



# Situation and prospects for forests and forestry in the APEC region

---

ASIA-PACIFIC ECONOMIC COOPERATION  
FIRST APEC MEETING OF MINISTERS RESPONSIBLE FOR FORESTRY  
6-8 September 2011

Prepared by

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS  
ASIA-PACIFIC NETWORK FOR SUSTAINABLE FOREST MANAGEMENT  
AND REHABILITATION

Beijing 2011

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations or the Asia-Pacific Network for Sustainable Forest Management and Rehabilitation concerning the legal status of any economy, country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The mention of specific companies or products of manufacturers, whether or not these have been patented, does not imply that that these have been endorsed or recommended by FAO or APFNet in preference to others of a similar nature that are not mentioned.

All rights reserved. Reproduction and dissemination of material in this information product for educational or other non-commercial purposes are authorized without any prior written permission from the copyright holders provided the source is fully acknowledged. Reproduction of material in this information product for resale or other commercial purposes is prohibited without written permission of the copyright holders. Applications for such permission should be addressed to: Chief, Electronic Publishing Policy and Support Branch, Communication Division, FAO, Viale delle Terme di Caracalla, 00153 Rome, Italy, or by e-mail to: [copyright@fao.org](mailto:copyright@fao.org)

Printed and published in Beijing, China.  
Asia-Pacific Network for Sustainable Forest Management and Rehabilitation  
Beijing, China

2011 © APFNet/FAO



# Foreword

---

In 2007, APEC leaders set an aspirational goal to increase forest cover in the APEC region by at least 20 million hectares by 2020, as part of a Declaration on Climate Change, Energy Security and Clean Development. Recent experience in the region – where modest gains in overall forest cover have been achieved – suggests this will be a challenging, but realistic, target. It will require a cooperative effort to accelerate afforestation in some economies and to reduce deforestation in others – but, behind these overarching objectives is a need for strong leadership and guidance to implement a wide variety of supporting measures to make the goal achievable.

In line with this focus, in Yokohama in 2010, President Hu Jintao proposed that China host this First APEC Meeting of Ministers Responsible for Forestry to advance region-wide cooperation on forestry. The meeting provides an opportunity for Ministers and senior officials to jointly consider the new challenges – and new opportunities – that are emerging for forestry in Asia and the Pacific. Important topics for Ministerial consideration include improving use of forests and wood resources to enhance livelihoods and promote sustainable development; strengthening forest governance and management to enhance green growth and the provision of the full range of forest goods and ecosystem services; and most importantly, identifying areas where practical cooperation can be enhanced to achieve inclusive growth for forestry in the region.

FAO and APFNet are delighted to contribute this overview paper as a reference for the Ministers' discussions. The meeting represents a hitherto unique coming together of forestry leadership in Asia and the Pacific and will constitute an important milestone in charting future forestry directions in the region. We wish the Ministers every success in their deliberations.

Lu De  
Deputy Director General  
Asia-Pacific Network for  
Sustainable Forest Management  
and Rehabilitation

Hiroyuki Konuma  
Assistant Director-General and  
Regional Representative for Asia and  
the Pacific  
Food and Agriculture Organization  
of the United Nations





# Contents

---

FOREWORD	3
CONTENTS	5
1. Forest resources	6
2. Forest policies and institutions	8
3. Forest products - production, consumption and trade	10
4. Financing and investment in forests and forestry	12
5. Progress towards sustainable forest management	14
6. The outlook for forests and forestry to 2020	16
7. Priorities for the future	18
Annex 1. Regional initiatives and organizations dedicated to promoting sustainable forest management	20
Annex 2: Data tables	22
References	26

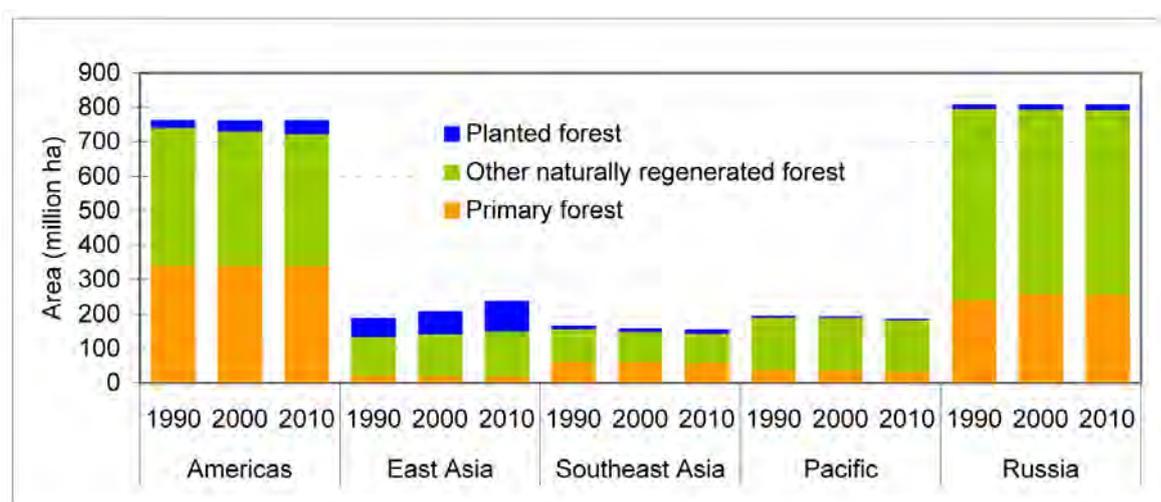
This publication adopts the following subregional groupings for APEC economies:

Americas	Canada, Chile, Mexico, Peru, United States of America
East Asia	People's Republic of China, Hong Kong (China), Japan, Republic of Korea, Chinese Taipei
Pacific	Australia, New Zealand, Papua New Guinea
Russia	Russia
Southeast Asia	Brunei Darussalam, Indonesia, Malaysia, Philippines, Singapore, Thailand, Viet Nam

# Forest resources

APEC economies cover 46 percent of the world's land area and account for 53 percent of its forests. Across the APEC region, forest area increased by 1 percent between 1990 and 2010 with different trends prevailing among the subregions (Figure 1.1). Considerable investments in forest resources have been made in several economies during the past two decades. In China, the increase in forest area of 49.7 million hectares wholly accounted for the huge expansion seen in East Asia's forests. In Viet Nam, an increase in forest area of 4.4 million hectares resulted from similar large-scale investment in forest restoration. In Southeast Asia as a whole, however, 21.2 million hectares of forest were lost, primarily as a result of reductions in Indonesia where forest conversion for industrial agriculture expanded considerably, particularly in the 1990s.

In the Pacific economies, a reduction in forest area of 7.4 million hectares was accounted for by Australia (-5.2 million hectares) and Papua New Guinea (-2.8 million hectares). In Australia, forest loss has resulted primarily from severe drought and fire and is generally not expected to be permanent. In the Americas, reductions in forest cover in Mexico (-5.5 million hectares) and Peru (-2.2 million hectares) were balanced by an increase in the United States of 7.7 million hectares. Forest area changes in other APEC economies, including Russia, were relatively minor.



**Figure 1.1. Forest area by category in APEC economies**

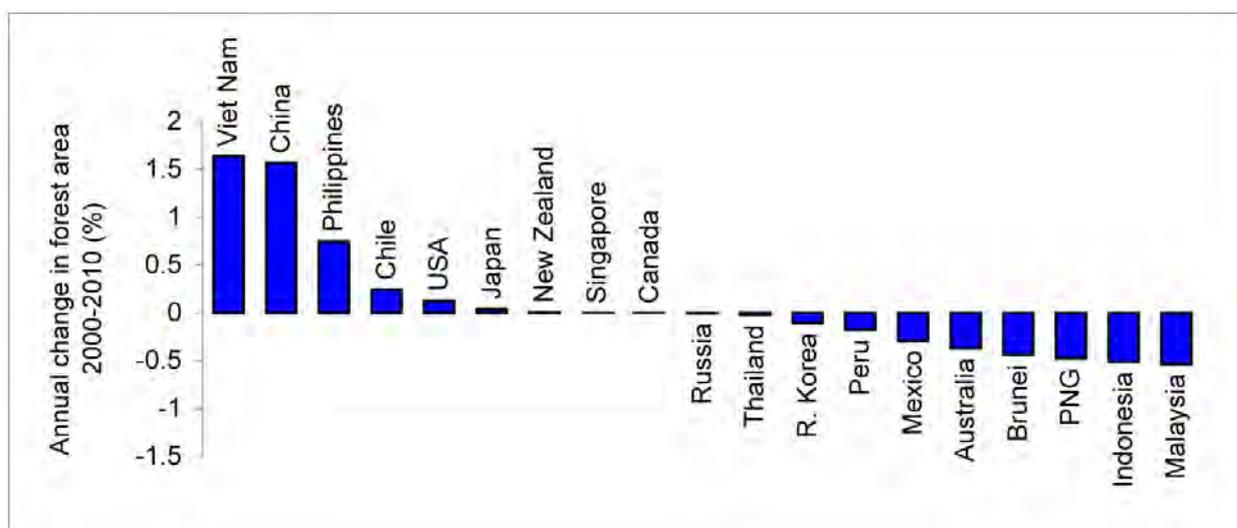
Source: FAO (2010b)

## Box 1: Mountain pine beetle impacts on forest resources in North America

An estimated 17.5 million hectares of forest have been affected by mountain pine beetle in British Columbia and 80 percent of pine forests in the province are expected to be wiped out by 2013. Large areas in Colorado and Wyoming in the United States have also been affected. Climate warming and the overmaturity of stands following years of strict fire control have been blamed for the severity of the attack. Measures are now being taken to control resulting carbon emissions by making use of wood from affected trees in forest products or biofuel applications and by replanting affected areas. At present, the main fear is that the outbreak will spread eastwards into areas of jack pine, a close relative of lodgepole pine, which is favoured by the beetles.

