber production will also cease.

After 1987, employment for West Coast people was available in some communities with the newly established DOC and with the continuing production forestry, which was eventually taken over by TWC. Time series studies of the effects on employment are limited and the degree to which skilled workers moved to other employment in the region is not clear. However, studies on the contribution from tourism to employment in the West Coast region show that, in 1992, about 8 percent of the local full-time jobs in the West Coast region were supported by tourism. Figures also indicate that expenditure on tourism in the region increased substantially between 1987 and 1994, suggesting equivalent increases in employment. By 1994, the tourism sector in the region, in terms of total numbers employed, was second only to pastoral farming and was substantially ahead of forestry.

Economic multipliers from a 1986/87 survey of the West Coast region also showed that tourism had greater capacity to boost household income than forestry, but less capacity than forestry to contribute to the total regional economy or employment.

The extensions to national parks and the establishment of World Heritage Park status in South Westland have boosted visitor numbers in the area. The extensive and spectacular tracts of natural landscapes suggest that the region has a high capacity to expand its tourism economy. Local businesses and services in a number of the smaller communities appear to have also benefited. The larger communities have increased accommodations, restaurants and other tourist services.

More recent surveys of local attitudes regarding forest management in the region suggest mixed support for conservation. But there is some concern that the region could become too dependent on tourism and related service-oriented employment unless other (non-timber) production activities are also developed.

SUSTAINABLE FOREST MANAGEMENT AND FOREST PROTECTION – THE CURRENT DEBATE

The most recent phase of New Zealand logging restrictions has been the Government's decision to phase out remaining timber production in State-owned natural forests. The forests affected are all within the West Coast region, comprising approximately 130 000 ha of beech and podocarp natural forests, areas under sustainable management, and "overcut" forests.

The policy was published in the pre-election Labor Party manifesto and confirmed by the new Government after the November 1999 election. The policy was implemented immediately with the decision to halt further consideration of the beech forest management proposals. The consents for beech management, under the RMA, were to be considered in local Government council hearings.

The new Government has also confirmed the previous Government's decision to halt the remaining unsustainable logging of State-owned natural forests. Additionally it has decided to phase-out timber harvest from the natural forests under sustainable management. Measures include proposed legislation to cancel the West Coast Accord and early completion dates for existing timber-supply contracts.

The Government acknowledges that this decision was made as a "matter of judgment." It highlights the overriding determination that cessation of timber production is necessary for forest conservation of State-owned natural forests in the West Coast region, given that:

- the decision applies to all timber harvests (unsustainable and sustainable);
- concurrent with the measures, the Government has offered a package of economic assistance to the region; and
- the decision also pre-empted any discussion or analysis of the relative merits of full protection (no logging) versus the integration of timber harvesting and conservation measures.

Opponents of the Government's decision criticize the lack of debate of merits or demerits of timber harvesting through sustainable management of beech forests. This resulted from TWC withdrawal from the RMA consent hearings. Harvesting advocates argue that new harvesting methods have minimal impacts on the forests. These methods follow the natural dynamic processes of tree growth and senescence applied in conjunction with aerial extraction of logs. They argue that management oriented to ecological processes would also lead to a broadening of the scope for biodiversity conservation, integrating "conservation through sustainable management" and management of other forests under full protection. They dispute that timber harvesting is the major cause of biodiversity loss, but instead blame invasive pests for forest decline and species loss.

Similar arguments apply to the management of rimu forests, including the 9 500-ha area designated for sustainable management in 1984, from which the current commercial timber harvest is also scheduled to cease. Critics of the Government's decision argue that timber production based on low-impact extraction and management techniques that follow natural patterns of growth and mortality are key developments in sustainable management. They further point out that there is a strong distinction between these forests and the areas being logged under unsustainable regimes, and from which timber harvest will also cease.

Supporters of the Government's decision believe that full protection of the State-owned natural forests is required if the remaining natural forests are to contribute effectively to key conservation goals. They argue that timber harvest removes key habitat trees, facilitates weed and pest introduction and creates habitat disturbances affecting both vegetation and native fauna. They also note that the production forests are a particularly significant part of the relatively extensive lowland forests of the region and that timber harvest, despite methods proposed for sustainable management, is an unacceptable risk to the forests.

Despite its decision relating to State-owned West Coast natural forests, the Government continues to support timber harvest from private natural forests in accordance with the sustainable forest management principles of the Forests Act.

The Government decision also pre-empted further scheduled changes to the Forests Act that would have finally removed the exemption for State-owned forests under the Act's sustainable forest management provisions. That exemption maintained the inconsistency between policies applying to private forests and those applying to State-owned forests.

The West Coast policy change was undoubtedly made easier by the region's unique conservation qualities and the inconsistencies in existing forest policies. However, the West Coast is also the only remaining area of New Zealand with State-managed production natural forests. Other regions either lost natural forest cover many years earlier or any remnants of State-owned forests were fully protected previously. Technical advances in sustainable management of the West Coast forests have been achievable under incentives such as high timber value, and the necessity to manage forests according to natural processes and conservation imperatives, rather than to meet production demands. Ironically these achievements have been clouded by the debate and controversy that has characterized the West Coast forests in recent years.

CONCLUSION – LESSONS LEARNED FROM NEW ZEALAND'S EXPERIENCE

Progressive restrictions

Natural forest logging restrictions have spanned about three decades and resulted in a progressive reduction of the role of natural forests for timber production. They include the measures imposed before, and after, the substantial restructuring of the Government in 1987. After 1987, the measures became more focused on meeting forest protection goals.

Historic circumstances

Early research and assessment of the natural forest resource led to the establishment of planted forests. The issues of the "environmental era" could not have been foreseen in the 1920s. However, the limitations of the natural forests to produce considerable timber volumes in perpetuity were certainly expected. This knowledge provided a major impetus to create planted forests to meet timber demands.

Most of the better quality, accessible land was cleared for farming. However, much of New Zealand's first major State forests, and the earliest large-scale private forest planting during the 1920s and 1930s, occurred on relatively accessible, flat land with friable pumice soils in the volcanic plateau area of the Central North Island. The forest establishment was made possible principally because of the failure of livestock farming on these lands due to cobalt deficiencies in the soil. Later farm practices were able to correct the problem but planted forest had already gained a major boost.

The extensive national forest surveys during the first half of the twentieth century, and the applied research into planted forest, provided knowledge on the shrinking extent of natural forests and supported the successful development of planted forests.

Planted forests

The planted forests have been vital as a substitute for natural forest timbers and in creating the alternative "production forests" in New Zealand. They were established during several "planting booms" assisted by research and development. Nevertheless, it took time for radiata pine to be accepted as the mainstay timber. By 1987, the planted forests' capacity to replace the natural

forests as a production resource gave greater impetus to the environmental arguments for reducing natural forest logging.

The success with radiata pine has been an undoubted key to the overall success of planted forest. However, other species should play a strategic part in planted forest as substitutes for a declining supply of specialty timbers from natural forests. A number of introduced hardwood and softwood species, potentially able to meet this role, are currently only a small component of the planted forests. However further development of New Zealand's planted specialty timbers may be hastened by the reducing supply of natural forest timber.

Restructuring of the forestry administration

The 1987 Government restructuring led to the privatization of the public-owned planted forests and the progressive withdrawal of the Government from production forestry. Under the current policy, the Government will continue this change by halting the remaining timber production in the State-owned natural forests.

The restructuring was a fundamental reorganization of New Zealand's Government, including the institutional arrangements for environmental administration. The transfer of Government-owned natural forests to the DOC created a clear physical and functional difference between natural and planted forests.

Economic considerations

Due to the step-by-step implementation and the concurrent adaptation of the milling industry to planted forest resources, the impacts of the logging restrictions have been manageable. Transitional arrangements, such as the provision of bridging timber volumes to enable industry and forest owners to adapt, played a key role. In some instances, arrangements were not possible, such as with the 1990 export ban. In this case, the Government incurred direct costs in order to compensate for terminated contracts.

The industry currently processing natural forest timber faces considerable uncertainties. The current policy changes will further reduce supply from State-owned forests. The industry will need to rely on the smaller private forests, planted forests, or imported timber instead. Imports may, however, shift towards processed items, reducing the dependence on domestic processing.

The increase in the price of natural forest timbers reflecting high-value specialty uses has occurred in line with the reduced supply and adaptation of processing towards higher valued products and end-user markets.

The economic and social impacts have been most prevalent in the forested South Island West Coast region. Debate concerning the role of the natural forests in the region has spanned several decades and has defied any apparent permanent solution. The region contains extensive natural forests including lowland forests, largely under State ownership. Its economy historically relied on coal and timber. The adaptation to more sustainable natural resource use paralleled a strong public push for forest protection.

The debate continues over issues of regional self-reliance, obligations of the Government, social and economic circumstances and whether some State-owned forests should continue to be harvested for timber or be solely devoted to protection. The New Zealand Government is also considering an economic development package to assist the region during the transition period.