Average annual rates of forest area change in APEC economies between 2000 and 2010 are shown in Figure 1.2. Generally, economies with low forest cover have high rates of afforestation and vice versa. Gains in forest area result predominantly from forest planting whereas losses are mostly from natural forests with attendant implications for biodiversity, especially in the species-rich forests of Southeast Asia where deforestation rates remain highest.

Overall forest cover in the APEC region is increasing modestly, though the rate of increase has slowed in recent years. Between 2005 and 2010, forest cover increased by 1.3 million hectares per annum; below the rate required to meet the APEC goal of increasing forest cover by 20 million hectares by 2020.



**Figure 1.2. Forest cover change 2000-2010**

Source: FAO (2010b)

**Natural forests:** Just under a third of all forests in the APEC region are considered ‘Primary’<sup>1</sup> while 59 percent are considered ‘Other naturally regenerated’.<sup>2</sup> Among APEC economies, primary forest losses between 1990 and 2010 were greatest in Mexico (-5.2 million hectares), Papua New Guinea (-5.1 million hectares), Peru (-2.7 million hectares), the Republic of Korea (-2.6 million hectares) and Indonesia (-2.0 million hectares). In Russia and the United States, increases of 14.8 and 5.3 million hectares resulted from reclassification and forest regrowth respectively.

In China, the increase in the area of other naturally regenerated forests is largely due to natural expansion of forests into abandoned agricultural land while in several other economies it is primarily due to an opening up of primary forests to timber harvesting and other human activities. In Indonesia, extensive conversion of forest to agriculture reduced the area of other naturally regenerated forest by 11 million hectares between 1990 and 2010.

**Planted forests:** Eighty-five percent of the APEC region’s 164 million hectares of planted forest<sup>3</sup> resources are contained within five economies: China (47 percent), the United States (15 percent), Russia (10 percent), Japan (6 percent) and Canada (5 percent). Planted forests expanded by 64 million hectares between 1990 and 2010 with the most dramatic increases in China where 35.2 million hectares were planted. In the Americas, planting rates have also been high with the major additions recorded in Canada (7.6 million hectares), the United States (7.4 million hectares) and Mexico (3.2 million hectares). Significant areas of planted forest were also established in Russia (4.3 million hectares), Viet Nam (2.5 million hectares) and Thailand (1.3 million hectares).

These rapid rates of increase in forest area signify a shift taking place in forestry sectors around the region to forest plantation production of wood, afforestation for desertification control and watershed protection and increasing efforts to reduce deforestation and better manage and conserve natural forests. Great potential exists for increasing production of wood and fibre from planted forests and future investment in afforestation of heavily degraded lands could provide environmental as well as economic benefits (Box 9, p 8).

<sup>1</sup> Naturally regenerated forest of native species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed.

<sup>2</sup> Naturally regenerated forest where there are clearly visible indications of human activities.

<sup>3</sup> Forest predominantly composed of trees established through planting and/or deliberate seeding.

# Forest policies and institutions

Forest policy in most APEC economies has undergone a major transition in the past several decades, involving a shift from timber-focused management to far greater focus on protection, conservation and multiple-use management that gives attention to a wide range of goods and services.

Most APEC economies have developed formal overarching forest policies or policy statements as part of their forest programmes. These invariably centre on principles of sustainable forest management, with notable trends including:

- Increased thrust on ecological aspects with provision of ecosystem services gaining primacy; and
- Emphasis on increased involvement of stakeholders in forest management, including forest policy formulation.

## Box 2: Nature Education Centers (NECs) in Chinese Taipei

To enhance SFM, Chinese Taipei has integrated environmental learning centres with forest parks. These centres help to promote forest conservation in a recreational setting and allow the public to learn about and appreciate nature. Through increased conservation awareness and participation, people can protect the environment and achieve SFM goals.

NECs have diverse educational, research, conservation, cultural and recreational functions. The first centre was established in Dongyanshan Forest Park in June 2007. By 2009, eight units comprised an extensive nature education system in which “people can learn from nature while having fun.”

Climate change-related considerations are increasingly influencing forest sector activities and are set to become firmly embedded in forest policies. Although the focus to date has been towards climate change mitigation activities such as afforestation, reforestation and reducing deforestation and forest degradation, the use of wood energy and harvested wood products to offset emissions from fossil fuels and more carbon intensive materials is gaining prominence.

The United States and Canada in particular have become world leaders in forest-related bioenergy development, the synthesis of biofuels from woody materials and piloting of ‘biorefineries’. In addition to climate change mitigation, adaptation to the predicted impacts of climate change is increasingly a focus. Key areas of interest include maintaining forest health and vitality, managing fire risk and monitoring ecosystem perturbations. The roles of trees and forests in coastal and slope protection are also attracting attention in areas where storm intensity is predicted to increase.

Other key themes included in forest policy include forest rehabilitation (for example in China and Indonesia), poverty alleviation, and Forest Law Enforcement, Governance and Trade (FLEGT). Policy development to protect against forest invasive species and safeguard forest health are a focus of attention in many economies. Wildfire policies including pre-emptive measures to reduce fuel loadings and wildfire risk are a major focus in several economies, including Australia, Mexico and the United States.

## Box 3: Timber production in New Zealand’s natural forests

New Zealand’s natural forests cover 6.5 million hectares and constitute 78 percent of all forests. More than 5 million hectares of natural forests are legally protected in national parks and reserves or under covenant. Since 1993, timber production from natural forests has been strictly regulated under the indigenous forest management provisions in the Forests Act 1949. Harvesting in natural forests may only be carried out in accordance with a government-approved sustainable forest management permit or plan. Natural forest timber may only be processed at registered mills and stringent provisions regulate export of unfinished natural forest timber items. Less than 200 000 hectares of indigenous forests are currently available for harvesting and natural forest timber production has dwindled to around 15 000 m<sup>3</sup> per annum. Nonetheless, New Zealand has an expanding forest industry based on planted forests that currently produce more than 25 million m<sup>3</sup> of timber each year.

FLEGT has become a significant focus in both consumer and producer economies. Illegal logging and associated trade have had not only serious environmental, but also economic and social consequences. Notable policy and legislative responses have included cooperative measures such as development of Voluntary Partnership Agreements between producers and consumers, unilateral measures to improve forest law enforcement, and measures to encourage responsible procurement and create incentives for forest certification.

Other transnational issues are garnering policy attention including ‘exported’ deforestation and resource exploitation, shared water resources and transboundary haze.

In addition to forest policies, a plethora of extra-sectoral policies impinge on forests and forestry. Some overlap; for example, policies dealing with biodiversity, infrastructure development, protection of wildlife and desertification. However, other policies in related sectors – agriculture, industry, energy, rural development, trade, etc – also often heavily influence the forest sector, even though they may be directed at issues far outside the forest sector.

Globalization, economic liberalization and the increasing interconnectedness of economies are reflected in the consistency and universality of many key trends in forest governance. Economic liberalization and a shift towards market-based mechanisms has been a key theme in economies such as China, Peru and Viet Nam. Devolution and decentralization of forest management rights and responsibilities and the spread of participatory approaches are exemplified in economies such as China, Philippines and Viet Nam. In some economies, including Australia, Chile, New Zealand, Malaysia and the United States, mercantile aspects of forestry – including production and processing of wood and non-wood forest products, provision of ecosystem services such as carbon sequestration and hydrological services, and elements of research and development – have variously been commercialized, corporatized and sometimes privatized.