Forest policy measures

Forest policy measures through the period have generally been discrete and narrowly focused. The pre-1987 Forest Service policies were developed in response to mounting concern over exploitative logging and clearance of the natural forests. Post-1987 measures focused on the

private forests. By the 1990s, a number of statutes affected the natural forests under various tenures. This created a complex and uncoordinated framework of legislation. Although an umbrella Forest Policy was proposed in the late 1980s, this was not developed further.

SUMMARY

New Zealand has benefited from a number of advantages in developing and implementing the logging bans. They include:

- New Zealand's largely unpopulated natural forests contrast with those in other countries of the Asia-Pacific region where local communities impose pressures on the natural forests for timber and other produce;
- the extensive planted forests were well established and offered a readily available alternative resource by the time that the natural forest logging began to diminish; and
- the privatization of planted forests placed these forests on a totally independent commercial footing.

The New Zealand experience would suggest that policies relating to the establishment and implementation of logging bans should include:

- good information and inventory of existing forest resources;
- a conservation strategy with clear, focused goals and objectives;
- formulation of a comprehensive forest policy that considers a broad array of issues (management, information, research, conservation, timber production, and forests of all tenures) to generate appropriate, long-term strategies for forestry development;
- planned progressive implementation, coupled with establishment of planted forests with a commercial focus;
- transitional mechanisms, with incentives and allocated volumes, to reduce impacts on industry and compensation claims; and
- an established private-sector involvement in forestry, covering the full range of forest management, wood processing, and product marketing.

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IMPACTS AND EFFECTIVENESS OF LOGGING BANS IN NATURAL FORESTS: PEOPLE'S REPUBLIC OF CHINA

Yang Yuexian

BACKGROUND

Distribution of natural forest resources

The fourth inventory of national forest resources in China indicated that natural forests total 87.3 million ha, representing 65 percent of the 133.7 million ha of total forest area. These forests can be divided roughly into three categories: natural forests under protection, scattered natural forests, and natural forests that urgently require protection. Natural forests under protection total approximately 20 million ha and account for 23 percent of natural forests. Scattered natural forests total 17.7 million ha and account for 20 percent. Natural forests urgently requiring protection are concentrated near major rivers such as the Yangtze, Yellow and Songhuajiang Rivers, around large-scale water control projects, and at the core zones of important mountains. These are located in the provinces and autonomous regions of Tibet, Sichuan, Yunnan, Guizhou, Hunan, Jiangxi and Hubei (the Yangtze River basin); Qinghai, Gansu, Ningxia, Shaanxi and Shanxi (the Yellow River basin); and Jilin, Heilongjiang and Inner Mongolia (the Songhuajiang and Nenjiang River basins). Together, these forests total 49.6 million ha, or about 57 percent of all natural forests in the country.

The Chinese Government and the State Forestry Administration (SFA) have always given significant attention to natural forest protection and several laws and regulations have been formulated to protect these forests. Forest protection includes monitoring and control of timber harvesting, establishment of nature reserves, development of integrated wood utilization and afforestation. These activities play important roles in reducing the loss and depletion of natural forests, but extensive utilization has yet to be adequately resolved.

In 1998, the Government imposed logging bans on natural forests in the upper reaches of the Yangtze River and the middle and upper reaches of the Yellow River to halt the deterioration of the natural environment and safeguard sustainable development. As part of this plan, the Natural Forest Conservation Program (NFCP) to cover China's chief natural forest areas was formally initiated.

Current state of natural forest resource protection

The Government and the SFA, executing forest management on behalf of the State, have initiated laws, regulations and programs to enhance natural forest protection, including:

1. Normalizing felling systems and controlling the consumption of wood from natural forests. Timber output has been reduced systematically since the early 1980s; selective cutting is replacing traditional large-scale clear cutting.
2. Expediting the development of nature reserves and parks with natural forests as the main constituent component. China has already successfully established the Xishuangbanna and Hainan tropical rainforest nature reserves. The Changbai Mountain, Wuyi Mountain and Shen Nong Jia nature reserves emphasize the protection of different forest vegetation types. The Wo Long and Di Qing nature reserves protect rare and endangered animal species, such as the giant pandas, golden monkeys and Manchurian tigers. The national forest parks of Er Mei Mountain, Huangshan Mountain and Zhang Jia Jie highlight forest-based ecotourism as a priority. Several forestry centers stress research and teaching.
3. Developing the wood-based panel industry to reduce dependence on natural forests. As of the end of 1998, the annual output of fiberboard and particleboard made from logging and processing residues totalled 1.4 million m^3 and 1.1 million tons respectively, which helped reduce the annual consumption of standing timber by approximately 5.1 million m^3.

4. Cultivating additional planted forest resources to reduce the reliance on natural forests. China has established timber and fuelwood plantations since the early 1950s. By the end of 1998, 17.5 million ha of timber plantations and 610 000 ha of fuelwood plantations had been established. These types of plantations play an important role in reducing harvests in natural forests.

Due to the lag in the development of timber substitutes and comprehensive timber utilization, as well as the rapid pace of economic development, the commercial timber output targets set by the State could not be fully reduced to sustainable levels. The industrial timber deficit during the planned adjustment period could not be met from domestic sources alone. Moreover, the redeployment of laid-off workers in the forest areas became increasingly difficult; the financial burden on local Governments, schools, hospitals and judiciaries in the forest areas grew heavier; and the enterprises had little choice but to over-log the natural forests to generate revenues and meet timber production targets.

In mid-1998, the Government decided to remove large areas of natural forests from timber production. This was carried out first in the ecologically fragile upper reaches of the Yangtze River, the middle and upper reaches of the Yellow River and the upper reaches of the Songhuajiang River. Strengthening the management of natural forests to maintain and restore ecological functions, China began large-scale protection of natural forests.

Evolution of macro-policies relevant to natural forest protection since 1949

Since founding the People's Republic of China in 1949, the Government focused mainly on developing the economy. Forestry science and technological information received relatively lower priority. The consequent lack of public awareness about the importance of forest resources resulted in a dramatic decline in China's natural forest area. From the 1950s to the 1990s, forest harvesting took place in virgin forests and natural secondary forests. China has recently raised awareness about the importance of preserving the natural environment. The country has subsequently shifted from a mentality of exploitation to one of preservation.

While the forests were being harvested to fuel the developing economy, certain sectors of the Government were concerned with the level of timber consumption. Several events and initiatives illustrate support for forest protection, even during early stages of the country's economic development. At the first national forestry conference, held in 1950, a guiding principle of "protecting forests in an all-round way, afforestation in key localities, rational felling, and rational utilization" was formulated. In 1962, the late Premier Zhou Enlai stressed the need to reconcile better forest management and utilization with forest protection during an inspection of northeast China's forest area.

In the 1970s, the Ministry of Forestry (MOF) revised the "Management Measures of Felling and Regeneration." The main components of these measures include banning clearcuts around large reservoirs, lakes and near major rivers and their first and second order tributaries. Clearcuts were also restricted in natural forests and ecologically fragile areas.

In 1979, China promulgated the Forest Law,[1] Wildlife Protection Law, and Regulations on Wildlife-based Forest Reserves. These laws were the first to use legal means to enforce forest protection. They include clear stipulations about the felling and utilization of forests and natural resources, especially the protection of tropical rainforests and wildlife. After participating in the United Nations Conference on Environment and Development (UNCED), Rio de Janeiro, Brazil in June 1992, the Chinese Government formulated several forest protection directives, including the "Guidelines of Forest Activities," and the "Action Plan on Biodiversity Maintenance."

[1] The draft forest law was prepared in February 1979 and became official on 1 January 1985.

Unfortunately, the guiding principles, policies, and regulations regarding the protection of natural forests and the control of over-cutting were not effectively implemented. More than two-thirds of the natural forests have suffered varying degrees of destruction. Protected natural forests are less than one-third of China's total forest area, the majority of which are nature reserves designated as special purpose areas, or natural forests in Tibet that are very difficult to access by loggers. In 1993, Hainan province first proposed a logging ban for its 320 000 ha of tropical rainforests, which was subsequently approved by the People's Congress in 1994.

In 1997, President Jiang Zemin called on the people to rebuild a beautiful northwest China by restoring degraded natural areas. The following year, the Government decided to ban logging in natural forests in the upper reaches of the Yangtze River, the medium and upper reaches of the Yellow River, and in State-owned forests in 17 provinces of northeast China, Inner Mongolia and Hainan by establishing the NFCP. The decision was reflected in the "Suggestions of Central Committee and State Council on Reconstruction after Flood, Harness of Rivers and Lakes and Water Conservancy Project Construction."

To effectively implement the logging ban of 1998, the following measures are being taken. First, a special team of forestry police and full-time guards is being employed to enforce forest protection and suppress illegal cutting. Second, forest workers are being re-deployed and resettled. Third, several small investment projects are being introduced in phases to demonstrate the potential for new profitable State-owned and private activities. Fourth, provincial Governments are receiving funds from the national Government to assist workers unemployed as a result of the logging bans. Fifth, retirees receive a pension from the national Government to reduce the cost to State enterprises. Sixth, the Government is offering tax and credit breaks to encourage commitment to development projects.