As a result, forest ownership patterns are increasingly diversified, both within and among APEC economies. In economies such as Chile, Japan, Republic of Korea and the United States private ownership of forests predominates. In Papua New Guinea, 97 percent of forests are under customary ownership. In most other economies, forest ownership is mixed, but higher proportions of public forest ownership are the norm. In Brunei Darussalam and Singapore all forest land is publicly owned, while Malaysia (98 percent), Canada (92 percent) and Indonesia (91 percent) also have high rates of public forest ownership. In several economies, however – including Australia, Indonesia and Philippines – management of significant tracts of publicly-owned forests has been devolved to private sector entities or communities. In almost all economies, the involvement of the private sector, farmers, local communities and NGOs is on the increase, creating a dynamic, pluralistic, institutional environment.

#### **Box 4: Canadian Boreal Forest Agreement**

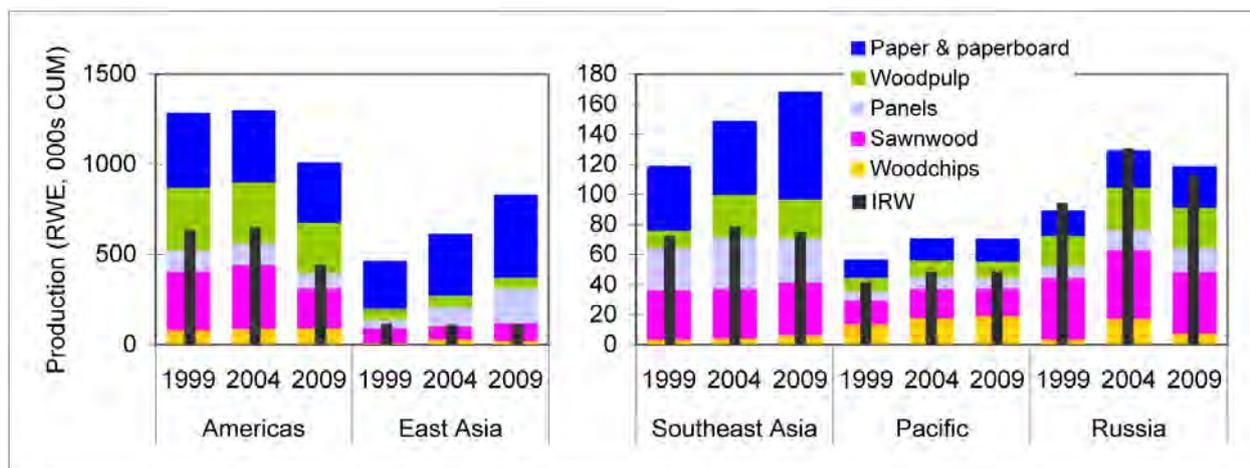
The Canadian Boreal Forest Agreement is a unique collaboration between 21 major Canadian forest products’ companies and nine leading environmental organizations to implement world-leading, on-the-ground sustainable forest management practices that best reflect the principles of ecosystem-based management in boreal forests. The agreement applies to more than 76 million hectares of boreal forests. The agreement encompasses action on climate change, at-risk species protection and protected area development; as well as enhancing the prosperity of the forest sector and promoting marketplace recognition of environmental performance.

#### **Box 5: Forest land allocation in Viet Nam**

Prior to 1994 forests in Viet Nam belonged exclusively to the state and were managed by state-owned entities. More recently, a policy of forest land allocation – to households, individuals, communities and the private sector – has seen ownership of more than 8 million hectares of forests transferred by the state. By 2005, there were more than 1.2 million forest landowners in Viet Nam. This has generally resulted in improved forest management, new livelihood opportunities and contributions to poverty alleviation.

## Forest products - production, consumption and trade

The United States, Canada and China dominate production of forest products in the APEC region and output levels in Southeast Asia, the Pacific and Russia are an order of magnitude lower than in the Americas and East Asia (Figure 3.1). Trends have, however, diverged between the subregions over the past five to six years as broader economic changes have taken place.



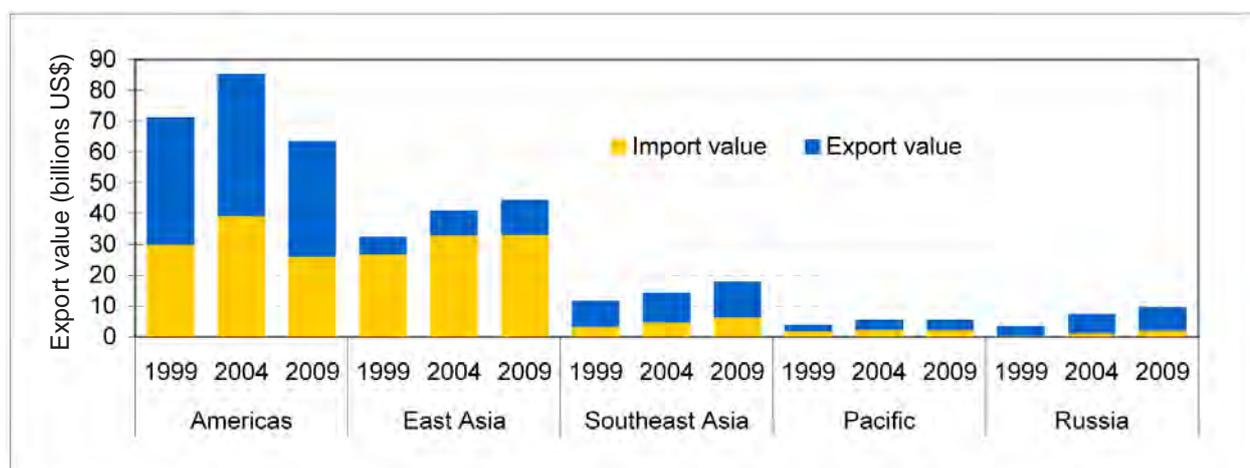
**Figure 3.1. Trends in roundwood equivalent production of forest products by APEC subregion**

Source: FAO (2010b).

Indicating the early onset of the current global financial crisis, significant reductions in production and consumption of forest products were seen in the United States and Canada after 2005. Products used in house building – industrial roundwood (IRW), sawnwood and panels – were more severely affected than woodpulp and paper and paperboard. With continuing turmoil in global financial markets and low growth in the United States' economy, a turnaround may yet be some way off.

In contrast to the situation in North America, production and consumption of the major wood products in the other subregions, except Russia, have been maintained. Production of more highly processed products expanded significantly in East Asia and Southeast Asia as emphasis turned towards higher value products in the face of changing supply-demand balances. In Russia, a softwood log export tax imposed in 2008 resulted in a fall in production and exports as detailed in Box 6.

Trade in forest products in the APEC region increased rapidly between 2002 and 2008 with average annual gains of 6.4 percent by value. Between 2008 and 2009, however, a 20 percent reduction was recorded, much of which was associated with North American markets (Figure 3.2).



**Figure 3.2. Trends in import and export values of forest products by APEC subregion**

Source: FAO (2011)

In recent years, the most significant shifts in forest products' trade in the region have centred on China and the United States. China, the largest APEC importer of forest products, accounted for 28 percent of the region's imports by value in 2009 with the United States, Russia and Canada being the main suppliers. The economic crisis has had limited impact on China's imports, which fell by only 6 percent in value between 2007 and 2009. By contrast, imports to the United States, the second biggest importer in the region, fell by 41 percent, indicating a steep decline in United States' demand, which also impacted China's exports.

Japan's imports of primary wood products also fell steeply between 2007 and 2009. Since 2000, China has superseded Japan as Asia's foremost importer of wood products. Rebuilding in the wake of the Tōhoku earthquake will likely drive higher demand in Japan.

With the United States' housing and construction markets remaining depressed, China seems set to consolidate its position as a key consumer of North American primary forest products and exporter of low-cost secondary products. Continued recession in the United States could, however, also slash demand for processed products, with rebounding impact on United States' exports of primary wood products.

Notwithstanding currency realignments, one possible source of alteration to trade flows could potentially result from implementation of the 2008 amendment to the United States' Lacey Act. The amendment makes it an offence in the United States to trade in any wood product sourced in contravention of the laws of any other economy.

Although most western economies are still emerging from recession, many commodity prices, including for some wood products, are high relative to recession – and even pre-recession – levels.