Experiences of natural forest resources protection

During China's 50 years of organized forestry and forest protection activities, there have been both successful experiences and bitter lessons. The main successes are:

- a policy framework for balancing protection with harvesting and utilization of the natural forests was gradually elaborated;
- the country's forestry development strategy was adjusted to gradually increase afforestation and systematically reduce timber output;
- measures were taken to ensure that forest regeneration would keep pace with logging;
- large-scale establishment of tree plantations was launched, especially for producing timber and fuelwood;
- industries were encouraged to use logging and processing residues to reduce waste and dependence on natural forest resources;
- forest enterprises were encouraged to develop non-forest and non-wood industries to reduce the reliance on natural forests; and
- nature reserves and forest parks were established to expand the protection of natural forests.

The main mistakes and lessons drawn from the experiences in natural forest protection are:

1. Since the overriding goal of forest management in China has been timber production, sustainable management principles have not been fully accepted. Between 1949 and the mid-1980s, exploitable resources in most State-owned forest bureaus sharply declined and the country entered a "resource crisis." China's overall "economic difficulty" encouraged ever-increasing harvests of forest resources to generate revenue. This vicious circle intensified the destruction of natural forests.
2. The integration of administrative and commercial activities in the State forest bureaus was an important cause of over-harvesting natural forests. During the initial phase of operation,

almost all the 136 State-owned forests were natural forests. The forest bureaus had to generate funds for public security, courts and schools, but they were also responsible for carrying out Government functions. As the population in forest areas continued to increase, the amount of funds needed for public services also grew, and the forest bureaus were compelled to harvest more timber to generate revenue.

3. The issue of separating ownership from operation rights has not been solved. The forest bureaus are responsible for both forest production and cessation of illegal felling. In the past especially when they encountered issues that conflicted with their interests, they usually acted in favor of economic returns. In addition, since the bureaus have been ineffective in enforcing timber harvest laws, farmers continued to indiscriminately clear forests to create farmland.

Outstanding environmental issues

Hundreds of years of warfare, climatic changes and human activities have diminished the area and quality of China's natural forest resources. This decline has continued to worsen, as manifested in the following ways:

1. Soil erosion has seriously affected 3.7 million km^2, with an increase of 10 thousand km^2 per year. Heavily eroded areas in the Yangtze and Yellow River basins alone totalled 1 million km^2. Excessive siltation is not only a threat to the normal operation of key water control projects such as the Gezhou Dam, Three Gorges and Xiao Long Di, but also affects agriculture and economic development.
2. China's desert has reached a size of 2.6 million km^2 and is increasing by more than 2 460 km^2 each year. Water flow in major rivers has also become more erratic, with some rivers ceasing to flow or flowing intermittently for long periods.
3. From the 1950s to the 1990s, natural disasters increased both in terms of area impacted and rate of occurrence (Table 5). In 1998, an extraordinary flood in the Yangtze River valley resulted in a direct economic loss of 166.6 billion yuan[2], a level of destruction seldom seen in history.
4. Fifteen to twenty percent of China's plant and animal species are threatened by habitat deterioration. Of the 97 animal species under the Government's first-class protection, 20 are on the verge of extinction.

Table 5. Area affected by natural disasters and floods in China, 1952-1997 (thousand ha/year)

Year	Area affected by natural disasters	Area affected by floods
1952-1959	10 466	4 963
1960-1969	17 731	5 854
1970-1979	11 584	2 243
1980-1989	20 390	5 528
1990-1997	24 982	8 544

Source: China Calamity Report

[2] US$1 = 8.27 yuan (January 2001).

GOALS, SCOPE, TASKS AND MEASURES OF THE NFCP

The goals of the NFCP are to:

- achieve basic improvements of the natural environment in the upper reaches of the Yangtze River in 5 years and a remarkable improvement in 10 years;
- achieve basic improvement of the natural environment in the middle and upper reaches of the Yellow River in 10 years and a remarkable achievement in 20 years, including reforestation and greening of waste lands;
- implement forest protection measures in northeast China, Inner Mongolia, Hainan and Xinjiang to rehabilitate the natural forests, improve stand quality and ecosystem functions; and
- ensure that programs to rehabilitate China's natural environment are successful and ongoing for several decades.

The specific objectives are to:

- reduce timber harvests from natural forests by 19.9 million m^3 from 1997 to 2003;
- conserve 41.8 million ha of natural forests in the upper reaches of the Yangtze River, upper and middle reaches of the Yellow River, and in Inner Mongolia, Northeast China, Xinjiang Ugur Autonomous Region and Hainan Province; and
- establish 21.3 million ha of timber plantations from 2000 to 2005 in the upper reaches of the Yangtze River and the upper and middle reaches of the Yellow River.

The total forest area covered by the NFCP is 123.7 million ha that includes 56.2 million ha of natural forests and 11.8 million ha of plantations (Table 6).

Table 6. Area of forests covered by China's National Forest Conservation Program (thousand ha)

Region	Forest area	Natural forests	Plantations	Open woodland & shrub-land	Land with immature trees	Non-forested land	Other forest-land
Yangtze basin	55 150	22 800	5 890	15 680	960	9 810	10
Yellow basin	34 400	7 580	3 870	7 130	960	14 830	30
N. E. & Inner Mongolia	31 690	24 390	2 050	580	1 370	3 270	30
Hainan	410	320	0	10	10	70	-
Xinjiang	2 040	1 100	0	600	20	260	60
Total	**123 690**	**56 190**	**11 810**	**24 000**	**3 320**	**28 240**	**130**

Nearly all commercial logging in natural forests in 13 provinces in the upper reaches of the Yangtze River and the middle and upper reaches of the Yellow River will be banned by the beginning of 2000. This will ensure protection of 30.4 million ha of natural forests. In 2000, the timber output in this area will be decreased to only 1.1 million m^3, a 91.6 percent reduction.

A significant decrease in State-owned timber output in northeast China and Inner Mongolia will continue past 2000. At the same time, the timber output in the Xinjiang forests will also decrease significantly. In 1997, the timber output from these forests was 18.5 million m^3. By 2003, the projected output will be 11 million m^3.

In 1997, the timber output from all the natural forests included in the NFCP was 32.1 million m^3. It decreased to 29.3 million m^3 in 1998, and to 22.8 million m^3 in 1999. It is expected that timber output will be further reduced to 12.1 million m^3 by 2003 (Figure 16).

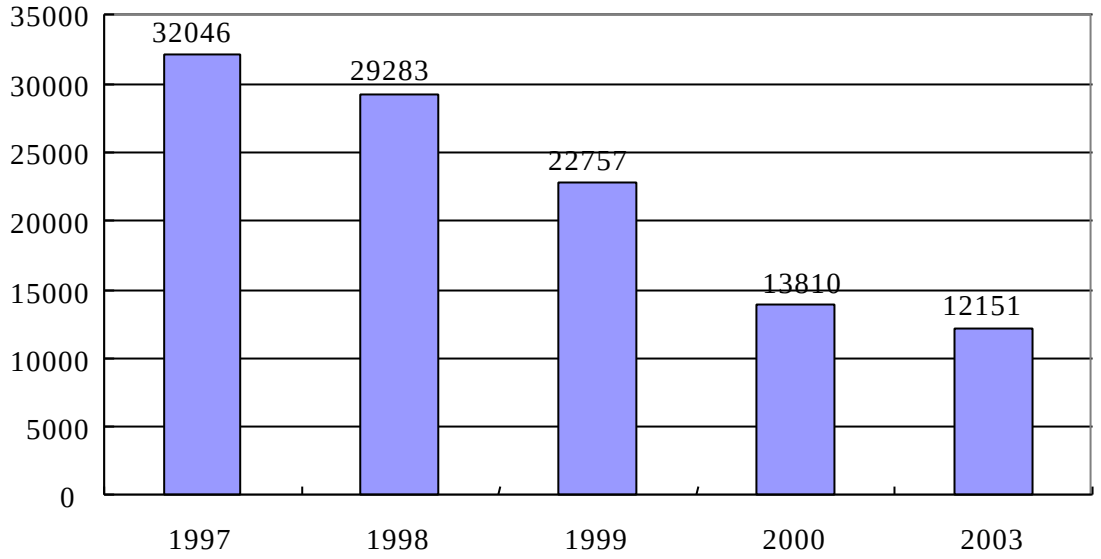

Figure 16: Timber output from natural forests under China's National Forest Conservation Program

According to NFCP plans, strict logging bans will be implemented in 41.8 million ha of natural forests. Protection and management of these forests will be strengthened either through specially assigned personnel or with contracted local forest workers or forest farmers. Small groups will be established to work in restricted forests, remote mountainous regions, and less accessible and sparsely populated areas. Individual contractors will be hired to oversee densely populated areas, and those that are adjacent to farmlands. The individual contractors will be given rights to use forest resources in their assigned areas. Profits will accrue to them as long as the protection and management of the natural forests are not compromised. Natural forests without marketable resources will be monitored by special patrols. Logging bans are also expected to be imposed in other forests, open woodland, shrubland and afforested land with immature trees.

To control soil erosion and improve the natural environment of the Yangtze and Yellow River basins, logging of natural forests will be banned and protection and management activities will be intensified. About 21 million ha are expected to be afforested from 2000 to 2010.

The State-owned forest bureaus will have to lay off 1 million workers as a result of the logging bans. A key issue is the generation of alternative employment opportunities. Some workers formerly engaged in harvesting will be employed in protection and management jobs. Employment will be generated in the plantation sector and by developing non-timber forest product industries. Workers not interested in alternative jobs will be paid a lump sum settlement allowance of up to three times their previous year's average wage. Forest industrial enterprises will establish, as and when needed, a redeployment service center to retrain unemployed forest workers and provide them with basic living expenses and medical care, as well as old-age and unemployment benefits.

Policies and measures

Administrative measures

Local Governments will adopt an administrative system to ensure proper implementation of the NFCP. Task forces will be formed and group leaders identified at the provincial and local Government levels.

Government documents mandating specific logging bans will be issued in support of the NFCP. After the catastrophic floods in 1998, logging of natural forests was banned along stretches of the Yangtze and Yellow Rivers, as well as in Sichuan, Yunnan, Chongqing, Gansu, Shaanxi and Qinghai, with resolutions from local Governments to strengthen protection of their natural resources.

Monitoring natural forest protection efforts by grassroots units will be stressed. Field visits by Premier Zhu Rongji, as well as officials of the SFA, State Council, provincial and local Governments are being made to ensure firm commitment to forest protection under the new program.

Financial measures

Funds for the NFCP will be provided primarily by the central Government, with supplementing input from local Governments. The Center for NFCP under the SFA is currently formulating regulations and rules for allocation and use of funds. Local Governments will also be required to bear approximately one-third of the loss of local revenues resulting from the logging bans and restrictions.

Technical support measures

Since the 1970s, the forestry sector has developed many innovations through collaborative research and has used them in natural forest protection. Further research should be promoted, along with field application of suitable knowledge and technologies.

A sound management system and monitoring at all levels will be necessary for proper implementation of the NFCP. A system for quality control will also be established, accompanied by technical standards for project construction, scientific index system, expert consultation, and feedback, in accordance with the NFCP design and standards.

Training is crucial to implement the NFCP. Training will be programmed at three levels. The central forestry department is responsible for training managerial and key technical personnel at the provincial level. The provincial divisions will train managerial and key technical personnel at the prefecture, county, and forestry bureau levels. Finally, county units will focus on the training of forestry cadres, key technicians and farmers at township and village levels.

ECONOMIC ASSESSMENT OF THE NFCP

Impacts on timber production

An analysis of China's historical timber production and supply reveals distinct regional characteristics. The proportion of timber production from 1949 to 1997 by forest area and regions[3] is shown in Figures 17 and 18, based on data from the former MOF and the SFA.[4] The majority of the domestic timber was from State-owned forests in the northeast, northwest, and southwest.

[3] China is divided into three economic zones: The eastern region includes Liaoning, Beijing, Tianjin, Shanghai, Hebei, Shandong, Jiangsu, Zhejiang, Fujian, Guangdong, Guangxi, and Hainan. The central region includes Heilongjiang, Jilin, Shanxi, Inner Mongolia, Anhui, Jiangxi, Henan, Hubei, and Hunan. The western region includes Sichuan, Yunnan, Guizhou, Tibet, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang and Chongqing. Hainan and Chongqing are newly established and their data are incomplete, so they are included in Guangdong and Sichuan respectively. This aggregation does not influence the results.

[4] Collated in accordance with the collections of National Forestry Statistics by Ministry of Forestry (1949-1987, 1988-1997) and China's Yearbook of Forestry (1990-1998).

The implementation of the NFCP will have divergent impacts on timber production in different regions. Timber output from the southwest and northwest State-owned forests will decrease significantly. This may stimulate southern China and other areas to expand timber production. In fact, the southern collective forest area has increased its supply of timber and is currently the leading source of timber produced in the country. The proportion of timber from plantations will also be increased. The central and western regions, which used to be China's main timber producing areas, will very likely be most affected by the NFCP. Implementation of the NFCP also provides a great opportunity for the eastern region to cultivate forest resources and develop timber production.

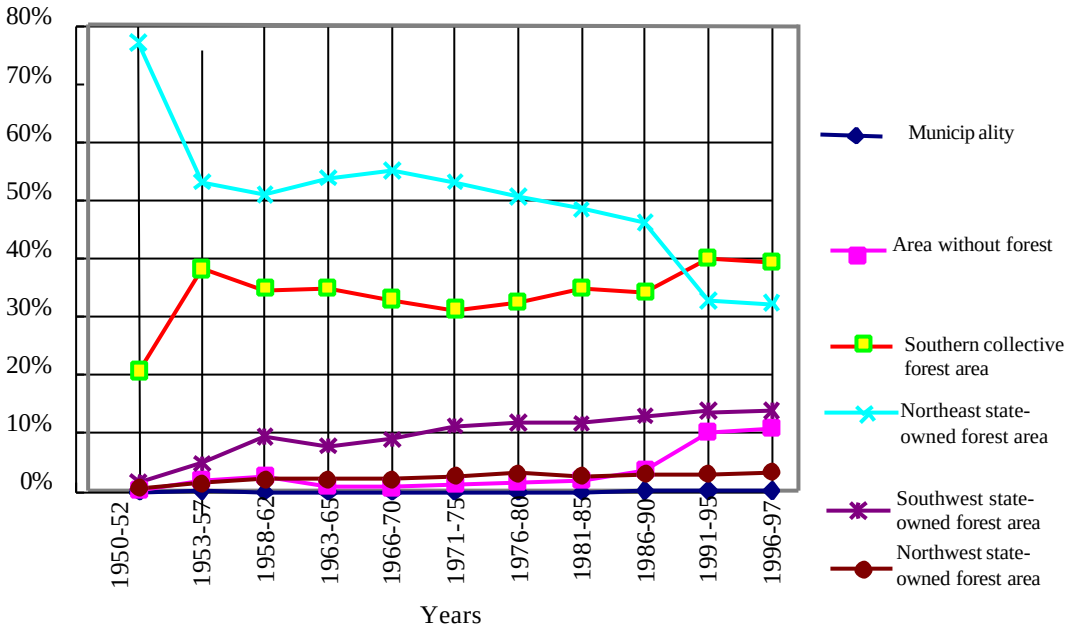

Figure 17. Proportion of timber production by forest area in China, 1950-1997

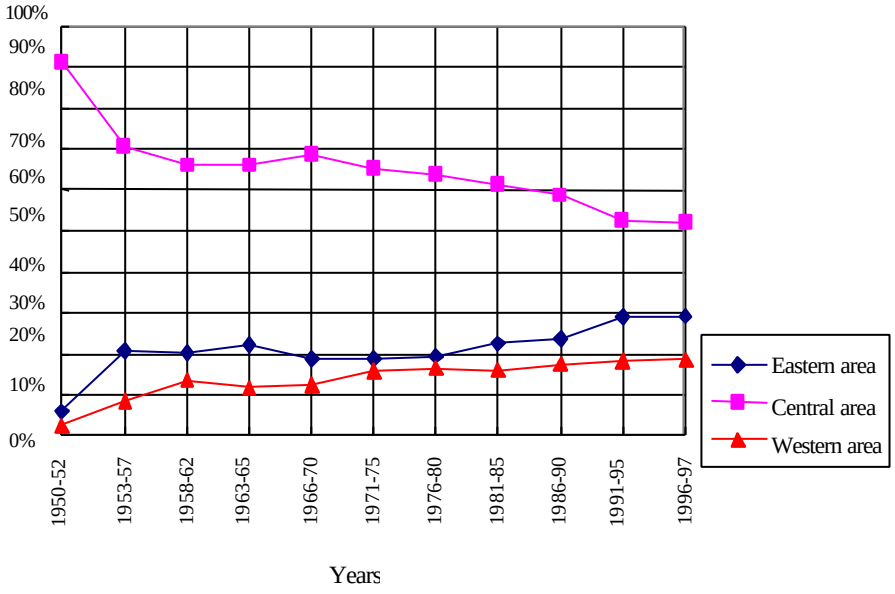

Figure 18. Proportion of timber production by region in China, 1950-1997

Impacts on industrial timber supply

China's timber comes chiefly from domestic producers, and includes that which is harvested from both State-owned and non-State forests. The targeted annual harvest of State-owned forest timber was 61.7 m^3 from 1983-1997. The lowest amount actually harvested was 52.3 million m^3 in 1983, while the highest was 67.7 million m^3 in 1995. Timber from non-State sources, which was not included in annual harvest targets, totalled more than 19 million m^3 per year between 1984 and 1991, and was over 20 million m^3 per year from 1992 to 1997 (Table 7).