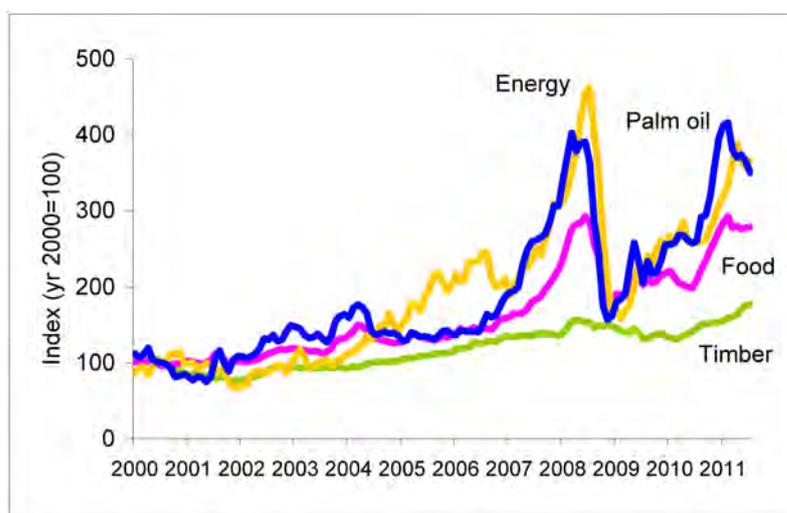


Figure 3.3 Commodity price boom

Source: World Bank (2011)

Primary drivers of this price boom include: (i) Asia's strong demand from processing facilities and domestic consumer markets; (ii) high energy prices adding to processing and delivered costs; and (iii) a variety of supply side 'shocks'.

#### Box 6: Russian log export tax

In April 2008, Russia imposed a 25 percent softwood log export tax, causing log exports to decline from a peak of 51 million m<sup>3</sup> in 2006, to 22 million m<sup>3</sup> in 2009. The shortfall in Asian markets has mainly been met by exporters in North America and New Zealand and log prices have increased significantly. Russia's imminent accession to the World Trade Organization is, however, expected to be accompanied by a significant reduction in the log export tax, adjusting market dynamics accordingly.

A protracted period of strong prices for wood producers in many APEC economies seems likely. If the economic recovery gathers widespread momentum, increasing demand for wood products may push prices even higher. Conversely, the ongoing risk of a double-dip recession and changes in the Russian log tax rate could have negative price impacts.

High prices for commodities outside the forest sector may also impact on forests. Current high prices for food, palm oil, rubber, etc., will increase demand for agricultural land and – allied with high log prices – extend the economic frontier deeper into marginal forest lands.

## Financing and investment in forests and forestry

Measures to facilitate increased investment in forests and forestry will be critical components in achieving APEC's aspirational goal to increase forest cover in the APEC region by at least 20 million hectares by 2020.

In economies where forests are mainly publicly-owned and managed, government investments in afforestation and reforestation are likely to be key drivers of forest expansion. In this instance, the extent of political will and the success of forestry advocacy in garnering appropriations from government budgets will likely dictate success in increasing forest cover. For example, Box 7 notes the success of China's six key afforestation programmes. In almost all economies where forest recovery has occurred, massive public sector investment – or the creation of strongly enabling conditions for private investment – have been primary drivers. Public afforestation and reforestation programmes will continue to be a vital component of forest area expansion in APEC economies.

In economies where non-government ownership is significant, private investment in afforestation will be an important component in increasing forest cover. Private investment in forestry (as elsewhere) is largely governed by a balancing of risks and rewards. Many APEC economies have used (and some continue to use) direct and indirect incentives – including provision of planting materials, land grants, subsidies, concessionary loans, tax concessions, etc. – to tilt this risk-reward balance in favour of forestry investment. Generally, however, the establishment of an enabling investment environment for the private sector – such as through clear and secure property and resource rights and coherent and stable policies – has proven to have far greater influence on forest investments than direct incentives. Conversely, if the commercial forestry environment exacerbates risk – for example, through weak governance, excessive regulation, weak law enforcement, lack of strong and enforceable property rights and arbitrary changes in policies and procedures – investment will be discouraged.

### Box 7: China's six key afforestation programmes

In the late 1990s, China started the Six Key Forestry Programmes (SKFP) to promote afforestation. The six programmes commenced as individual programmes in 1998, and were reorganized into the SKFP during the 10th Five-Year Plan. With one exception, the initial purposes of the SKFP were to protect natural forests, address water and soil erosion problems, and protect wildlife and endangered species. The Programme for Fast-Growing and High-Yielding Forest in Key Areas (FGHYFP) mainly targeted enhancing wood supplies. All of the programmes used afforestation as their main thrust, backed by a number of supporting policies and activities. To 2005, the total area afforested under the SKFP, including areas planted and naturally regenerated, was 58 million hectares, with total expenditure of US\$22 billion.

In the ten years to 2010, China's total investment in forestry, from all sources, was US\$92.5 billion.

Source: FAO (2010a)



A variety of emerging mechanisms and investment vehicles offer potentially new and innovative ways of financing forestry. Box 8 describes some recent developments in private sector timberland investment. While timber production remains by far the largest revenue source from forests – and constitutes a dominant source of forest financing – new potential revenue streams from payments for provision of ecosystem services – most notably carbon financing – have also emerged.

A variety of discrete carbon trading mechanisms encompassing forestry are developing in APEC economies. New Zealand implemented an Emission Trading Scheme (ETS) in 2008 with forestry being the first sector to which the scheme was applied. In North America, state and provincial efforts to develop carbon trading mechanisms include the Western Climate Initiative (WCI) (seven

US states and four Canadian provinces), which aims to commence implementation of a cap-and-trade programme in January 2012, and the Regional Greenhouse Gas Initiative (ten eastern US states). The WCI initiative includes the State of California, which aims to establish what will be the largest carbon emissions' market in North America and the second largest in the world behind the EU ETS. Various other APEC economies, including Australia (Clean Energy Bill 2011), Japan (Tokyo Metropolitan Government), China (several cities), and Republic of Korea (ETS Bill 2011) are working to develop carbon trading mechanisms. These efforts signal prospects for eventual development of a loosely integrated Asia-Pacific carbon market and, more generally, prospects for financing forestry investment. To date, however, the broad inclusion of forests in carbon markets has proven extremely challenging and some caution is warranted in assessing future investment growth in forest carbon.

### Box 8: New forest investment vehicles

In recent years a variety of new forest investment vehicles have emerged, particularly in North America.

- Timber Investment Management Organizations (TIMOs) have increased from three in the early 1980s to more than 25 in 2007.
- A class of tax-efficient, publicly-listed vehicles known as Timberlands Real Estate Investment Trusts (T-REITs) has grown markedly in the past decade. The world's largest private planted forest owner (Plum Creek) is a T-REIT. Total investments by TIMOs and T-REITs in 2007 are estimated to be US\$50 billion.
- Sovereign Wealth Funds (SWFs) are another emerging source of funds that could play a serious role in forest investment (Neilson 2007). These are state-owned investment funds; examples include Hong Kong Monetary Authority Investment Portfolio and Government of Singapore Investment Corporation. Total assets under management by SWFs in 2010 are estimated at US\$4.2 trillion.

Reductions in deforestation will also contribute to achieving APEC's regional target. For most APEC developing economies – including Indonesia, Mexico, Papua New Guinea, Peru, Philippines and Viet Nam – Reducing Emissions from Deforestation and Forest Degradation (REDD) with the inclusion of conservation, sustainable management of forests and enhancement of forest carbon stocks (REDD+) offers prospects for significant North-South flows of forest financing. Initial commitments to REDD financing at the United Nations Framework Convention on Climate Change meeting in 2009 (COP15) totalled US\$3.5 billion.

Payments for various other ecosystem services also offer some prospects for financing forest investment through various markets and mechanisms including ecotourism, payments for upstream water protection, biodiversity conservation and bioprospecting rights, debt-for-nature swaps and similar approaches. While pilot schemes are being implemented in many economies, widespread adoption of many of these mechanisms has proven elusive.

### Box 9: Investments in reforestation and planted forest production

Planted forests in APEC economies total 164 million hectares and account for more than 60 percent of the global total. Current planted forest wood production potential in the region is estimated at more than 700 million m<sup>3</sup>, approximately 90 percent of the region's demand for industrial wood.

Increasing areas and improved management of planted forests could significantly reduce demands for timber from natural forests, reducing forest degradation, while also providing green building materials with a carbon footprint much smaller than substitute products such as concrete, steel and aluminium.

Millions of hectares of grassland and heavily degraded forests in the region may become economically viable sites for planted forest development and assisted natural regeneration if newly developed financing mechanisms prove workable.



# Progress towards sustainable forest management

Seven thematic elements, derived from regional and international processes on criteria and indicators for sustainable forest management (SFM), are accepted as key components of SFM:

- (1) *Extent of forest resources* – maintaining significant forest cover and stocking;
- (2) *Biological diversity* – its conservation and management;
- (3) *Forest health and vitality* – reducing fires, pollution, invasive species, pests and diseases;
- (4) *Productive functions* – maintaining production of wood and non-wood forest products;
- (5) *Protective functions* – in relation to soil, hydrological and aquatic systems;
- (6) *Socio-cultural and economic functions* – support provided to the economy and to society;
- (7) *Legal, policy and institutional framework* – to support the above themes.

The 2010 FAO Global Forest Resources Assessment (FAO 2010) used trends in variables connected with these components to assess progress towards SFM as shown for the APEC region in Table 5.1.

At the regional level significant positive trends are evident in forest designated for conservation and protection, the area of planted forest, wood removals and the area of forest under private ownership. No strongly negative trends are evident at the regional level. Looking at different aspects of SFM in the subregions, trends are also predominantly positive or stable.

These results present a positive picture of sustainable forest management in APEC economies. A key trend has been an increase in the extent of forest resources in East Asia, and in China in particular, where huge investments in forest production, forest conservation and forest protection have been made over the past two decades.

Some imbalances do, however, exist at subregional levels, particularly in relation to reduction in forest area, falling production and forest degradation as indicated by declining growing stock and carbon stock. The mix of economies within each subregion, and in Southeast Asia in particular, also hides underlying changes in individual economies.

In Southeast Asia, negative trends in growing stock and carbon stock demonstrate continuing and widespread degradation of forest resources. There are also significant differences among economies in forest resource trends. In Indonesia and Malaysia, the quality and extent of forest resources are declining due to high demand for land and timber (Box 10). Contrasting trends are evident in Viet Nam and the Philippines, where public and private investments are revitalizing forest resources.

Across the region, benefits to biodiversity resulting from increases in the area of forest designated for conservation have been tempered by continuing reductions in the extent of primary forests in many economies. Reductions have been particularly rapid in Viet Nam, Republic of Korea, Papua New Guinea and several other economies where statistics have not been recently updated.

## **Box 10. Forest degradation, climate and ecosystem stability in Kalimantan**

In Kalimantan, Indonesia, protected lowland forests declined by more than 2.9 million hectares between 1985 and 2001 and remaining forests are suffering the increased impacts of a series of linked factors. Regeneration of dipterocarp trees, which constitute more than 90 percent of the commercial timber, has been disrupted by logging, forest clearance, reduction of the extent of intact stands of dipterocarps and resulting increase in intensity of seed predation. The cycle of logging, forest drying, use of fire for clearing forest and increasing frequency of El Niño dry periods has established successive rounds of ecosystem degradation. Climatic changes may also be affecting seed production in dipterocarps, which is likely to further exacerbate impacts on ecosystem health.

Sources : Curran *et al.* (1999); Curran *et al.* (2004).

While forest resources have been degraded in several developing economies around the region, China has imposed logging bans and reduced the area of forest open for production. This has largely resulted from shifts in policy towards production of ecosystem services in response to environmental catastrophes. As this has taken place, wood imports by China from many wood-exporting economies within APEC have increased to supply rapidly increasing demand. Several other economies in the region, including the Philippines, Viet Nam and Thailand, also have full or partial logging bans aimed at protecting natural forests in particular.

As resources are being increasingly degraded or protected in developing economies, planted forests have begun to expand. Rates of increase have been highest in Mexico, Brunei and Viet Nam, but in terms of area, the increase in China, at 2.3 million hectares per annum between 2000 and 2010 outweighs increases in all other economies put together. Wood removals in China also increased up to 2005 following a steep decline between 1990 and 2000 after logging bans were enforced. Removals have increased in other subregions, most notably Russia, where an increase of over 6 million cubic metres per year between 2000 and 2005 increasingly supplied rising demand in China. In Papua New Guinea, wood removals have also increased rapidly while the area of primary forest has fallen.

In contrast to the overall trend, significant reductions in removals have been seen in Indonesia, Mexico and, most importantly, the United States where removals fell by almost 3 million cubic metres per year between 2000 and 2005 as a result of forest protection measures and falling demand.

**Table 5.1. Trends towards SFM in APEC subregions: absolute and annual percentage changes in component variables, 2000-2010**

	Americas		East Asia		SE Asia		Pacific		Russia		APEC		UNITS
	Annual change		Annual change		Annual change		Annual change		Annual change		Annual change		
	%	Absolute											
<b>EXTENT OF FOREST RESOURCES</b>													
Area of forest	0.0	105	1.4	2 990	-0.2	-354	-0.4	-702	0.0	-18	0.1	2 021	1 000 ha
Growing stock of forests	0.7	591	1.6	294	-1.1	-226	0.0	0	0.2	125	0.4	784	M m <sup>3</sup>
Carbon stock in forest biomass*	0.2	111	1.6	114	-1.2	-235	-0.3	-34	0.1	34	0.0	-50	MT
<b>BIOLOGICAL DIVERSITY</b>													
Area of primary forest	0.0	-87	-0.3	-63	-0.4	-217	-1.0	-352	-0.1	-165	-0.1	-883	1 000 ha
Area of forest designated for conservation	1.0	1 173	7.6	465	0.5	140	1.8	483	0.8	138	1.2	2 399	1 000 ha
<b>PRODUCTIVE FUNCTIONS OF FOREST RESOURCES</b>													
Area of forest designated for production	-0.4	-487	-2.2	-2373	0.1	93	0.5	50	0.1	435	-0.3	-2 282	1 000 ha
Area of planted forest	2.5	882	3.0	2 284	2.0	239	2.2	73	1.0	163	2.5	3 641	1 000 ha
Total wood removals**	-0.2	-1 340	2.1	1 658	0.9	372	2.8	1 357	5.2	6065	0.8	8 112	M m <sup>3</sup>
<b>PROTECTIVE FUNCTIONS OF FORESTS</b>													
Area of forest designated for protection	-0.2	-12	4.4	2 757	-0.3	-90	5.0	2	0.1	105	1.8	2 763	1 000 ha
<b>SOCIO-ECONOMIC FUNCTIONS OF FOREST RESOURCES</b>													
Area of forest under private ownership**	0.1	298	0.7	5 450	0.6	85	-1.6	-1 053	-	0	1.2	4 780	1 000 ha

\* Forest carbon in living (above- and belowground) biomass; \*\* Trend between 2000-2005.

Colour key: Positive change >0.5% per annum No major change Negative change <-0.5% per annum

Source: FAO (2010b)

The general picture is of a sector at different stages of development around the region with changing societal demands shifting the balance between production and protection. In the less-developed economies, forest management is transforming alongside society as infrastructure expands and demand for land and export commodities increases. Among the more advanced economies, forest cover has generally stabilized and increasing spatial separation of the production and protection roles of forests has been seen. Between these two extremes – in China and Viet Nam for example – vigorous programmatic approaches are helping to rejuvenate the forestry sector following years of overexploitation.

## The outlook for forests and forestry to 2020



Even in the event of significant setbacks, there is little doubt that the global economy will resume a solid upward growth trajectory during the forthcoming decade. At the same time, the total population in APEC economies is forecast to increase by more than 150 million people to 2.9 billion in 2020. This combination of population and economic growth is expected to drive significant increases in demand for forest goods and services, and for goods from competing land uses.

Key drivers of deforestation and forest degradation will include demands for agricultural land for food and biofuels, demands for wood products and hydro-power and mining developments. At the same time, high prices for wood products and biofuels are likely to exert positive pressures to enhance wood and biomass supplies. Other drivers of afforestation and forest rehabilitation will include demands for ecosystem services – especially carbon sequestration, hydrological services, biodiversity conservation and measures to arrest and control desertification – and increasing concern for environmental values among increasingly affluent consumers.

The impacts of increasing populations on demands for wood and land will be partially tempered by increasing rates of urbanization in most developing economies as industrial and service sectors expand. Opportunities for increased incomes and improved livelihoods are likely to drive migration to urban areas and reduce direct pressures on forests. In several economies, remittances from overseas workers are helping to support rural livelihoods, including promoting forest expansion and wood production on marginal agricultural lands.

In terms of wood supplies, by 2020 the vast majority of wood used in the APEC region will be sourced from planted forests. Wood supplies from natural forests will continue to be important for economies such as Canada, Indonesia, Papua New Guinea and Russia, but will continue to decline as a proportion of overall production.

### Box 11: Green economic development

Green economy is a model of sustainable development based on the pursuit of an inclusive approach that addresses social and ecological problems. Centred on renewable resources, it maintains ecosystem services and enhances inter- and intra-generational equity. Key aspects of green economies include:

- Meeting basic needs for all;
- Minimizing inequalities;
- Optimizing material and energy efficiency;
- Enhancing ecosystem functions and services;
- Eliminating adverse social and environmental impacts of development.