Table 7. Volume of China's domestic timber production, 1983–1997 (million m^3)

Year	State-owned forest production	Non-State forest production	Total
1983	52.3	-	52.3
1984	63.9	19.7	83.6
1985	63.2	19.5	82.7
1986	54.8	17.0	71.8
1987	64.1	19.8	83.9
1988	62.2	19.2	81.4
1989	58.0	19.7	77.7
1990	55.7	18.9	74.6
1991	58.1	19.7	77.7
1992	61.7	20.9	82.6
1993	63.9	21.7	85.6
1994	66.2	24.4	90.6
1995	67.7	25.0	92.7
1996	67.1	24.8	91.9
1997	64.0	23.6	87.6

Note: Source for State-owned forest production: Statistics Department of SFA
Non-State forest production: estimated from various sources

The greatest demand for industrial timber is for construction, furniture, coal mining, paper, stationery, railway sleepers, matches and for use in chemical industries. This demand fluctuated annually, with consumption averaging 90.3 million m^3 from 1993 to 1997 (Table 8). Demand for plywood also increased dramatically from 5.3 million m^3 in 1993 to 19.3 million m^3 in 1997, an annual increase of 37.9 percent.

Table 8. Industrial timber consumption by sectors in China, 1993-1997 (thousand m^3 and percent)

Sector	1993		1994		1995		1996		1997	
	Volume	percent	Volume	percent	Volume	percent	Volume	percent	Volume	percent
Construction	57 240	67.7	63 390	66.2	52 300	59.0	56 850	62.2	58 300	63.9
Furniture	2 550	8.9	12 190	12.7	12 680	17.2	12 680	13.9	12 000	13.2
Coal mining	6 860	8.1	8 050	8.4	7 900	8.8	7 900	8.6	7 640	8.4
Paper	5 770	6.8	3 780	6.0	7 610	7.9	7 610	8.3	6 950	7.6
Stationery	3 290	3.9	2 460	2.6	2 330	2.6	2 480	2.7	2 500	2.7
Vehicle & ship	2 130	2.5	2 190	2.3	2 210	2.6	2 210	2.4	2 160	2.4
Chemical	700	0.8	720	0.7	750	0.8	730	0.8	710	0.8
Sleepers	700	0.8	560	0.5	540	0.6	540	0.6	530	0.6
Chemical fiber	2 130	0.4	390	0.4	390	0.5	390	0.4	380	0.4
Total	**84 610**		**95 730**		**88 620**		**91 390**		**91 170**	
Plywood	5 320		6 520		18 980		12 260		19 250	

Sources: Yearbook of Light Industry; Strategy of Forestry Development in 21 Century; Economic and Technological Indices of Peasant Used Timber

Relatively small volumes of timber are exported from China. Total exports were 8.6 million m^3 in 1997. Using data from Table 7 as well as export and import data, the volume of timber available for domestic consumption can be derived as shown in Table 9, showing an average volume of 91.3 million m^3 per year from 1993 to 1997.

Table 9. Volume of timber available for China's domestic consumption (million m^3)

	1993	1994	1995	1996	1997
Domestic timber production*	85.6	90.6	92.7	91.9	87.6
Imports	8.2	7.5	6.9	7.3	9.1
Exports	4.5	5.8	7.9	7.3	8.6
Timber available for domestic consumption	89.3	92.3	91.7	91.9	88.1

Note: Timber available = domestic timber supply + imports - exports

Comparing the volume of timber available (Table 9) against the actual volume consumed (Table 8), it can be seen that the volume of timber available is on the decline, while domestic consumption is increasing slightly (Table 10). During the years when there was a deficit in the balance (1994 and 1997), the balance from previous years were used to meet the demand. However, if the trend of decreasing supply and increasing demand were to continue, then the surplus from previous years would not be sufficient to keep up with demand.

Table 10. Volume of timber available for China's domestic use and actual consumption (million m^3)

	1993	1994	1995	1996	1997
Timber available for domestic consumption	89.3	92.3	91.7	91.9	88.1
Actual domestic consumption	84.6	95.7	88.6	91.4	91.2
Balance	4.7	-3.4	3.1	0.5	-3.1

By 2003, the NFCP targets to reduce timber production from the natural forests by 19.9 million m^3. Under such circumstances, the gap between supply and demand would become more acute and China would very have to seek alternative supply sources, most likely through expanding its forest plantations and imports.

Impacts on timber prices

Despite the projected declines, existing stocks and imports will keep timber supplies stable until 2003. Therefore, domestic timber prices are not expected to change drastically in the short-term, except for the occasional price fluctuations. For example, timber prices were only slightly higher during the annual Fall Timber Trade Fair in Nanjing in 1998. Common tree species were approximately 5 percent more expensive after the logging ban was announced, and prices for species for special uses were approximately 10 percent higher. Prices are likely to continue to increase because the gap between supply and demand will widen.

Impacts on local non-industrial timber

Non-industrial timber is used mainly as fuelwood, or by farmers for general household purposes. Historically, consumers rely mainly on the natural forests to fulfil such needs. Fuelwood accounted for about 30 percent of yearly total consumption of forest resources, while household activities, including construction, utilized 20 percent. The NFCP, therefore, will also reduce non-industrial timber supply.

The Government is adopting a number of measures to encourage people to build brick and concrete homes instead of wooden framed houses. It is also promoting the establishment of fast-growing fuelwood plantations, development of alternative energy such as coal, gas, solar energy, biogas, and hydroelectricity, and improved stoves.

Sources of timber supply

Apart from its domestic sources, China has also relied on imports to meet its timber demands. However, the high foreign exchange rate makes this approach unattractive as a long-term measure. The NFCP logging bans, coupled with the deteriorating environmental conditions of the timberlands, render the domestic timber supply quite unpredictable. The optimum solution is a two-pronged approach of increasing imports and maximizing domestic timber production.

More intensive thinning and tending regimes of middle-aged and immature timber stands can help improve their productivity. Scientific and technological advances can also be used to increase the utilization rate of forest resources. Utilizing small-dimension logs for wood-based panels and pulp and paper offers further opportunities, and demands can be partially met by ensuring the use of non-timber substitutes. In addition, increasing the growth and yield of timber plantations through the use of improved planting stock and better management should not be overlooked.

These approaches, in conjunction with the imports of medium- and large-diameter timber and high-grade pulp and its products, can resolve the supply and demand imbalance. Other remaining issues include improving the levels of afforestation and silviculture, and identifying suitable land to extend the forest area.

Timber plantations as an alternative source of supply

After nearly 50 years of development, the area, stock and productivity of China's timber plantations have increased significantly. Today, China has the largest area of plantations in the world, amounting to 34.3 million ha, of which 17.5 million ha are industrial timber plantations, with a growing stock of about 578 million m^3.

The Government plans to gradually shift timber production from natural forests to plantations. However, the output from plantations is still below expectations and needed volumes. Plantations will supply 13.5 million m^3 in 2000 and 39.3 million m^3 in 2005 (Table 11). Chinese fir, Masson's pine, larch, Chinese pine and cypress account for 88.5 percent of coniferous plantations. Poplar, eucalyptus, soft broadleafs, hard broadleafs and mixed broadleafs account for 92.8 percent of broadleaf species. Based on these projections, it may be possible for the plantations to become the main source of industrial timber if forest management practices are improved and the plantation areas and species structure are adapted to market demands.

Impact on the timber industries and international trade

Impacts on the wood industries

China's wood industry consists mainly of sawmills, woodchip processing, and wood-based panel producers. The success of the industries is directly related to the availability of timber. The main source of raw material is timber from nearby forests under the control of the provincial departments of forestry and their affiliated local organizations.

Table 11. Volume of China's timber plantation production by species (thousand m^3)

	1994-1996	1997	1998	1999	2000	2005
Chinese fir	2 780.0	2 780.0	2 780.0	5 280.0	5 280.0	17 850.0
Masson's pine	39.0	39.0	39.0	39.0	390.0	2 290.0
Larch	83.0	83.0	83.0	83.0	83.0	83.0
Chinese pine	0.4	0.4	0.4	0.4	0.4	60.0
Cypress	0.0	0.0	0.0	0.0	0.0	37.5
Others	263.0	263.0	263.0	263.0	263.0	1 580.0
Conifers subtotal	***3 165.4***	***3 165.4***	***3 165.4***	***5 665.4***	***5 665.4***	***21 900.5***
Poplar	1 750.0	1 750.0	5 760.0	5 760.0	5 760.0	14 580.0
Eucalyptus	170.0	110.0	110.0	110.0	1 290.0	1 990.0
Soft broadleafs	490.0	490.0	490.0	490.0	490.0	620.0
Hard broadleafs	32.0	32.0	32.0	32.0	32.0	32.0
Mixed broadleafs	60.0	60.0	60.0	60.0	60.0	120.0
Others	150.0	150.0	150.0	150.0	150.0	100.0
Broadleafs subtotal	***2 652.0***	***2 592.0***	***6 602.0***	***6 602.0***	***7 782.0***	***17 442.0***
Total	**5 817.4**	**5 757.4**	**9 767.4**	**12 267.4**	**13 447.4**	**39 342.5**

In 1998, shortly after the NFCP came into effect, State-owned wood processing enterprises were badly affected by the decline in production and export volumes. China's output of wood-based panels declined by 35.9 percent to 10.6 million m^3, sawntimber by 11.1 percent to 17.9 million m^3 and woodchips by 17.4 percent to 4.4 million m^3. The value of the State-owned wood processing industries decreased by 6.5 percent to 6.2 billion yuan, and that of related sawntimber and woodchip production by 4.8 percent to 2.6 billion yuan. Similarly, the export value of sawntimber and woodchips suffered a serious setback of 51.9 percent, dropping to 454.5 million yuan. Only the export value of wood-based panels, valued at 103.8 million yuan, showed an increase of 3.6 percent.