The green economic model implies that high GDP growth should increasingly be examined in the context of human and natural resource exploitation and increasing social conflicts. The following areas are of primary significance for forestry:

- Forests as a source of renewable energy and means of reducing carbon emissions;
- Wood as a green building material, replacing energy-intensive materials like steel, aluminium, bricks and concrete;
- Production of a wide range of green products, especially through biorefineries;
- Revitalization of rural economies through investments in rebuilding forest capital and creation of significant new employment.

Development of new products and new markets will be an ongoing theme for forestry in APEC economies. Persistence of high energy prices and climate change concerns will focus attention on bioenergy as a substitute for fossil fuels. High technology approaches to producing ethanol from forest biomass through second-generation processes are under development, while wood pellets are already emerging as a significant export industry for economies such as Canada and Australia.

The global agenda for forestry will continue to be dominated by climate change. Efforts to establish formal carbon trading mechanisms will continue to gather momentum, notwithstanding that these pioneering efforts face significant challenges and will undoubtedly experience set-backs. REDD+ will increase in importance for developing APEC economies, though progress in implementation is likely to be slow and potentially frustrating in the immediate future.

Increasing interconnectedness of economies will continue to be manifested across wide-ranging aspects of forestry including:

- Trade patterns will increasingly encompass ethical values, such as social equity, sustainability and legality;
- Market efficiency will be enhanced through promotion of free trade, though more subtle protective measures will continue to emerge;
- Increasing internationalization of forestry investment;
- More development of multilateral collaborative solutions to global and transnational challenges; and
- Increasing international scrutiny of all economies' social, environmental and economic practices and progress towards sustainable forest management.

#### **Box 12: Indonesia-Norway REDD+ partnership**

In 2009, Indonesia announced it would reduce greenhouse gas emissions by 26 percent by 2020, but that reductions up to 41 percent would be achievable if international help was forthcoming. The major contributor in achieving these targets will be improved management of peat and forests.

In 2010, Indonesia and Norway signed a Letter of Intent establishing a bilateral REDD+ partnership. Indonesia agreed to take systematic and decisive action to reduce its forest and peat-related greenhouse gas emissions, whereas Norway agreed to support those efforts by making available up to one billion US dollars on a payment-for-results basis over the next several years.



The Sydney Declaration on Climate Change, Energy Security and Clean Development, adopted at the 15th APEC Economic Leaders' Meeting in 2007, set a goal of increasing forest cover in the region by at least 20 million hectares by 2020. In the period 2005-2010, forest cover increased in eight APEC economies: China, Chile, Japan, Philippines, Russia, Thailand, the United States and Viet Nam. The sum of forest area increase in these eight economies was 17.3 million hectares. These gains were partially negated by forest area losses in most other APEC economies, totalling 10.8 million hectares. The annual net regional gain in forest cover in the five-year period was 1.3 million hectares; indicating that a continuation of current trend rates will result in a shortfall of 7 million hectares in relation to the 2020 target. However, between 2000 and 2005 a faster rate of forest cover increase was recorded (2.7 million hectares per year) than in more recent years indicating that the APEC goal is clearly attainable. Efforts to reduce deforestation and increase rates of afforestation rates will, however, need to be redoubled if the target is to be reached.

# Priorities for the future

APEC economies are passing through divergent development paths with high and low economic growth rates and varying levels of social and ecological sustainability. For most economies, accomplishing high growth rates remains the priority. However, increasing social and ecological vulnerability is encouraging a shift to 'green' development. Key related priorities are listed below.

## ***Rebuilding the natural resource base and conserving existing resources***

Although the APEC region is unlikely to face wood shortages in the near future, rebuilding the natural resource base and conservation of existing resources will remain a high priority. As economies develop, the demand for land and for wood is expected to increase considerably. Consequently, more forests are likely to be cleared, as is already happening in several economies in the region. Forest resources in economies where governance is weak are especially at risk. Conserving carbon stocks, particularly in peat swamp forests and mangrove areas, should be a key priority in global attempts to reduce greenhouse gas emissions. At the same time, afforestation, reforestation and rebuilding the natural resource base can provide employment during the current period of global economic recovery.

Heightened awareness of climatic anomalies and seeming increases in natural disasters around the region are likely to move sentiment towards further support for SFM in the coming years. With demand for wood and timber remaining high, the challenge will be to maintain flows of forest products while sustaining or increasing production of ecosystem services.

## ***Conserve forest biodiversity***

Several economies within APEC contain particularly high proportions of the world's biodiversity, and policies and actions that affect forests in these economies and others will have significant impact on the survival of thousands of species (Box 13).

As well as deforestation and forest degradation, huge demands for wildlife and plants for food, medicine and other uses will mean a constant drain on populations of marketable species. In particular, there is a need to increase awareness amongst consumer populations of the damage done by continued trade in endangered species, and products from endangered species, such as tigers, mahogany, parrots and snakes.

Containing biodiversity losses will take a multinational and multidisciplinary effort involving public awareness, strengthened forest law enforcement efforts, improved financing for protected areas and implementation of environmental safeguards in conjunction with development activities.

## ***Policies and institutional changes are essential***

Policies, legislation and institutional arrangements should empower people to undertake individual and collective actions, helping to resolve conflicts and establish trade-offs among competing objectives. Issues requiring immediate attention in several economies include:

### **Box 13: Biodiversity crisis in Southeast Asia and Papua New Guinea**

Much of Southeast Asia's considerable biological diversity is contained within forests, while Papua New Guinea is home to an estimated 6-7 percent of the planet's species. Forestry-related decisions and activities therefore have considerable repercussions on biodiversity in these economies.

In combination with climate change and the increasing frequency of El Niño events, forest degradation and fragmentation can lead to increasing chances of catastrophic fire and species losses. The wildlife trade has reached unprecedented levels in Southeast Asia and it is estimated that between 13 percent and 42 percent of species will be lost by 2100, at least half of which may represent global extinctions.

In Papua New Guinea, it is estimated that 83 percent of commercially accessible forests will have been cleared or degraded by 2021 if current trends continue – with significant repercussions on biodiversity and the sustainability of resource extraction.

Sources : Sodhi *et al.* (2004); Shearman *et al.* (2008)

- Provision of secure tenure as a fundamental means of empowering local communities and individuals and motivating activities to address natural resource degradation and poverty. In several economies, government devolution of ownership or management responsibilities for forests would promote better stewardship and more efficient provision of goods and services.
- Reform of public sector agencies with emphasis on facilitation and regulatory functions and shifting managerial functions to the private sector, including individuals and communities.
- Policies and legislation should provide a stable enabling environment which rewards ‘good’ behaviours and penalizes ‘bad’. Excessive bureaucracy and endemic corruption remain significant impediments to forestry development in several economies.

### ***Governance***

There is a need to strengthen governance in several APEC economies; both generally and within the forestry sector. Attention to reducing or eradicating corruption will be important in improving investor confidence and creating efficient industries. More broadly, better governance will be a prerequisite to continuing to export to high paying markets in the United States and the European Union in particular. Significant efforts will be required to build appropriate administrative systems and, under certain circumstances, switch wood and timber suppliers where existing sources do not meet with new requirements. Governance standards will also be of paramount importance in attracting carbon financing. Economies with poor governance will be severely disadvantaged in competing for carbon funds, with money gravitating away from more risky investments.

### ***Climate change adaptation***

The seeming increase in the frequency of extreme climatic events, whether human-induced or otherwise, draws attention to the need for improvements in forest management to increase resilience to invasive species, devastating wildfires and similar destructive elements (Box 14). In several APEC economies, forest fragmentation and degradation have increased vulnerability to disturbance. At the same time, greater human activity in forest areas has increased the incidence of fire while expansion of international trade has allowed invasive species to spread. Maintaining the health and vitality of forests through regular monitoring, replanting, thinning and improved fire management can help increase forest resilience.

#### **Box 14: Fire management**

Increased opening and drying of forests, increased fuel loads, changing weather patterns and increasing frequency of anthropogenic ignitions are raising the frequency of devastating fires in the region. In relation, there is a strong need to improve fire management to avoid large losses of forest and potential ecosystem collapse.

Fire management can be improved through information and awareness campaigns, faster fire responses and improved legislation. Depending on the nature of local fire ecology, better management of forests to reduce fuel loads can reduce the intensity of forest fires and consequent carbon emissions. Monitoring and communication efforts are also necessary, as well as specific management practices at local levels.