Many small-scale enterprises had operated with outdated equipment and inefficient management. There had been little accountability for costs and revenues, and basic elements of competitiveness were frequently lacking under the former centrally planned system. However, they managed to maintain profitable production levels because raw material was inexpensive and easy to acquire. Since the implementation of the NFCP, harvested volumes have declined significantly forcing several enterprises to reduce or halt production.

Several private forest product companies have also been affected by the NFCP. In 1998, the production levels for wood-based panels, sawntimber and woodchips decreased by 5.9 million m^3, 2.5 million m^3 and 730 000 m^3 (44.5, 14.0 and 40.3 percent) respectively. Located near economic centers and along the coastal areas, they are more exposed to market forces, and derive their raw material from domestic and international suppliers. Nonetheless, many firms had to sharply curtail their production.

Impacts on the international trade of timber products

China increasingly depends on timber imports, particularly hardwood logs and wood-based panels (Table 12). Log imports from 1981 to 1997 totalled 93 million m^3, averaging 5.5 million m^3 per year, or 9.4 percent of the country's timber supply. The greatest volume of log imports was 10.7 million m^3 in 1988, accounting for 19.1 percent of the total log supply that year. During the 1980s, overall timber and wood product imports increased at an average annual rate of 8 percent, except in 1981. However, while the volume of imports generally increased during the 1990s, the share of imports as a percentage of total wood supply declined at a rate of about 8 percent per year. One exception was imports of sawntimber, which exhibited a reverse trend. Sawnwood imports, which averaged about 1 percent of domestic production in the 1980s, increased noticeably in the 1990s.

Table 12. Volume of China's major forest product imports, 1981-1997 (thousand m^3)

Year	Log	Sawntimber	Plywood
1981	1 871	75	259
1982	4 652	132	514
1983	4 413	162	304
1984	7 956	600	573
1985	9 820	148	824
1986	7 818	165	621
1987	7 180	98	1 406
1988	10 675	392	1 352
1989	6 410	125	1 073
1990	4 193	252	1 377
1991	4 097	306	1 463
1992	4 670	974	1 585
1993	3 459	1 208	2 229
1994	3 335	896	2 109
1995	2 583	851	2 083
1996	3 186	933	1 777
1997	4 471	1 325	1 489
Total	**92 989**	**8 642**	**21 038**

Source: China Customs Statistics

With limited commercial timber resources, China's log export volume is low and has generally declined since 1988 (Table 13). On the other hand, exports of processed products, such as plywood, are increasing due to the opening of domestic markets, market liberalization and rapid growth of companies with foreign investments. Nevertheless, China's wood product imports outstrip its exports.

Table 13. Volume of China's major forest product exports, 1988-1997 (thousand m^3)

Year	Logs	Sawntimber	Plywood	Veneer
1988	314	3	8	-
1989	475	4	9	-
1990	91	86	21	2.
1991	135	98	22	4.
1992	237	923	238	72
1993	155	330	45	16
1994	91	390	106	17
1995	97	408	129	21
1996	64	383	177	20
1997	63	387	438	3

Source: China Customs Statistics

To counter the reduction in harvests from the natural forests, timber production can be augmented by intensifying management and thinning practices and increasing supplies from plantations and imports. The Government eliminated the tariff on logs in 1999 to boost imports (Tables 14 and 15). In an apparent response to the tariff reduction, import volumes increased substantially in 1999 compared with 1988.

Table 14. Volume of China's log and sawntimber imports, 1998 and 1999 (m^3)

Category	1998	1999	Percent increase
Logs	4 190 000	9 010 000	115.0
Sawntimber	1 468 905	2 428 743	65.3
Total	**5 658 905**	**11 438 743**	**102.1**

Source: China Customs Statistics

Table 15. Value of China's wood and wood product imports, 1998 and 1999 (thousand US$)

Category	1998	1999	Percent increase
Wood and wooden products, charcoal	1 725 551	2 615 575	51.6
Softwood and softwood products	11 603	12 054	3.9
Wood pulp and other pulp	1 000 872	1 478 052	47.7
Total	**2 738 026**	**4 105 681**	**50.0**

Source: China Customs Statistics

The United States, Canada, and Western and Northern Europe are leading suppliers of logs and sawntimber to China. The main species imported include oak, maple, beech, Douglas fir and hemlock from the United States and Canada. North America also provides the bulk of China's imports of pulp and paper products.

Russia is also emerging as an important supplier of logs and forest products to China. Currently, China mainly imports logs and pulp from Russia. South American and African countries are important sources of selected tropical hardwood logs. Southeast Asian countries such as Indonesia, Malaysia, Laos, Cambodia and Myanmar are also important due to their close proximity. China has imported particularly large volumes of plywood and dipterocarp logs from Indonesia and Malaysia, and high-quality timber from Myanmar. It is expected that China will also look to Australia and New Zealand as suppliers of timber imports in the future.

Impact on Government tax revenue and budgets

Government tax revenue and budgets will definitely be affected by the logging restrictions and the subsequent decline in timber production, particularly in areas where timber is a main source of income. Tax revenue from timber production and sales is earned primarily through Agriculture and Forestry Special Production taxes, value-added taxes, income taxes, business taxes, and other fees in accordance with local conditions. The Agriculture and Forestry Special Production tax is set at 16 percent, the value-added tax at 17 percent, income tax at 33 percent, and the business tax between 3 and 20 percent.

According to a survey conducted by the SFA after the implementation of the NFCP, the revenue for Lijiang prefecture of Yunnan province decreased by 126.83 million yuan annually. Estimates for Sichuan province indicated that its revenue was expected to decrease by 680 million yuan in 1998. Income from timber-related industries in the Ganzi, Aba and Liangshan prefectures averaged 80 percent of their total revenues, with Xinlong County in Ganzi topping the list at 98.3 percent. Xiangtang and Heishui counties in Aba (two poverty-stricken areas) are also highly dependent on timber revenues, which accounted for 91 percent and 86 percent of their total revenues, respectively. After the logging bans were implemented, the total revenue for Aba decreased by 30 million yuan in 1998. The Wenchuan paper mill, an affiliated enterprise of the Aba prefecture, with fixed assets of 130 million yuan, has stopped operations due to raw material shortages. Similarly, Leshan, whose forestry sector accounted for 61.42 percent of local revenue, lost 200 million yuan in 1998. Ermei, a famous timber-producing county, saw a decline of more than half its revenue (about 120 million yuan).

Such discouraging impacts need to be addressed and resolved for the NFCP to be successful. Looking from a broader and long-term perspective, the NFCP will have positive and far-reaching impacts on the sustainable development of the national economy and society as a whole. It will effectively help slow down the deterioration of China's environment and reduce the frequency and adverse impact of natural disasters, thereby lessening the strain on the national economy and budgets.

Serious soil erosion has caused increased siltation in the Yangtze River and created a "suspended river" in the Jinjiang River section. The water level of the river is several meters higher than the

riverbanks during the flooding periods, and is held back only by embankments. During the past four decades, Jinjiang has spent a huge amount of resources to build a 3 600 km wall along the Yangtze River and 30 000 km of embankments along its branches and tributaries.

The catastrophic floods in 1998 affected hundreds of millions of people and caused extensive damages to riverine areas. The State reacted by greatly increasing funding for flood control projects. During the months before the onset of the next flooding season, the State invested 46.5 billion yuan in water conservation projects. The cost for the embankment projects on the Yangtze River alone totalled 7.8 billion yuan.

Despite efforts to control flooding, serious economic and social costs continue to plague China. Flooding of the Yangtze River is increasing in frequency from about once to four times per decade. At the same time, water flow has become more erratic. In 1997, the river ceased to flow for 226 days, causing severe droughts, which again affected the economy adversely.

The NFCP, therefore, represents one way to help reduce the enormous financial and social costs of natural disasters. China's overall economy is currently being restructured and capital resources are scarce. Expenditures redirected to deal with natural disasters only reduce China's ability to address necessary restructuring issues. The NFCP will ultimately free capital resources for China's development.

If the economies of forested areas are to improve, the local economy must also be restructured to focus on a broader-based and diversified system. Along with the traditional forest-dependent processing activities, new economic growth points and industries, including the development of tourism, cash tree crops and other suitable forestry and animal husbandry, need to be considered.