### ***Investments to improve science and technology***

Enhancing social and ecological sustainability requires major improvements in science and technology. The focus is, however, not so much on research, but translating existing knowledge into technologies that use energy and materials more efficiently. Capacity development in the past has largely focused on economic profitability, while social and ecological dimensions have been ignored. In the context of mounting social and ecological problems, science and technology developments should focus on enhancing resource and energy efficiency, including increased use of renewables.

### ***Investments in development and leadership***

Greater availability of resources, access to intellectual capital and higher levels of development mean that most new developments in forestry – in policy, practices, education, science and technology – are pioneered by economies in either the APEC or European blocs. For global forestry to continue to move forward and meet emerging challenges it is critical that APEC economies continue to invest in new developments and provide leadership, guidance and assistance to less-developed economies. Particular attention needs to be given to enhancing knowledge and technology transfer to help less-developed economies contribute to mitigation of transnational problems and meet globally-agreed targets.

## Annex 1. Regional initiatives and organizations dedicated to promoting sustainable forest management

A range of regional agreements and instruments are important in promoting forestry cooperation in the APEC region. Among the most significant are:



### Asia

The *Association of Southeast Asian Nations (ASEAN)* has established several technical networks and working groups that relate strongly to forestry, including working groups on nature conservation, biodiversity, climate change, implementing international forest policy processes and pan-ASEAN timber certification.

The *Asia Forest Partnership (AFP)* was launched in 2002 as a partnership for sustainable development based on the Rio Declaration principles and the values expressed in the Millennium Declaration. AFP set itself the task of information sharing, dialogue and joint action to promote sustainable forest management.

The *Asia-Pacific Forest Invasive Species Network (APFISN)* is a regional forest invasive species network under the auspices of the APFC.

The *Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet)* is an open regional organization promoting and improving sustainable forest management and rehabilitation in the Asia-Pacific region through capacity-building, information-sharing, regional policy dialogues and pilot projects.

The *Heart of Borneo Initiative (HoBI)* provides a framework for cooperation on the HoB and commits Indonesia, Malaysia and Brunei Darussalam to preparing strategic and operational plans with joint road maps for realizing the 'One Conservation Vision' for the HoB.

The *Mekong River Commission (MRC)* works to facilitate joint management of the member economies' shared water resources and development of the economic potential of the Mekong River.

The *Northeast Asian Forest Forum (NEAFF)* is a non-governmental organization for the restoration of degraded ecosystems and the conservation of forests in Northeast Asia.

### Pacific

The *Secretariat of the Pacific Community* is an international organization that provides technical and policy advice and assistance, training and research services, including on forestry, to its Pacific Island members.

#### Box 15: Regional Forestry Commissions

FAO has established six Regional Forestry Commissions that cover the world's major geographic regions. The commissions provide forums for discussing and addressing forestry issues at regional levels. Three commissions encompass the APEC region:

- The Asia-Pacific Forestry Commission (APFC);
- The North American Forest Commission (NAFC); and
- The Latin American and Caribbean Forestry Commission (LACFC).

## Latin America

### *Amazon Cooperation Treaty Organization (ACTO)*

The Amazon Cooperation Treaty (ACT), signed in 1978, is a legal instrument that recognizes the transboundary nature of the Amazon. The main purpose of the ACT is to promote the harmonious development of the Amazon while incorporating Amazonian territories into respective economies, an essential condition for reconciling economic growth with environmental preservation.

The *Latin American Network of Forest Education (RELAFOR)* supports better teaching and learning of forestry in the region. It links universities and education academies to increase knowledge and local capacities through the exchange of experiences, promotion of dialogue, dissemination of information and technical collaboration using existing technical and financial resources.

The *Latin American Technical Cooperation Network on National Parks, other Protected Areas and Wildlife (REDPARQUES)* supports the management of forests in protected areas and of wildlife. The purpose of this network is to more effectively share available technical knowledge and experience in the region.

The *Latin American Technical Cooperation Network on Watershed Management (REDLACH)* supports watershed management and the promotion of sustainable development in Latin America and the Caribbean, facilitating the exchange of information and promoting technical cooperation between economies.

### **Box 16: International Tropical Timber Agreement**

While not a purely regional mechanism, the International Tropical Timber Agreement (ITTA) is of great importance to forestry in APEC economies. The ITTA focuses on the world tropical timber economy and the sustainable management of the resource base, simultaneously encouraging the timber trade and the improved management of the forests.

The *Tarapoto Process* is a coordinated effort between economies to define a set of criteria and indicators for sustainable forest management, which reflect the specific features of the region's ecosystems as well as their social and cultural factors. The main purpose is to help achieve sustainable forest management and sustainable development.

## Other initiatives

A range of global, multilateral, bilateral and other organizations, processes and initiatives dealing with forestry are active in the APEC region. International organizations including the Food and Agriculture Organization of the United Nations (FAO), the International Tropical Timber Organization (ITTO) (Box 16), the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP) and the United Nations Forum on Forests (UNFF) have roles and interests that encompass forestry, natural resources and the environment. The World Bank and Asian Development Bank have important forestry financing roles. APEC members also participate in a wide range of processes associated with forest-related international conventions and agreements; for example the Convention on Biological Diversity (CBD), UN Convention to Combat Desertification (UNCCD) and the UN Framework Convention on Climate Change (UNFCCC). Specialized international agencies and programmes that focus on specific aspects of forestry include the Center for International Forest Research (CIFOR), the Forest Carbon Partnership Facility (FCPF), the International Model Forest Network (IMFN), the International Network for Bamboo and Rattan (INBAR), the World Conservation Union (IUCN), Mangroves for the Future (MFF), the The Center for People and Forests (RECOFTC) and UN-REDD. Examples of multilateral programmes include Lowering Emissions in Asia's Forests (LEAF) and Responsible Asia Forestry and Trade (RAFT). A wide range of international non-governmental organizations are also active in forestry in the APEC region.

## Annex 2: Data tables

Table 1: Basic data for APEC economies

Economy	Land area	Population 2008				GDP 2008	
	Total (1 000 ha)	Total (1 000)	Density (Popn/ km <sup>2</sup> )	Annual growth rate	Rural (% of total)	Per capita (PPP) (US\$)	Annual rate of growth (%)
Australia	768 228	21 074	3	1.1	11	38 784	3.7
Brunei Darussalam	527	392	74	1.8	25	51 300	-1.5
Canada	909 351	33 259	4	1.0	20	39 078	0.4
Chile	74 880	16 804	22	1.0	12	14 436	3.2
People's Republic of China	938 822	1 314 726	140	0.6	57	5 971	9.0
Hong Kong, China*	110	7 122	6 757	0.4	0	44 600	2.3
Indonesia	181 157	227 345	125	1.2	49	3 994	6.1
Japan	36 450	127 293	349	-0.1	34	34 129	-0.7
Republic of Korea	9 873	48 152	488	0.4	19	27 658	2.2
Malaysia	32 855	27 014	82	1.7	30	14 215	4.6
Mexico	194 395	108 555	56	1.0	23	14 570	1.8
New Zealand	26 771	4 230	16	0.9	14	27 260	-1.1
Papua New Guinea	45 286	6 577	15	2.4	88	2 180	6.6
Peru	128 000	28 837	23	1.2	29	8 509	9.8
Philippines	29 817	90 348	303	1.8	35	3 513	3.8
Russia	1 638 139	141 394	9	-0.4	27	15 923	5.6
Singapore	69	4 615	6 698	2.9	0	49 321	1.1
Chinese Taipei*	3 598	23 071	715	0.2	-	33 000	0.7
Thailand	51 089	67 386	132	0.6	67	8 086	2.5
United States	916 193	311 666	34	1.0	18	46 350	0.4
Viet Nam	31 008	87 096	281	1.1	72	2 787	6.2
<b>TOTAL</b>	<b>5 941 738</b>	<b>2 696 956</b>	<b>45</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

Sources: FAO (2010)

\* = CIA (2011)