To counter the financial difficulties associated with the logging ban in the Sichuan province, members of the provincial Political Consultative Conference identified the following priorities:

- develop the province's water resources, mining, and tourism and stabilize these sectors of the economy;
- establish stable agriculture and animal husbandry sectors by selecting and improving leading financially-viable enterprises, adjusting product and output structures to provide for a broader mix of goods and services, and integrating agricultural enterprises and farm households into the market economy;
- promote animal husbandry within the rural economy;
- apply modern forest management technologies to enhance the environmental functions of forests such as soil and water conservation; and
- fully utilize natural plant resources as a source of edible fungi, wild food and medicinal herbs.

The Aba prefecture decided to promote tourism to offset the timber revenue losses. It attracted 163 000 tourists in 1998, earning 152 million yuan, a 128 percent increase in revenue from 1997 and a 130 percent increase in the number of tourists. Revenue earned from tourism is now 30 percent of the prefecture's GDP.

Distribution of the costs of implementing the NFCP

Several diverse activities, involving a large number of all stakeholders, are necessary to facilitate the implementation of the NFCP. Authorities directly overseeing the affected forests will have to simplify the administrative structures and cut expenses. The national Government will have to compensate local Governments for losses incurred as a consequence of the logging ban. Industries will need to implement managerial and economic reforms, re-deploy and compensate unemployed workers. Small private processing firms using timber from protected forests must find alternatives to continue operations or dissolve their companies and settle their obligations to creditors and employees.

The Government must also deal with the widespread rural dependence on fuelwood. Substituting coal or electricity for fuelwood may be an option in some places. The development of fuelwood plantations should also be encouraged.

The costs associated with implementation of the NFCP will be borne by the State, local Governments, private firms and individuals. Most of the compensation will be borne by the central Government, while the provincial Governments will pay a lesser portion. The direct cost to the State and local Governments is the loss of tax revenue from timber and other forest products. The central Government spent 4.3 billion yuan in 1998 and 6.1 billion yuan in 1999 to help implement the NFCP. Private firms will bear the cost of lowering or halting production. Workers will be affected by redundancies. Forest farmers lose by not being able to harvest timber and fuelwood.

ASSESSMENT OF ENVIRONMENTAL IMPLICATIONS OF THE NFCP

Biodiversity

According to the bio-geographic zoning criteria used in the *Summary of China's Biodiversity Protection*, key protected natural forests include:

- Northeast China: Heilongjiang, Jilin;
- North China: Shaanxi, Shanxi, Henan, Hubei
- Northwest China: Inner Mongolia, Ningxia, Gansu, Xinjiang;
- Tibet-Himalaya: Qinghai, Tibet;
- Southwest China: Yunnan, Sichuan, Chongqing;
- Central China: Guizhou; and
- South Tropical China: Hainan.

China's forests contain some of the richest biodiversity in the world due to the country's large size and the extremely variable geographic conditions. Unfortunately, humans have destroyed much of the natural forests. More than half the habitats have disappeared in nearly two-thirds of the provinces. Protection of natural forest resources is therefore urgently needed as a means to conserve biodiversity.

China has ranked its provinces according to their relative priorities and importance for protection of biodiversity, with Grade A provinces being accorded the highest priority, Grade B second priority, and Grade C the last priority. The country's four Grade A priority provinces (Yunnan, Sichuan, Xinjiang and Jilin) and seven Grade B priority provinces are all included the NFCP (Table 16).

Table 16. Status of protected natural forests by provinces in China

Province	Land area (km^2)	Forest area (km^2)	Plant species close to extinction	Reserves		Priority
				Area (km^2)	Number	
Heilongjiang	455 000	152 944	16	4 172	16	B
Jilin	189 000	60 789	24	7 999	7	A
Shaanxi	207 000	44 714	36	1 842	7	B
Shanxi	157 000	8 100	14	624	4	C
Henan	167 000	14 199	25	723	16	C
Hubei	186 000	37 790	44	1 467	6	B
Inner Mongolia	1 158 000	137 401	20	0	0	C
Ningxia	66 000	951	6	935	6	C
Gansu	450 000	17 690	32	10 374	19	B
Xinjiang	1 650 000	11 209	24	100 021	21	A
Qinghai	721 000	1 945	10	7 731	4	B
Tibet	1 228 000	63 203	31	2 097	7	B
Yunnan	383 000	91 965	154	11 635	30	A
Sichuan	566 000	59 108	78	27 019	63	A
Guizhou	176 000	23 093	65	1 335	9	C
Hainan	34 100	2 420	-	737	31	B

Note: Sichuan's data include Chongqing

Most provinces under the NFCP are species-abundant regions. The impact of the NFCP can already be witnessed by the reappearance of the rare grand panda and takin in the former logging area of the Long Chao Ping Forest Industry Bureau of Shaanxi province.

Soil erosion and fertility

Soil erosion has been one of China's main environmental problems hindering the development of the national economy. According to a 1990 remote sensing survey, the area affected by erosion amounted to 3.7 million km^2, or 38.3 percent of China's total land area. The annual amount of eroded soil was 5 billion tons. This is the equivalent to 1 centimeter of surface soil of the total area of farmland, with a further loss of nitrogen, phosphorus and potassium that is equivalent to over 40 million tons of standard fertilizer. The implementation of the NFCP should reduce soil losses substantially.

The Yangtze and Yellow River basins encounter the most severe soil erosion in China. The area affected by erosion in the Yangtze River basin increased to 620,000 km^2 in the early 1990s from 360 000 km^2 in the 1950s. The middle and upper reaches of the Yellow River cover 640 000 km^2 of the loess plateau, and soil erosion has affected 450 000 km^2 of the area.

Desertification

The western central region of China is affected by severe desertification, with grave impacts on industrial and agricultural production. In northern China, there are approximately 30 days of strong winds with very high dust levels per year, damaging more than 14 million km^2 of farmland and reducing grain production. The Lanzhou Institute of Desertification of the Chinese Academy of Sciences reported that 31.8 percent of desertification was induced by the destruction of natural vegetation, 28.3 percent by overgrazing, 25.4 percent by over-reclamation, and 8.3 percent by improper utilization of water resources. Direct economic losses caused by desertification total approximately 54 billion yuan per year.

Water resources

The average discharge of the Minjiang River in Sichuan decreased from 14.8 billion m^3 when the People's Republic of China was first founded in 1949 to 13.1 billion m^3 in 2000, a drop of 11.5 percent. Between 1988 and 1997, the discharge of the Qinghai River, the source of the Yellow River, declined by 4 billion m^3. From 1978 to 1987, the lower reaches of the Yellow River dried up seven times, the longest drought lasting 20 days. In recent years, droughts have become successively longer, lasting 226 days in 1997 and affecting 100 cities and 100 million people. Since China's natural forests are located primarily in important watersheds of major rivers (Table 17), forest protection is crucial in solving the country's water shortage.

Table 17. China's natural forest resources by river basin

River basin	Area (thousand km^2)	Percent of total area	Stock (billion m^3)	Percent of total stock	Forest cover (percent)
Yangtze	25 510	29.2	2.351	28.1	22.0
Yellow	2 790	3.2	0.179	2.1	5.9
Zhujiang	7 060	8.1	0.327	3.9	26.7
Heilongjiang	31 440	36.0	2.873	34.3	40.2
Huaihe	540	0.6	0.016	0.2	8.3
Haihe	500	0.6	0.015	0.2	8.1
Liaohe	1 020	1.2	0.049	0.6	14.6
Songhuajiang	16 050	18.4	1.395	16.7	33.2

ASSESSMENT OF SOCIAL AND ECONOMIC IMPLICATIONS OF THE NFCP

Impacts of the logging ban on the employment of forest workers and forest farmers

Employment statistics indicate that 1.1 million forest workers, including those involved in road construction, mechanical repair, transportation, log depots, log processing, wood processing and logging, will lose their jobs when the logging bans are implemented. This will increase the pressure on China's social welfare system. Proper redeployment of these workers is critical for the success of the NFCP. State and local governments and relevant private firms are developing several strategies to minimize the impacts on employment and, consequently, on China's social welfare system.

Forest ownership is mainly held by the State, with minimal collective tenures. Private ownership of forests is limited mainly to mountainous plots maintained by farmers and trees scattered around their houses. These farmers would not be much affected by the logging ban and subsequent closure of small wood processing plants unless they are employees or seasonal loggers.

Efforts will be made to re-deploy laid-off employees to work in forest management and protection, afforestation and silviculture. It is estimated that one person will be re-employed in forest management or forest protection for every 187 to 380 ha of natural forests. The central Government will pay the salaries of employees in forest management and protection, whereas salaries of workers involved in afforestation, silviculture, and exploitation of resources will come from the capital improvement investment funds, private firms, and bank loans. Laid-off employees can also seek alternative employment on their own or through Government re-employment centers. They will receive a lump-sum severance pay equivalent to three times the average local wages from the central finance department. Finally, workers with private companies who cannot be reassigned and do not want to voluntarily terminate their contracts, can consult re-employment centers funded by the central financial department. They will also receive monthly unemployment benefits for up to three years. If they cannot find another job within three years, they will be given social welfare support to cover minimum living expenses. Local governments and private firms are also encouraged to retrain and help workers upgrade their skills, and to create new job opportunities.

Recent evidence indicates that laid-off production workers re-employed in forest management and protection are happy to accept the offer because the work is easier with almost the same pay. Those who found new jobs through the job centers often receive higher wages because they have acquired new skills through re-training.

Economic impacts

Impacts on the income of Government and private enterprises

Subsidies paid to State enterprises by the central Government and local financial departments as a result of the logging bans are higher than their foregone profits. For example, the Government paid the Da Xing An Ling Forestry Company in Heilongjiang province a 330 million yuan subsidy in 1998. Even after deducting workers' social security costs, the firm's actual net income was still 2.2 times more than the losses incurred by decreased production. Many other forest products firms have had similar experiences.

Impacts on the income of forest workers and farmers

Approximately 60 percent of the central Government funds paid to affected areas are used to subsidize employment costs for State enterprises. Workers re-employed in forest management and protection are paid approximately 8 000 yuan per year, which is between 700 and 5 511 yuan higher than their former wages. Although forest farmers would be losing income from seasonal harvesting and timber processing, it is likely that they can be contracted for other forestry-related work. To stabilize their income, the central Government will also give preferential credit and tax breaks for alternative income-generating activities such as to tree breeding and forest nurseries.

Many laid-off workers seeking new jobs elsewhere do not find work quickly. These workers often have few skills and little experience. Therefore, the Government and private sector should offer technical guidance, training, and services to mitigate social impacts.

Impacts on social welfare

Currently, the State is responsible for many social services and amenities, including pension, education and medical care. Some forest bureaus and enterprises even pay local government expenses. However, forest revenues that previously subsidized these benefits have declined due to reduced harvesting and environmental deterioration even before the logging bans were imposed.

Despite that scenario, the central and local governments guarantee that policies will be developed and funds made available to help forestry enterprises and communities to deal with social welfare problems. One measure includes transferring education, medical care, public security, legal institutions, and the people's courts to the jurisdiction of local governments. Central and local financial departments will jointly bear the expenses of these programs with the local departments providing most of the funds. The central Department of Finance will also give high priority to secure investments in affected areas.

CONCLUSIONS

Protecting the natural forests supports China's policy of environmental protection and helps the country meets its commitments under international conventions. With an unevenly distributed forest cover of only 13.9 percent of the total land area, China needs more forests. Deforestation has not been effectively checked in many locations. Approximately 2 million ha of forestland have been converted to open woodland, shrubland, denuded land, and land for non-forest

purposes each year. The Chinese Government considers environmental protection a basic national policy. Logging bans or restrictions are important for achieving this policy. In addition, the implementation of the NFCP is one of the Chinese Government's means to fulfil its commitment to international agreements and global efforts to accelerate environmental protection.

The upper reaches of the Yangtze River and the middle and upper reaches of the Yellow River are the birthplaces of the Chinese civilization. They are sources of valuable raw materials and energy for economic development and the source of water for inhabitants in the valleys. However, overuse of the natural resources has slowed economic and social development. Deforestation is one of China's greatest problems. Logging bans, afforestation and greening of degraded and sloping land are necessary to rehabilitate the Yangtze and Yellow River watersheds.

State-owned forests are important sources of income. Much of China's timber comes from the Northeast and Inner Mongolia, and the Songhua and Nenjiang Rivers. The country's main tropical rainforests are located in Hainan, a popular tourist region. The Xinjiang forest is an important water conservation area. Logging bans or reductions are necessary to rehabilitate the forest resource, improve the stand quality, and improve the ecological functions of these forest areas.

The NFCP is an important step to realize the country's strategic objectives to protect and improve the natural environment. It also plays an important role in maintaining China's social stability and in safeguarding sustainable development. In support of the NFCP, the Chinese Government has formulated relevant policies, endorsed enabling laws and regulations, and set up administrative, budgetary, and scientific structures to ensure that the NFCP objectives and tasks will be accomplished.

China's NFCP will not only protect 56.2 million ha of natural forests but will increase the forest area by 22.7 million ha. It will help maintain China's rich biodiversity, prevent soil erosion, and reduce the incidence of natural disasters. It will play an important role in reducing the financial pressures on the Government to provide relief for emergencies and disasters. It will help safeguard people's lives and property and maintain social security. It will bring new opportunities and vitality to the economy, and transform economic growth patterns. China's large-scale implementation of logging bans will also elevate the standard of living for many citizens.

Several countries have established successful forest protection programs. China has made a significant step in the right direction, thus attracting the attention of several developed countries. The next move is to participate in technical exchanges and cooperation with the international community to achieve the joint goal of natural forest protection.

POLICY OPTIONS AND NEW MEASURES

Prior to the 1980s, public awareness of the importance of protecting natural forests was poor and over-consumption of natural forest resources was common. Since then, China has strengthened its Forest Law, developed a logging quota system and made considerable progress in protecting its forests. With rapid economic development and ineffective enforcement, however, the logging quota was not observed and other forms of forest destruction took place, raising great concerns that the NFCP would fail. One assurance to prevent this from happening is to enforce supporting laws when implementing the logging bans.

Hainan and Sichuan provinces have formulated provincial regulations for natural forest protection that have gained enthusiastic support. Their positive experiences are now the basis for formulating national policies. Laws and regulations will be passed to give natural forests legal protected status. Organizations responsible for carrying out the duties will be identified, thus disassociating them from politics.

The NFCP is implemented by the SFA but involves numerous departments at the State, provincial, county and local levels. Proper planning and coordination are, therefore, very important. The objectives, scope, policies, responsibilities and implementing measures at each

level must be clearly outlined and conveyed to all participants. The order of authority and command has to be identified and established at the State, provincial and county levels. Rules governing the management and funding of the NFCP should be formulated and an audit of the NFCP management and financial bodies should be incorporated. In addition, audits, public bidding, and supervision must be institutionalized.

Participation from all segments of society should be encouraged. A national campaign to raise public awareness of the importance and benefits of natural forest conservation is necessary. The State should fund the NFCP adequately. The reduction in local Government funds, loans and the redeployment of unemployed workers should be solved properly to instill the faith of the local Governments, forest industries and forest workers in the NFCP.

Although natural forest management and protection are very important for many aspects of the national economy and societal well-being, no permanent budget has been set aside for maintaining nature reserves. A policy must be formulated to mandate that the costs of maintaining the natural forest environment and forest protection are a public responsibility. Secure, long-term funds should be provided for these purposes. After years of deliberation, the prospects of establishing an adequate funding system are good. The relevant authorities should capitalize on current favorable public awareness and support, and implement such a policy to draw these funds from the national Government. The 1997 national Government revenue was about 150 billion yuan. If 3 percent would be used for ongoing management costs, 4 to 5 billion yuan per year would be available.

The means to achieve multiple-use forests have not received much attention at the local level. Several important questions are still to be answered:

- Should natural forests be managed for diversity?
- How should the forests be managed to maximize diversity?
- Should mature or over-mature forests be felled and utilized, or left to nature to take its own course?
- How should natural forests with logging bans be managed?
- Should non-timber resources in natural forests with logging bans be utilized?
- If yes, how should these forests be utilized?
- Should tourism, hunting and science education activities be allowed in protected natural forests?

Scientific research and development must support the implementation of the NFCP and find answers to these questions. The Government should fund research and development of non-wood substitutes for the construction, furniture and other wood-based industries to reduce the domestic demand for timber. For example, Longshen New Materials Co., Ltd. in Hunan province, has developed a non-wood substitute that has the appearance, feel and durability of wood. The product has surpassed the performance of some other products from Japan and has passed the scrutiny of the Chinese Commission of Science and Technology. Such products have the ability to substantially reduce the pressure on the natural forests and the Government should encourage their use.

Approximately one-third of the country's wood consumption is for fuelwood. Solving the rural energy problem is an important issue. Rural biogas projects, and the use of coal and electricity should be promoted. Projects to develop wind, solar and geothermal energies should also receive Government support.

Logging bans in the natural forests are not the ultimate goal of the NFCP. Rather, the overall goal is to improve the economic, social and ecological benefits that forests can provide to society.

Logging bans have considerable economic impacts on forest industries. Redeployment of forest workers and support for non-wood and other non-forest-based industries will be important.

Restructuring the economy and developing new industries must also be undertaken. The State should provide special loans and tax breaks to consolidate and expand natural forest protection. The key to effective forest protection in collective forests is support for farmers to find employment with wages comparable to those in forest industries. National commercial banks should use Government funds to provide special loans to farmers to support necessary economic restructuring.

It is also necessary to establish a preferential policy to support the cultivation of fast-growing and high-yielding plantations. Forestry authorities should select appropriate areas, and use good planning, design and technical approaches. Banks should provide special loans accordingly.