**Table 2: Extent of forest and other wooded land**

Economy	Land area					
	Forest		Other wooded land		Other land (1 000 ha)	
	1 000 ha	% of land area	1 000 ha	% of land area	Total	of which with tree cover
Australia	149 300	19	135 367	18	483 561	-
Brunei Darussalam	380	72	50	9	97	-
Canada	310 134	34	91 951	10	507 266	-
Chile	16 231	22	14 658	20	43 991	0
People's Republic of China	204 740	22	102 012	11	632 162	-
Hong Kong, China*	19	17	-	-	-	-
Indonesia	94 432	52	21 003	12	65 722	-
Japan	24 979	69	0	0	11 471	-
Republic of Korea	6 222	63	0	0	3 651	-
Malaysia	20 456	62	0	0	12 399	-
Mexico	64 802	33	20 181	10	109 412	-
New Zealand	8 269	31	2 557	10	15 945	-
Papua New Guinea	28 726	63	4 474	10	12 086	-
Peru	67 992	53	22 132	17	37 876	700
Philippines	7 665	26	10 128	34	12 024	-
Russia	809 090	49	73 220	4	755 829	5 650
Singapore	2	3	0	0	67	0
Chinese Taipei**	2 102	58	-	-	1 496	-
Thailand	18 972	37	0	0	32 117	-
United States	304 022	33	14 933	2	597 238	26 993
Viet Nam	13 797	44	1 124	4	16 087	-
<b>TOTAL</b>	<b>2 152 313</b>	<b>36</b>	<b>513 790</b>	<b>9</b>	<b>3 350 497</b>	<b>33 343</b>

Sources: FAO (2010)

\* = ISD (Hong Kong) 2003

\*\* = Forestry Bureau of Chinese Taipei (2011)

**Table 3: Trends in extent of forest 1990–2010**

Economy	Forest area (1 000 ha)				Annual change (1 000 ha/year)		
	1990	2000	2005	2010	1990- 2000	2000- 2005	2005- 2010
Australia	154 500	154 920	153 920	149 300	42	-200	-924
Brunei Darussalam	413	397	389	380	-2	-2	-2
Canada	310 134	310 134	310 134	310 134	0	0	0
Chile	15 263	15 834	16 043	16 231	57	42	38
People's Republic of China	155 020	174 879	190 923	204 740	1 986	3 209	2 763
Hong Kong, China	19	19	19	19	-	-	-
Indonesia	118 545	99 409	97 857	94 432	-1 914	-310	-685
Japan	24 950	24 876	24 935	24 979	-7	12	9
Republic of Korea	6 370	6 288	6 255	6 222	-8	-7	-7
Malaysia	22 376	21 591	20 890	20 456	-79	-140	-87
Mexico	70 291	66 751	65 578	64 802	-354	-235	-155
New Zealand	7 720	8 266	8 311	8 269	55	9	-8
Papua New Guinea	31 523	30 133	29 437	28 726	-139	-139	-142
Peru	70 156	69 213	68 742	67 992	-94	-94	-150
Philippines	6 570	7 117	7 391	7 665	55	55	55
Russia	808 950	809 269	808 790	809 090	32	-96	60
Singapore	2	2	2	2	0	0	0
Chinese Taipei**	2 102	2 102	2 102	2 102	-	-	-
Thailand	19 549	19 004	18 898	18 972	-55	-21	15
United States	296 335	300 195	302 108	304 022	386	383	383
Viet Nam	9 363	11 725	13 077	13 797	236	270	144
<b>TOTAL</b>	<b>2 130 151</b>	<b>2 132 124</b>	<b>2 145 801</b>	<b>2 152 332</b>	<b>197</b>	<b>2 736</b>	<b>1307</b>

Sources: FAO (2010)

\* = ISD (Hong Kong) 2003

\*\* = Forestry Bureau of Chinese Taipei (2011)

**Table 4: Trends in removals of wood products 1990-2009**

Economy	Industrial roundwood				Woodfuel
	Total volume (1 000 m <sup>3</sup> over bark)				
	1990	2000	2005	2009	2005
Australia	17 213	24 407	26 332	25 304	4 828
Brunei Darussalam	94	115	123	107	12
Canada	155 958	198 918	200 247	115 353	2 903
Chile	14 386	24 437	32 529	36 401	15 098
People's Republic of China	91 229	96 019	94 669	93 129	192 390
Hong Kong, China	–	–	–	–	–
Indonesia	38 366	33497	37572	36 354	62 341
Japan	29 300	17 987	16 166	16 619	92
Republic of Korea	1 139	1 592	2 350	3 176	2 477
Malaysia	41 260	24 380	25 186	20 126	2 858
Mexico	7 580	8 105	6 181	6 425	38 752
New Zealand	11 947	19 279	19 005	20 210	0
Papua New Guinea	2 655	2 309	2 614	3 040	5 533
Peru	1 073	1 511	1 742	1 347	7 343
Philippines	4 928	3 079	3 129	3 798	12 469
Russia	–	105 800	138 000	112 900	
Singapore	0	0	0	0	0
Chinese Taipei	203	35	60	44	12.6
Thailand	3 093	6 262	8 700	8 700	19 398
United States	427 200	420 619	423 456	292 091	40 437
Viet Nam	4 669	4 183	4 754	5 850	22 000
<b>TOTAL</b>	<b>852 089</b>	<b>992 498</b>	<b>1 042 754</b>	<b>800 930</b>	<b>467 430</b>

Sources: FAO (2011)

---

# References

---

**Canadian Forest Service.** 2011. (Available at: <http://cfs.nrcan.gc.ca/aboutus>).

**Central Intelligence Agency (CIA).** 2011. *The world fact book* (Available at: <https://www.cia.gov/library/publications/the-world-factbook/index.html>).

**Curran, L.M., Caniago, I., Paoli, G.D., Astianti, D., Kusneti, M., Leighton, M., Nirarita, C.E. & Haeruman, H.** 1999. Impact of El Niño and logging on canopy tree recruitment in Borneo. *Science*, 286(5447): 2184.

**Curran, L.M., Trigg, S.N., McDonald, A.K., Astiani, D., Hardiono, Y.M., Siregar, P., Caniago, I. & Kasischke, E.** 2004. Lowland forest loss in protected areas of Indonesian Borneo. *Science*, 303: 1000-1003.

**FAO.** 2011. FAOSTAT ForeSTAT database. (Available at: <http://faostat.fao.org/site/626/DesktopDefault.aspx?PageID=626#ancor>)

**FAO.** 2010a *Asia-Pacific Forestry Sector Outlook Study*. Bangkok, FAO.

**FAO.** 2010b *Global forest resources assessment 2010*. Rome, FAO.

**FAO.** 2010c *Growing green assets: removing constraints to private sector investment in forestry in Asia and the Pacific*. Bangkok, FAO.

**FAO.** 2009. *Planted forests: uses, impacts and sustainability*. Rome, FAO/CABI.

**FAO.** 2005. *Global forest resources assessment: progress towards sustainable forest management*. Rome, FAO.

**FAO.** 2004. *What does it take? The role of incentives in forest plantation development in Asia and the Pacific*. Bangkok, FAO.

**Forestry Bureau of Chinese Taipei.** 1993. Third forest inventory. Forestry Bureau, Council of Agriculture, Chinese Taipei. (Available at: <http://www.forest.gov.tw>).

**Gaia Consulting Ltd.** 2011. *Indonesia-Norway REDD+ Partnership: first evaluation of deliverables*. (Available at: <http://www.un-redd.org/>)

**Information Services Department (Hong Kong).** 2003. *Hong Kong statistical year book 2003*. Hong Kong SAR Government.

**International Forest Industries.** March 2011. Update on Russian log export tax (Available at: <http://www.internationalforestindustries.com/2011/03/17/update-on-russian-log-export-tax/>)

**Nair, CTS.** 2011. *Why pursue a green development path?* Mathrubhumi Yearbook Plus 2011. Kozhikode, Kerala, Mathrubhumi Printing and Publishing Company.

**Neilson, D.** 2007. Corporate private sector dimensions in planted forest investments. In: *The future of forests: proceedings of an international conference on the outlook for Asia-Pacific forests to 2020*. Bangkok, FAO, 2009.

**Shearman, P.L., Bryan, J.E., Ash, J., Hunnam, P., Mackey, B. & Lokes, B.** 2008. *The state of the forests of Papua New Guinea: Mapping the extent and condition of forest cover and measuring the drivers of forest change in the period 1972-2002*. University of Papua New Guinea.

**Sodhi, N.S., Koh, L.P., Brook, B.W. & Lg, P.K.L.** 2004. Southeast Asian biodiversity: an impending disaster. *Trends Ecol. Evol.*, 19:654-660.

**UN Department of Economic and Social Affairs, Population Division.** 2011. *World population prospects: the 2010 revision*. (Available at: <http://esa.un.org/unpd/wpp/index.htm>)

**UN-REDD Programme.** 2011. (Available at: <http://un-redd.com/>)

**Western Climate Initiative.** 2011. (Available at: <http://www.westernclimateinitiative.org/>)

**World Bank.** 2011. *World Bank commodity price data*. (Available at: <http://econ.worldbank.org/>)

**Yasmi, Y., Broadhead, J.S., Enters, T. & Genge, C.** 2010. *Forestry policies, legislation and institutions in Asia and the Pacific: Trends and emerging needs for 2020*. Bangkok, FAO.